

EDITED BY
JONATHAN CURRY-MACHADO
JEAN STUBBS
WILLIAM GERVASE CLARENCE-SMITH
JELMER VOS

The Oxford Handbook *of* COMMODITY HISTORY

THE OXFORD HANDBOOK OF

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About the Editors

Jonathan Curry-Machado is founding editor and coordinator of the Commodities of Empire British Academy Research Project https://commoditiesofempire.org.uk and Associate Fellow of the Centre for Latin American and Caribbean Studies (University of London). His research ranges from the history, identity, and influence of migrant engineers in nineteenth-century Cuba, in the context of transnational networks of trade, capital, and technology through comparative study of Cuba and Java and the global transfer of cane varieties to rural society on the sugar frontier in the Hispanic Caribbean.

Jean Stubbs is co-founder of the Commodities of Empire Project, Associate Fellow of the Centre for Latin American and Caribbean Studies (University of London) and professor emerita of London Metropolitan University, where she directed the Caribbean Studies Center. She is a member of the Academy of History of Cuba and past president of the regional Caribbean Studies Association and UK Society for Caribbean Studies. Since her early monograph *Tobacco on the Periphery*, recently out in a new expanded edition, she has published widely on Cuba, her specialist interests spanning tobacco, labour, gender, race, class, nation, and migration.

William Gervase Clarence-Smith, emeritus professor at SOAS University of London and former chief editor of the *Journal of Global History* (Cambridge University Press), is one of the core team of the Commodities of Empire Project. He also coordinates, with Ed Emery, the Interdisciplinary Animal Studies Initiative at SOAS University of London. He has written widely on a number of commodities, notably tree crops and animals, with particular reference to Africa and Southeast Asia. He has also published on the history of colonialism, diasporas and migration, sexuality, religion, labour, climate, manufacturing, and transport.

Jelmer Vos is lecturer in Global History at the University of Glasgow and a member of the Commodities of Empire core team. He is the author of *Kongo in the Age of Empire, 1860–1913: The Breakdown of a Moral Order* (University of Wisconsin Press, 2015). He has also published several articles and book chapters on slavery, rubber, and coffee in nineteenth- and twentieth-century Angola, as well as the eighteenth-century ivory and slave trades from Côte d'Ivoire. He is currently writing a monograph on the history of coffee cultivation in Angola (James Currey, forthcoming).

Contributors

Cátia Antunes is a Professor of History of Global Economic Networks at the Institute of History, Leiden University. Her publications include *Pursuing Empire: Brazilians, the Dutch and the Portuguese in Brazil and the South Atlantic, 1620s–1660s* (Leiden, The Netherlands: Brill, 2022), and *Merchant Cultures: A Global Approach to Spaces, Representations and Worlds of Trade, 1500–1800* (Leiden, The Netherlands: Brill, 2022).

Anna Arabindan-Kesson is Associate Professor of Art and Archaeology and African American Studies at Princeton University, with research interests in African American Art and Art of the Black Diaspora. Her publications include *Black Bodies, White Gold: Art, Cotton and Commerce in the Atlantic World* (Durham, NC: Duke University Press, 2021).

Karl Heinz Arenz is an Associate Professor at the Federal University of Pará, with research interests in Amazonian colonial social history and popular cultures. His publications include *'Valente para servir': O padre João Felipe Bettendorff e a Amazônia portuguesa no século XVII* (Belo Horizonte, Brazil: Caravana, 2022).

Ulbe Bosma is Senior Researcher at the International Institute of Social History and Professor of International Comparative Social History at the Vrije Universiteit Amsterdam. He is a founding coordinator of the Commodity Frontiers Initiative. His publications include *The World of Sugar: How the Sweet Stuff Transformed Our Politics, Health, and Environment over 2,000 Years* (Cambridge, MA: Harvard University Press, 2023), and *The Making of a Periphery: How Island Southeast Asia Became a Mass Exporter of Labor* (New York: Columbia University Press, 2019).

John L. Brooke is Emeritus Arts & Sciences Distinguished Professor of History, Warner Woodring Chair in American History, and Professor of Anthropology, and former Director of the Ohio State University Center for Historical Research. His publications include *Climate Change and the Course of Global History: A Rough Journey* (Cambridge: Cambridge University Press, 2014).

Stéphane Castonguay is Canada Research Chair in Environmental History and Professor of History at the Université du Québec à Trois-Rivières. His publications include *The Government of Natural Resources: Science, Territory, and State Power in Quebec, 1867–1939* (Vancouver: University of British Columbia Press, 2021), and *Urban Rivers: Remaking Rivers, Cities, and Space in Europe and North America* (Pittsburgh, PA: University of Pittsburgh Press, 2012).

Rafael Chambouleyron is Professor of History at the Federal University of Pará, with research interests in the colonial Amazon rainforest and frontier. His publications include *Rivers and Shores: 'Fluviality' and the Occupation of Colonial Amazonia* (Peterborough, Ontario, Canada: Baywolf Press, 2019).

Paul S. Ciccantell is Professor of Sociology at Western Michigan University, with research interests in comparative sociology, sociology of development, and environmental sociology. His publications include *Migration, Racism and Labor Exploitation in the World-System* (New York: Routledge, 2021), and *Globalization and the Race for Resources* (Baltimore, MD: Johns Hopkins University Press, 2005).

Jonathan Curry-Machado is an Associate Fellow of the Centre for Latin American and Caribbean Studies (University of London), and founding editor and coordinator of the Commodities of Empire British Academy Research Project. His publications include Global Histories, Imperial Commodities, Local Interactions (Basingstoke: Palgrave Macmillan, 2013), and Cuban Sugar Industry: Transnational Networks and Engineering Migrants in Mid-Nineteenth Century Cuba (New York: Palgrave Macmillan, 2011).

William Gervase Clarence-Smith is Emeritus Professor at SOAS, University of London, and former chief editor of the *Journal of Global History*. He has written widely on a number of commodities, with particular reference to Africa and Southeast Asia. His publications include *The Global Coffee Economy in Africa, Asia, and Latin America* (Cambridge: Cambridge University Press, 2010), and *Cocoa and Chocolate, 1765–1914* (London: Routledge, 2000).

Jim Clifford is Associate Professor of Environmental History at the University of Saskatchewan, with particular interest in the application of digital methods including historical GIS, text mining, and augmented reality to the study of industrialization and global commodities. His publications include *West Ham and the River Lea: A Social and Environmental History of London's Industrialized Marshland, 1839–1914* (Vancouver: University of British Columbia Press, 2017).

Hanne Cottyn is a Marie Sklodowska-Curie Actions Global Fellow with Ghent University, Belgium, and the University of Tarapaca, Chile, researching 'More-than-Human Histories of Rural Landscapes in the Andes'. Her publications include *Las luchas sociales por la tierra en América Latina: Un análisis histórico, comparativo y global* (Lima, Peru: Universidad Nacional Mayor de San Marcos, 2016).

Helen Cowie is Professor of History at the University of York, where she researches and teaches the history of animals. Her publications include *Victims of Fashion: Animal Commodities in Victorian Britain* (Cambridge: Cambridge University Press, 2021), and *Exhibiting Animals in Nineteenth-century Britain: Empathy, Education, Entertainment* (Basingstoke, UK: Palgrave Macmillan, 2017).

Ana Crespo-Solana is Professor and Scientific Researcher in the Institute of History of the Spanish National Research Council (CSIC), and director of the ForSEAdiscovery project, with research interests in maritime archaeology and historical GIS. Her publications include *Heritage and the Sea: Maritime History and Archaeology of the Global Iberian World (15th–18th centuries)* (Cham, Switzerland: Springer Nature, 2022), and *Mercaderes atlánticos: redes del comercio flamenco y holandés entre Europa y el Caribe* (Córdoba: UCO Press, 2009).

Anne Dietrich is a Researcher at the University of Leipzig, with research interests in the history of global commodities: in particular, the provision and consumption of coffee, sugar, and tropical fruits in the GDR, studying trade relations with socialist-oriented countries in the Global South (especially Ethiopia and Cuba). Her publications include *Navigating Socialist Encounters: Moorings and (Dis)entanglements between Africa and East Germany during the Cold War* (Berlin: De Gruyter, 2021).

Alexander Engel is Interim Professor at the Department of History at LMU Munich and *Privatdozent* at the Institute for Economic and Social History, Georg-August University Göttingen, with research interests in the history of markets, prices, and commerce, globalisation and colonial economies, and the history of capitalism. His publications include *Risikoökonomie. Eine Geschichte des Börsenterminhandels* (Frankfurt, Germany: Campus, 2021), and *Farben der Globalisierung. Die Entstehung moderner Märkte für Farbstoffe, 1500–1900* (Frankfurt, Germany: Campus, 2009).

Suraiya Faroqhi is Professor of History at Ibn Haldun University, Istanbul, with research interests in early modern Ottoman social history: in particular, women and artisan production. Her publications include *The Ottoman and Mughal Empires: Social History in the Early Modern World* (London: I. B. Tauris, 2019), and *A Cultural History of the Ottomans: The Imperial Elite and Its Artefacts* (London: I. B. Tauris, 2016).

Leida Fernández-Prieto is Distinguished Researcher in the Institute of History of the Spanish National Research Council (CSIC), with research interests in the history of agricultural science and Caribbean environmental history. Her publications include *Espacio de Poder, Ciencia y Agricultura en Cuba* (Madrid/ Sevilla: CSIC/Diputación de Sevilla, 2019), and *Cuba Agrícola: Mito y Tradición, 1878–1920* (Madrid: Departamento de Historia de América, 2005).

João Figueiroa-Rego is Vice-Director and Senior Researcher at Centre of Humanities, Faculty of Social and Human Sciences, Nova University Lisbon, with research interests in tobacco in the Iberian world. His publications include *El tabaco y la esclavitud en la rearticulación imperial ibérica (s.XV-XX)* (Évora, Portugal: Publicações de CIDEHUS, 2019).

Luly Fischer is Associate Professor of Rural and Environmental Law at the Federal University of Pará, with research interests in property and land use in the Amazon.

Sandip Hazareesingh is a Senior Research Fellow in the Faculty of Arts and Humanities at the Open University. He was founding co-director of the Commodities of Empire British Academy Research Project. His publications include *Local Subversions of Colonial Cultures: Commodities and Anti-commodities in Global History* (Basingstoke, UK: Palgrave Macmillan, 2016).

Eric Herschthal is Assistant Professor of History at the University of Utah, with research interests in slavery and abolition in the Atlantic World, the history of science and technology, and climate history. His publications include *The Science of Abolition: How Slaveholders Became the Enemies of Progress* (New Haven, CT: Yale University Press, 2021).

Karin Hofmeester is Director of Research at the International Institute of Social History, Amsterdam and Professor of Jewish Culture at Antwerp University. She is also project leader of the Global Collaboratory on the History of Labour Relations, and is researching diamonds as a global commodity. Her publications include *Handbook Global History of Work* (Berlin: De Gruyter Oldenbourg, 2018), and *Luxury in Global Perspective: Objects and Practices, 1600–2000* (Cambridge: Cambridge University Press, 2016).

Sabrina Joseph is Provost and Chief Academic Officer of the American University in Dubai, with research interests in the Middle East and environmental history, encompassing land use and natural resource management. Her publications include *Commodity Frontiers and Global Capitalist Expansion: Social, Ecological and Political Implications from the Nineteenth Century to the Present Day* (Cham, Switzerland: Palgrave Macmillan, 2019).

Jed O. Kaplan is Professor of Geoscience at the University of Calgary, with research interests in human-environment interactions, palaeoenvironmental change, regional climate and land-atmosphere interactions, and land use and anthropogenic land cover change.

Santiago de Luxán Meléndez is Emeritus Professor at the University of Las Palmas de Gran Canaria, with research interests in Iberian tobacco. His publications include *Povoamento, tabaco, açúcar e arte na História das ilhas do Atlântico Médio* (Azores: CHAM, 2021), and *El tabaco y la esclavitud en la rearticulación imperial ibérica (s.XV-XX)* (Évora, Portugal: Cidehus, 2019).

Harro Maat is Associate Professor at Wageningen University, with research interests in social patterns and institutional arrangements emerging from practices of growing food and other agricultural products. His publications include *Local Subversions of Colonial Cultures: Commodities and Anti-commodities in Global History* (Basingstoke, UK: Palgrave Macmillan, 2016).

Joshua MacFadyen is Associate Professor in the Faculty of Arts and Canada Research Chair in Geospatial Humanities at the University of Prince Edward Island, with research interests in history and current problems of food and energy systems, and the

application of new digital humanities tools. His publications include *Flax Americana: A History of the Fibre and Oil that Covered a Continent* (Montreal: McGill-Queen's University Press, 2018).

Joyce A. Madancy is Professor of History at Union College, with research interests in state-society relations in nineteenth- and twentieth-century China. Her publications include *The Troublesome Legacy of Commissioner Lin: The Opium Trade and Opium Suppression in Fujian Province, 1820s to 1920s* (Cambridge, MA: Harvard University Press, 2004).

Leonardo Marques is a Professor in History at the Fluminense Federal University, Niterói, with research interests in Atlantic slave trade and the history of commodities. His publications include *História das Mercadorias: Trabalho, Meio Ambiente e Capitalismo Mundial (ss XVI-XIX)* (São Leopoldo, Brazil: Casa Leiria, 2023), and *The United States and the Transatlantic Slave Trade to the Americas, 1776–1867* (New Haven, CT: Yale University Press, 2016).

Paul R. Mullins was Professor of Anthropology at Indiana University-Purdue University Indianapolis, and former president of the Society for Historical Archaeology. His publications include *The Archaeology of Consumer Culture* (Gainesville: University Press of Florida, 2011). Paul died shortly before the publication of this *Handbook*.

Ghulam A. Nadri is Professor of History at Georgia State University, with research interests in indigo and Indian history. His publications include *The Political Economy of Indigo in India, 1580–1930: A Global Perspective* (Leiden, The Netherlands: Brill, 2016).

Franziska Ollendorf is a Researcher at the Leibniz Centre for Agricultural Landscape Research, in the Sustainable Land Use in Developing Countries working group. Her research interests include the political economy of cocoa, deforestation-free supply chains, agroecology, and food system transitions.

David Pretel is Lecturer in Global History and Beatriu Pinos-MSCA-COFUND Fellow at the Pompeu Fabra University, Barcelona. His research interests include the global history of Latin American commodities, intellectual property rights, and the entangled histories of technology, capitalism, and the environment in the Caribbean. His publications include *Technology and Globalisation: Networks of Experts in World History* (London: Palgrave Macmillan, 2018), and *The Caribbean and the Atlantic World Economy: Circuits of Trade, Money and Knowledge, 1640–1914* (Basingstoke, UK: Palgrave Macmillan, 2015).

Jonathan E. Robins is Associate Professor of Global History at Michigan Technological University, with research interests in agricultural commodities and the industries they serve. His publications include *Oil Palm: A Global History* (Chapel Hill: University of North Carolina Press, 2021), and *Cotton and Race across the Atlantic: Britain, Africa, and America, 1900–1920* (Rochester, NY: University of Rochester Press, 2016).

Corey Ross is Director of the Institute for European Global Studies at the University of Basel, with research interests in imperialism and global environmental history in the 19th and 20th centuries. His publications include *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017).

François Ruf is Researcher at the Centre for International Cooperation in Agronomic Research for Development (CIRAD), with research interests in cocoa, sustainability, and food security. His publications include *From Slash and Burn to Replanting: Green Revolutions in the Indonesian Uplands* (Washington, DC: World Bank, 2004), and *Booms et crises du cacao—Les vertiges de l'or brun* (Paris: Karthala, 1995).

Vicent Sanz Rozalén is Professor of Contemporary History at the Jaume I University, Castelló de la Plana, with research interests in tobacco and the social history of work. His publications include *Resistencia, delito y dominación en el mundo esclavo. Microhistorias de la esclavitud atlántica (s.XVII-XIX)* (Albolote, Spain: Comares, 2019), and *Social History of Spanish Labour* (New York: Berghahn Books, 2007).

David A. Smith is Professor of Sociology at University of California—Irvine, with research interests in comparative sociology, world systems analysis, and development. His publications include *Nature, Raw Materials, and Political Economy* (Amsterdam: Elsevier, 2005).

Jean Stubbs is Professor Emerita of London Metropolitan University, and an Associate Fellow of the Centre for Latin American and Caribbean Studies (University of London). She was founding co-director of the Commodities of Empire British Academy Research Project. Her publications include *Tobacco on the Periphery: A Case Study in Cuban Labour History, 1860–1958* (London: Amaurea Press, 2023).

Steven C. Topik is Distinguished Professor of History at the University of California—Irvine, with research interests in Latin America and World history through the study of commodities, especially coffee. His publications include *From Silver to Cocaine: Latin American Commodity Chains and World History* (Durham, NC: Duke University Press, 2006), and *The Global Coffee Economy in Africa, Asia, and Latin America* (New York: Cambridge University Press, 2004).

Enrique Uribe Leitz is a Researcher at the Centre for International Cooperation in Agronomic Research for Development (CIRAD), and completed his doctorate at Wageningen University, researching sustainability in global cocoa commodity chains. His publications include *EU Development Cooperation and Ethical Certification Schemes: Impact, Transparency and Traceability* (Brussels: European Union, 2021).

Marieke van Erp leads the Digital Humanities Research Lab at the KNAW Humanities Cluster, working on strengthening computational methods in humanities research. In 2023, she was awarded an ERC Consolidated grant to research improving language and semantic web technologies to create better knowledge graphs for humanities research.

Eric Vanhaute is Professor of Economic and Social History and World History at Ghent University, where he heads the Communities, Comparisons, Connections research group. He is a founding coordinator of the Commodity Frontiers Initiative. His publications include *Peasants in World History* (New York: Routledge, 2021).

Jelmer Vos is Lecturer in Global History at the University of Glasgow, with research interests in slavery, rubber, and coffee in Angola. His publications include *Kongo in the Age of Empire, 1860–1913: The Breakdown of a Moral Order* (Madison: University of Wisconsin Press, 2015).

Elizabeth Zanoni is Associate Professor of History at Old Dominion University, with research interests in the history of food and migration. Her publications include *Migrant Marketplaces: Food and Italians in North and South America* (Chicago: University of Illinois Press, 2018).

Michael Zeuske is Emeritus Professor of Iberian and Latin American History (University of Cologne), and Senior Research Professor and Principal Investigator at the Bonn Centre for Dependency and Slavery Studies, University of Bonn, with research interests in micro- and global histories of slaveries. His publications include *Handbuch Geschichte der Sklaverei. Eine Globalgeschichte von den Anfängen bis heute*, 2 vols. (Berlin/Boston: De Gruyter, 2019), and *Resistencia, delito y dominación en el mundo esclavo. Microhistorias de la esclavitud atlántica (s.XVII-XIX)* (Albolote, Spain: Comares, 2019).

INTRODUCTION

Researching Commodity History

JONATHAN CURRY-MACHADO AND JEAN STUBBS

In our contemporary world it is nearly impossible to escape from a dependency on commodities. We have become reliant on goods that are bought, transported, and sold—as food, industrial components, even entertainment—at an ever-greater remove from their geographical origins. In recent years, there has been a growing genre of historical, sociological, geographical, and anthropological scholarship in which the story of human societies has been told through the history of such commodities. Such studies underscore the importance of the cultivation, extraction, processing, and trade of many ubiquitous items of consumption forging our modern world. The study of commodities, their interactions, and their impact on local, regional, and global developments has become of central importance in researching and writing global history and thereby gaining a fuller understanding of the complex historical processes to which they have been so integral.

Through commodity chains, circuits, and networks, we can better trace global interconnections and social and economic relations, linking cultivation to consumption by way of manufacture and trade. From being nomadic hunter-gatherers, humans settled and began to farm the land, gradually making agricultural innovations that enabled ever larger quantities of crops to be cultivated, while increasing global trade resulted in their distribution throughout the world. In the process, and with the development of capitalism, human societies became bound together on an increasingly global scale, while the production of commercial crops led to profound ecological changes. Asia and Europe became connected from the Middle Ages, with the east-west trading of goods along the silk road and the spice route. From the sixteenth century, commodities were at the heart of the establishment by European powers of global empires, with the triangular trade of slaves, sugar, and tobacco connecting Africa and the Americas. From the nineteenth century on, an ever-more-integrated global capitalist system was created, highlighted even further when challenged by twentieth-century socialism. The processes of commodity extraction, trade, processing, and consumption have resulted

in the emergence of a global economy and society where events in one hemisphere directly influence the other, and the most remote locations are often the setting for the acquisition of raw materials and products demanded by industry and consumers the world over.

Commodity history is today a fast-developing field of study. Within it, not only are commodities followed as they make their way from land and water, through processing and trade to eventual consumption, so also local and global histories are understood and written through a commodities lens. Collaborative, comparative, and interdisciplinary research and the use of new informational technologies are also becoming increasingly important, and whereas many individual researchers continue to focus on particular commodity cases, they often do so within the context of projects that bring them together with others working on different commodities and regions, using various theoretical and methodological approaches. It is this interdisciplinary and collaborative approach that is making commodity history central to the development of local and global historical analysis and has seen the recent emergence of international advances towards accessing large quantities of historical data, across many different commodities and geographical regions. This is what has shaped our approach to the *Handbook*, departing from a mere compendium of single-commodity studies to explore broader empirical and conceptual underlying themes, with contributions authored by scholars who have been involved in these developments in a range of countries and linguistic regions. Here they discuss the state of the art in their field, draw on their own work, and signal lacunae for future research.

Conceptual and Collaborative Antecedents

In *Das Kapital*, Karl Marx defined a commodity as 'an external object, a thing which through its qualities satisfies human needs of whatever kind'.[1] He went on to explore commodities as a combination of their use value (their worth for the satisfaction of those human needs) and exchange value (the price that the market places on them), and this formed the basis of his understanding of the mechanisms of the capitalist system. Today, however, commodities are generally understood more loosely as traded goods, to be found wherever any form of exchange occurs.

Commodities defined in this way have been present in one form or another throughout economic history. Nevertheless, it has taken some time for a specific focus on commodities to emerge as being fundamental for our understanding of how the global system has evolved and functioned. Most current work in commodity history owes a debt to certain foundational texts—as can be attested by the frequency with which these are referred to in the chapters of the *Handbook*. In 1966, Fernand Braudel, leading scholar of the French Annales School, published his influential two-volume study of the

Mediterranean world during the early-modern Spanish empire under Philip II. In the first volume, he sought to establish a model for economic history, exploring the key role of the circulation of precious metals as a basis for trading systems, providing a form of readily established exchange value, before turning to a detailed examination of two key commodities of the early-modern period—pepper (an example of a luxury) and grain (a globally essential food source).[2]

A decade later, in the Anglophone world, US scholars came to the fore. In their 1977 article in the journal of the Fernand Braudel Center, historical sociologist Terence Hopkins and social and economic historian Immanuel Wallerstein laid out the basis for a world systems approach to history.[3] In this, commodities again occupied a central role, and in their sequel journal article in 1986 they explicitly looked at how commodity chains established the connections through which the global economy had developed prior to 1800.[4] The chains approach became systematized in the study of the contemporary global system through global commodity chains analysis. This was itself derived from world systems theory—which was initially more influential in sociological studies, offering as it did a framework for the analysis of global industries at a time when much attention was being given to the increasingly globalized nature of the world economy. Testimony to this in the 1990s are the volume edited by sociologists Gary Gereffi and Miguel Korzeniewicz—*Commodity Chains and Global Capitalism*—and Gereffi's *A Commodity Chains Framework for Analyzing Global Industries*.[5]

Gradually, the approach came to be more influential in historical studies, as exemplified in *From Silver to Cocaine*, edited by Stephen Topik, Zephyr Frank, and Carlos Marichal, the contributions to which explored the various ways in which Latin American commodity chains contributed to the building of the global economy from 1500 to the present times.[6] For Chapter 1 in this volume, Topik teams with two sociologists (Paul S. Ciccantell and David A. Smith) to chart how the global commodity chain approach has continued to develop, including the more recent global value chain approach.

Similar developments were taking place within the francophone *approche filière*. Whereas the two approaches cover much of the same general field, they have differed in their political and theoretical grounding as well as geography and language. The *approche filière* tradition originated in the study of contract farming and vertical integration in French agriculture in the 1960s and was soon applied to the analysis of French colonial and post-colonial state agricultural development policy. The initial focus was on local production systems and consumption of select export commodities such as rubber, cotton, coffee, and cocoa, and while a more anthropological approach in *filière* work dates from the 1970s with research on Sahel grain markets in the context of food crisis, it was not until the 1980s that areas such as international trade and processing were included. Strikingly, it is argued—contrary to the commodity chains approach, which works under a more unified theoretical framework—*approche filière* straddles different schools of thought, with a loosely knit set of studies using the *filière* (or chain) of activities and exchanges as a practical tool of analysis for applied research rather than a theory. In Chapter 2, scholars involved from a development studies

perspective—François Ruf, Franziska Ollendorf, and Enrique Uribe Leitz—discuss the differences as well as similarities with anglophone commodity-chain studies.

Although commodity chains (or *filières*) certainly drew attention to the complex social, political, economic, environmental, and cultural interactions in which these are set, as research has developed there has been an increasing trend towards focusing more explicitly on such interactions. By the early twenty-first century, with an increasing number of historians working in this direction, the time was ripe for the development of collaborative projects seeking to further commodity-focused historical research. In 2007, the Commodities of Empire (CoE) project was founded with British Academy recognition and funding and has prioritized facilitating international research among scholars of the 'Global North' and the 'Global South'. The express aim has been to further our global understanding from multiple local perspectives of the networks through which commodities circulated both within and in the spaces between empires. A particular focus of attention was on the local processes originating in Africa, Asia, the Caribbean, and Latin America, which significantly influenced the outcome of the encounter between the world economy and regional societies. The CoE workshops and *Working Papers* series have continued since then to help provide a focus for an international network of scholars to further the development of commodity history as a specific field of global study. A special edition of the *Journal of Global History* in 2009 and the publication of an edited collection *Global Histories, Imperial Commodities, Local Interactions* in 2013 contributed to this.[7]

With the increasing number of research projects dealing with the social, economic, and cultural history of agricultural, mineral, and manufactured commodities, in 2009 the 'Cultural Foundations of Integration' Centre of Excellence at the University of Konstanz and International Institute of Social History (IISH) in Amsterdam held a joint workshop on the history of commodities and commodity chains. The workshop provided an opportunity for advancing the development of international collaborative research connections, which continued to develop over the coming years. The CoE project and the Technology and Agrarian Development Group at Wageningen University in the Netherlands joined forces in 2009 on an 'anticommodities' research programme, which focused on modes of indigenous production as sustainable practice and resistance against agrarian commercial capitalism during the colonial era. A turn to the space in which commodity exploitation occurs, and the people that this involved, was behind the conceptualization of the 'anticommodity', 'defined as an enduring form of production and action in opposition either to actual commodities and their existing functions, or to wider social practices of commodification, rather than simply a momentary form of protest or reaction'.[8] Although originally intended as a somewhat controversial heuristic, the concept has nevertheless found its way into more recent scholarship. This has particularly been in relation to issues around food security and food-crop commodification, owing much to the intellectual heritage of anthropologist James Scott's *Weapons of the Weak* and the work of geographer Judith Carney and environmentalist Richard Rosomoff on *Black Rice* and *In the Shadow of Slavery* documenting Africa's botanical legacy in the Americas, evidencing a concern for subaltern technologies and actors.[9]

The origins and continuing impact that the anti-commodity concept has had in historical research is explored in Chapter 3, by historians Sandip Hazareesingh and Harro Maat, directors of the original anti-commodities programme.

The collaborative development of commodity history took another stride forward with the founding in 2014 of the Commodity Frontiers Initiative (CFI)—bringing together a network of researchers and research centres from around the world. In doing so, they were influenced by the work of historical sociologist Jason Moore, whose article published in 2000 in the journal of the Fernand Braudel Center introduced the concept of commodity frontiers to understand the centrality of sugar in the expansion of the early-modern world economy.[10] Although building on Hopkins's and Wallerstein's earlier world-systems work, Moore turned attention away from the focus on the commodities themselves, and their chains, to the spaces in which their exploitation occurred and the long-term impact of this in terms of sustainability and the environment. A similarly influential work was that of economist Edward Barbier's *Scarcity and Frontiers*, looking at how the availability of resources and their eventual exhaustion has led to productive zones adapting and moving elsewhere, and in so doing defining the course of human civilization.[11]

Following through on this thinking, CFI set out an agenda that was interdisciplinary in nature, embracing anthropological, economic, sociological, political, scientific, ecological, and developmental as well as historical perspectives. The aim was to systematically catalogue, study, and analyse a wide range of commodity frontiers over the past six hundred years, examining the role of the countryside and its people in the history of global capitalism.[12] In 2020, the *Commodity Frontiers Journal* was launched. In Chapter 4, Bosma and Vanhaute explain the concept of commodity frontiers and the development of the CFI, and several others, including Sabrina Joseph in Chapter 18 on the United Arab Emirates, provide examples of the historical application of the concept and some of the new methodologies that the CFI has been helping develop.

Over the same period, a number of other collaborative research initiatives broadened the reach of commodity history and some of those involved have also contributed to the *Handbook*. During 2011 and 2012, the Global History and Culture Centre at the University of Warwick hosted an international network and a series of workshops and conferences exploring global commodities and the material culture of early-modern connections. The aim was to bring together the methodologies of global history and material culture to analyse the part played in the development of global connections by material objects, in particular traded commodities, and to encourage transregional, global, and interdisciplinary research, alongside intercultural dialogue. The author of Chapter 5 in this volume, Suraiya Faroqhi, was one of the partners in that initiative. A leading scholar in Ottoman history, she here looks at the role of Ottoman silks in early-modern trading routes.

While such projects were moving the bounds of commodity history back to earlier time periods, others began looking to incorporate more systematically than had hitherto been the case the new technological and methodological possibilities of harnessing 'big data'. Although a primary focus of IISH is global labour history, in recent years

much of the research emanating from there has been combined with a commodity focus—along with a strong commitment to the development of several large-scale, international, collaborative programmes. One of these is the Global Collaboratory on the History of Labour Relations, in which work and commodities are inextricably intertwined, and labour itself can be seen as a commodity, as Karin Hofmeester, director of the Collaboratory, explores in Chapter 15.

From 2014, an international collaboration between York University and the University of Saskatchewan in Canada and the University of Edinburgh and University of St Andrews in Scotland resulted in 'Trading Consequences'. This has seen the development of a platform providing access to a wealth of data mining of historical documents related to international commodity trading, and its impact on the economy and environment. The environmental and digital historian Jim Clifford, who was one of the leaders of that project, co-authored Chapter 28 with Joshua MacFadyen, whose expertise is in geospatial communications, and environmental historian Stéphane Castonguay, to demonstrate the potential applications of historical GIS (geographic information systems) to commodity history.

Given the wide range of commodity-related historical research that is now being undertaken, the *Handbook* comes at a timely moment in the development of commodity history. On the one hand, the tendency towards 'following the thing'—in which commodities themselves are traced from cultivation and extraction through processing and trade to ultimate consumption—remains as prevalent as ever but is resulting in increasingly sophisticated understandings of the global histories that commodities have enabled. On the other, there is the historical research that looks beyond the commodities themselves, to the people and spaces from and through which these commodities are extracted, moved, and ultimately consumed. Often, locally focused studies are providing in-depth insights that can be brought together comparatively for a more nuanced understanding of historical global processes.

Following the Thing

In 2004, cultural geographer Ian Cook described the process of tracing the global commodity chain of the papaya fruit from farm to consumer as 'following the thing'.[13] Cook was writing from a radical social geographic perspective, seeking to 'de-fetishize' contemporary commodities, by reconnecting producers to distant consumers in the context of the globalized food (and other commodity) chains of the late twentieth and early twenty-first centuries. But the description is an apt one for much commodity history research—which at its simplest level continues to be primarily about tracing the global paths and interconnections taken by the tangible material goods that lie at the heart of our trading systems.

An early influential work in this vein, cited in several chapters of the *Handbook*, was anthropologist Sidney Mintz's *Sweetness and Power*, which tells the story of how sugar

became transformed from being a luxury into a necessity of modern life—changing the course of world capitalism and industry in the process.[14] Other studies followed, seeking to trace the rise of the modern world and global capitalism through specific commodities. In *Tobacco in History*, Jordan Goodman traced how a 'poor man's crop' had conquered the world; while Iain Gately, in *Tobacco*, argued that tobacco was the driving force behind the establishment of American colonies, Dutch merchant networks, and the African slave trade.[15]

The collection of essays on *The Global Coffee Economy* edited by William Gervase Clarence-Smith, one of the co-editors of this volume, together with Topik analysed coffee markets and societies over the past five centuries. Contributors examined 'the creation and function of commodity, labour, and financial markets; the role of race, ethnicity, gender, and class; the interaction between technology and ecology; and the impact of colonial powers, nationalist regimes, and the forces of the world economy in the forging of economic development and political democracy'.[16] It was an impressive task for one plant, the cultivation of which has spread throughout the tropical regions, and whose consumption has become commonplace throughout the temperate developed world.

Cotton also took centre stage in a series of more recent publications. In *Cotton*, Giorgio Riello traced how this textile drove a historical globalization that can be dated from as early as 1000 CE stretching to the present day. He explored this earlier globalized economy, and how it became transformed from the eighteenth century, with cotton leading European industrialization;[17] and Sven Beckert, in *Empire of Cotton*, more explicitly tied the development of global capitalism to this single commodity.[18] In similar fashion, Erika Rappaport, in *A Thirst for Empire*, showed how the global tea industry influenced the international economy and the rise of mass consumerism;[19] while Ulbe Bosma, in *The World of Sugar*, explored 'how the sweet stuff transformed our politics, health, and environment over 2,000 years'.[20]

Not everyone felt the need to lay such expansive claim to the importance of a single commodity in order to study its history in depth. In *Cocoa and Chocolate*, Clarence-Smith traced the cocoa commodity chain from planting to its ultimate consumption—following the thing over the long nineteenth century.[21] In *Banana Cultures*, John Soluri focused on the Central American banana cultivation and its North American consumption from the late nineteenth century to the present day, and its contribution to the wider history of twentieth-century globalization, with its impact on rural livelihoods, local economies, and biodiversity.[22] Similarly, Paul Gootenberg followed the story of *Andean Cocaine*, from its beginnings as a nineteenth-century medical commodity through its twentieth-century repression and late-twentieth-century resurgence.[23] Several of the chapters in the present volume exemplify such approaches, through their commodity case studies: the commodity chain of coffee (Chapter 1), the *filière* of cocoa (Chapter 2), palm oil (Chapter 13), and opium (Chapter 23).

It is not only commodity extraction that can be located in clearly defined geographic spaces. Commodity trade occurs through merchant networks, the nodes of which are ports—which have themselves become the subject of commodity-related

research. This has included wide-ranging collaborative and comparative projects, such as that which brought together port historians from across the Atlantic world and resulted in publications such as the collection by Miguel Suárez Bosa on *Atlantic Ports and the First Globalisation*[24] and Bosma and business historian Anthony Webster's *Commodities, Ports and Asian Maritime Trade since 1750*.[25] In Chapter 6, building on their work on Dutch and Portuguese imperial history, Cátia Antunes and Jelmer Vos explore the synergy between commodities and port cities from the perspective of commodity chains, identifying mutual dependencies. They illustrate this by looking in particular at Luanda's emergence as a port city through its intersectional co-dependency on several commodities in ways that are central to the development of other ports.

Rather than isolating single linear commodity chains, many studies are increasingly pointing towards the interaction between these, and the way in which they form temporal and spatial 'networks' or 'webs' with other commodities and industries. More expansive approaches can be seen in, for example, Barbara Hahn's *Making Tobacco Bright* and MacFadyen's *Flax Americana*.[26]

Other analyses follow commodities to look explicitly 'within, beneath, and beyond' the bounds of nations and empires—towards transnational and transimperial interconnections, as the present authors, Curry-Machado and Stubbs, have explored in their own research on sugar and tobacco, respectively.[27] This has resulted in the idea of different broad regional spaces defined by the commodity-driven interconnections crossing these: an Atlantic space, a Pacific space, and an Indian Ocean space. In Chapter 7 of this *Handbook*, Santiago de Luxán Meléndez, João de Figueiroa-Rego, Vicent Sanz Rozalén, and Stubbs draw on their collaborative work of the past decade documenting the centrality of tobacco and the tobacco monopolies in shaping the Iberian empires from the seventeenth to the nineteenth centuries, embedded as they were in transimperial and transcolonial connections in territories across the Americas, Africa, and Asia.[28]

Such approaches are enabling a deeper historical understanding of the functioning and development of the global economic system, uncovering new areas of research and challenging existing assumptions. In Chapter 8, Alexander Engel explores how futures trading—now a defining feature of the contemporary capitalist system—emerged much earlier than was originally thought. A heightened sense of competition and time as a valuable resource prompted the acceleration of trade in the eighteenth century, and standardization of forward contracting in the mid-nineteenth century made commodity trading more abstract and speculative.[29] His chapter comes as a timely follow-up to Chapter 7, which features the Spanish *situado*—in essence, a system of situating advance finance within and across Spain's colonies, with silver from the Viceroyalty of New Spain playing a key role. This can be seen as a precursor to the advance credit practices evidenced in tobacco agriculture to this day, and perhaps to futures trading, whose imprint coincided with the late-nineteenth-century switch from the silver to the gold standard.

A significant and welcome departure in the *Handbook* from this focus on commodities and the rise of global capitalism is Chapter 9, in which Anne Dietrich builds on her knowledge of the history of the German Democratic Republic to chart that of commodities across the twentieth-century socialist world in juxtaposition to the fast-globalizing dominant capitalist world. Her focus is on how Eastern bloc countries attempted to guarantee stable commodity flows through trade among member states of the Council for Mutual Economic Assistance (CMEA), which came to embrace socialist-leaning countries of the Global South, and she homes in on several facets of this: grain supply in the Soviet Union and China, cash crops in the Global South, CMEA energy networks, consumer goods in Eastern Europe, and sugar in Cuba.

Production is very often at the fore in commodity history, and several chapters here explore changes in production over time and space. In Chapter 10, Leonardo Marques looks at mining frontiers of the Iberian Americas—New Spain, New Granada, Peru, and Brazil—with a focus on changing labour regimes, technology, and environmental impact over time and space. Others have studied the different mechanisms that were stimulated by and became essential for commodity production and trade—such as the development of technologies, as explored by David Pretel and Lino Cambrupí in their *Technology and Globalisation*.[30] In Chapter 11, Pretel explores the technological history of export commodities in the processes of extraction and processing in the Global South, demonstrating this with case studies in the industrial treatment of raw materials in Asia, Africa, and Latin America, notably sugar, silver, henequen, and tree products. He highlights the persistence of traditional techniques and the technological connections across regions and collaboration of local and imported expertise. He also calls for a technological history of commodity production.

In similar fashion, the plantation-based system of production is interrogated in Chapter 12 by Ghulam A. Nadri. Influenced by the work of those studying production systems related to specific commodities—such as Bosma, who has explored the complex notion of plantation as applied to Asian sugar[31]—he interrogates change in how the concept of the plantation has been applied as an analytical framework in commodity history. He argues that Indian indigo production in colonial India, while being based primarily on peasant cultivation, should nevertheless be considered a form of plantation in which peasants produced the crop for European planters—an argument that echoes in many other crops and regions around the world.

In Chapter 13, Jonathan E. Robins widens the production web to look at the relationship between primary commodities and industrial consumers. He draws on his work on palm oil, once an early-modern luxury and today an important ingredient in manufacturing—showing how this drove demand, new forms of production, and expansion into new areas, while linking multiple industries and sites of production. He argues that its industrial success owed more to factors influencing its production cost than its material properties, and it was the emergence of a plantation system that consolidated palm oil's role in global history.

People and Spaces

Another foundational text for commodity history—as can be attested by the frequency with which it is referred to in chapters of this *Handbook*—is Arjun Appadurai's *Social Life of Things*.[32] Here commodities are seen not so much in the economic connections that have been established through them as in the social and cultural settings in which they have gained meaning, and to which they have given meaning. Commodities did not, of course, move themselves around the world. They depended on people not only to cultivate, extract, and process them but also to act as the conduits through which they were moved on their journeys to their ultimate points of consumption. Commodities had a profound social impact, partly through processes of migration tied to commodity frontiers successively exploiting new territories. The trading routes were themselves established and maintained by networks of diasporic merchants. Building on earlier work such as that of Philip Curtin into such trade diasporas, historians like Roger Knight have been uncovering the human stories of those who were responsible for the development of these global interconnections.[33]

There were extensive global migrations of people, some of them free, but many coerced. In Chapter 14, Michael Zeuske, co-editor of *Bonded Labour*, takes a longue-durée approach to explore the connection between the various forms of slavery and commodification—seeing this as a process that rendered slaves as human or 'talking commodities'.[34] The broader category of labour as a commodity is subsequently addressed by Hofmeester in Chapter 15. Drawing on her previous work, she takes as her point of departure foundational texts by Adam Smith, Marx, and Karl Polanyi.[35] Hofmeester then expands the debate beyond wage labour to all kinds of labour, from unpaid domestic work to slave labour. She provides a case study illuminating the changing work regimes in rough diamond production in India, Brazil, and South Africa from the seventeenth to the twentieth century.

In Chapter 16, our attention is turned from diamonds to landrush, in which Hanne Cottyn historicizes processes of land-rights commodification, and the struggles of rural communities over their rights to their lands. She begins with a theoretical discussion of the emergence of modern land-rights regimes, related transformations, and conflicts over multiple parallel existing land rights, demonstrating an uneven global trajectory of intensified commodification since the nineteenth century. Cottyn draws on her own empirical research in Andean communities in Bolivia to highlight rural trajectories that, through resistance and negotiation, have managed to remain outside the scope of land privatization.

The history of science and environmental history have also played a significant role in commodity history. For example, Stuart McCook, in his history of the 'coffee leaf rust' disease, shows how the global transfer of commodity-crop plants thanks to scientific knowledge circuits, also resulted in the global spread of pathogens.[36] Similarly, in Chapter 17, Leida Fernández-Prieto explores how such local and global

knowledge circuits were interconnected, through her case study of the control and eradication of sugar cane mosaic virus in Cuba and Puerto Rico. In this, she highlights the interconnections between experts, and between local and global strategies, for the generation of new scientific knowledge.

In sum, while much of commodity history continues to 'follow the thing', in so doing it is leading historians to look towards the interconnections that this is revealing: the people involved and the spaces through which they move. This has included the mapping and surveying of lands on the part of colonial authorities, scientists, and states, motivated by political and economic interests. In Chapter 18, Joseph documents this for the Trucial States in the early part of the twentieth century through British initiatives, showing how these played a pivotal role in the emergence of the oil frontier. The importance of who controls the land and the ways in which this is integrally tied to commodity extraction can also be seen in Chapter 19, in which Rafael Chambouleyron, Luly Fischer, and Karl Heinz Arenz examine land appropriation for the production of commodities and the social consequences of this appropriation, focusing mainly on Amazonian cacao from the mid-seventeenth through to the late nineteenth century. They demonstrate how the same commodity entailed different forms of land use, with diverse environmental and territorial consequences.

Environment and Consumption

The concentration on the role played by local actors in the production of global commodities in frontier zones has contributed to a 'glocalizing' trend in commodity history research to explain political, socio-economic, and environmental impacts. This can be seen, for example, in what has been described as the 'telescopic' approach of Katerina Teaiwa, whose *Consuming Ocean Island* on the remote Pacific island of Banaba explores the material and economic impact on local lives and culture that resulted from the extraction of phosphates coming from guano in order to service global industry.[37] Likewise, in *Kongo in the Age of Empire,* Vos sees the extraction and trade from Kongo of the global commodity of rubber through the history of local and migrant traders, missionaries, and the indigenous inhabitants—a global trade emerging from local dynamics.[38]

Importantly, as Moore stated, 'the most significant commodity frontiers were based on the exploitation of the environment'.[39] Although hardly a new observation, given a number of earlier historical studies focusing on this (such as Warren Dean's environmental history of Brazilian rubber), what is clear is that the historical ecological impact of commodities is coming under increasing scrutiny.[40] In Reinaldo Funes's *From Rainforest to Cane Field in Cuba*, ecological change, especially deforestation, is closely linked to the rise of the sugar industry.[41] More recently, Corey Ross has offered a more general environmental history, looking at the ecological cost of the growth in tropical commodity production since the nineteenth century.[42]

In Chapter 20, Ross articulates this growing environmental approach to commodity history as 'the ecological life of things'. He covers three principal themes—the economics of resource depletion, spatial teleconnections of markets, and ecological ramifications of specialization—that have led to an unprecedented exploitation of land, water, plants, animals, and soils.

This ecological turn has resulted in a deeper understanding of the ways in which commodities are changing landscapes and impacting the human relationship with nature. It is also informing recent debates around the Anthropocene, leading to questions of how far back this can be traced, and what part in it was played by commodities produced and extracted for global commerce and consumption. A detailed look at this in the context of commodities, carbon, and climate can be found in Chapter 21, co-authored by John L. Brooke, Eric Herschthal, and Jed O. Kaplan. The chapter reviews the long history of climate change and commodity production through the lens of human-derived, or anthropogenic, carbon emissions, which may have begun in advancing agricultural societies six to seven thousand years ago, with a focus on the early-modern Caribbean. They close by reviewing the rise of emissions through the 'Great Acceleration' after 1945 and the recent trajectory of energy decarbonization.

It is through commodities that we come to understand ourselves and our interactions with others and the world. Commodities as 'things' have to be produced by people, in spaces that have become defined—at times catastrophically so—by the ways in which production has been carried out; they have formed the basis of our global movements and exchanges; and ultimately fulfil their purpose in consumption. In so doing they have become how we define our lives, as Frank Trentmann has shown.[43] The commodities we consume, how, and with what consequences, are unquestionably of paramount importance for understanding society and culture. Animals in this context have supplied dietary needs, been used in producing goods from clothing to fertilizer, and harnessed to transport and process major commodities. In their changing role in global trade, animals themselves have been commodified, posing ecological and ethical issues, as animal historian Helen Cowie shows in Chapter 22. She illustrates this with a case study of the Pacific fur seal, which was hunted to the point of extinction in the nineteenth century.

The history of drugs and food is an exciting new field in commodity history, and the central place of the production, trade, and politics of control of psychoactive drugs in imperial and global trade and production is broached in Chapter 23 by Joyce A. Madancy. She explores this with a particular focus on opium, analysing responses to its commerce in India, Britain, and China in the final decade of the triangular trade, highlighting how differences in Indian and Chinese production methods reveal strengths and weaknesses in the political, social, and economic structure of each society. Food history has likewise increasingly adopted a commodity-history approach to global research on foodways and food systems from 'farm to fork'. In Chapter 24, food historian Elizabeth Zanoni demonstrates how food commodities are embedded in broader political, economic, and cultural milieus linked to other geopolitical dynamics such as migration, empire—and

nation-building, industrialization, and inequitable political and labour regimes, featuring one Italian family's entrepreneurial history in South America.

Methodological Challenges

Some of the arguably most challenging developments within commodity history are bound up with interdisciplinarity and new methodologies, ranging from archaeology, art history, and material culture to the recent technological breakthroughs in accessing big data. Of course, archaeology has always been a close ally of history, and it has had a key role to play in commodity history, examining the ways in which people have variously consumed commodities and how their meanings are constructed and contested. Chapter 25 by Paul R. Mullins, who died shortly before the publication of this *Handbook*, pushes the boundaries of historical archaeology as applied to African American commodity consumption in racially segregated nineteenth- and twentieth-century society. Archaeologies of commodification, he concludes, lend themselves to an interpretation of prosaic things that are intersection points between producers and consumers embedded in global structural, social, and ideological processes. Meanwhile, in Chapter 26, art historian Anna Arabindan-Kesson discusses commodities through the methodology of materiality, engaging with the physical substance of a commodity and its visual representation. Her special focus is on the representation of cotton and its geographies of connection to commerce, colonialism, and slavery.

Computational technology is advancing commodity history in ways and on a scale hitherto impossible to envisage. Language technology and semantic web expert Marieke van Erp teamed up with Bosma in Chapter 27 to discuss natural language processing and semantic web technologies to represent knowledge in a machine-readable manner, illustrating this in their application to apple pie recipes to explore culinary practices and sugar consumption. Clifford, MacFadyen, and Castonguay follow in Chapter 28 with an explanation of how GIS are allowing historians to bring together information from historical maps, textual sources, and quantitative data to interrogate historiographical assumption and develop new questions. Their case study is the Canadian forest-products trade, in an attempt to better understand the early development of Quebec export-oriented sawmills and the timber and firewood trade of the later nineteenth century.

Finally, in Chapter 29, commodities, interdisciplinarity and historical GIS are brought together by Ana Crespo-Solana, drawing on the work of an international project she spearheads on early-modern maritime routes, enabling the integration of historical and archaeological information with timber provenance data to analyse shipwreck sites and timber use. The project explores how the sea and the forests have been inextricably linked since the invention of the ship and the forest, and its main resource, wood, underwent a process of politicization and commercialization, due to timber's importance as a basic raw material for merchant navies and warships.

Organization of the Handbook

The intention of this Handbook is to present a broad range of contemporary work undertaken in commodity history from around the world, from a variety of perspectives, offering an insight into different linguistic historiographies. Rather than being organized around specific commodities, the approach has been to look to the most important themes and tendencies characterizing commodity history as a field of study—from cultivation, extraction, and processing through trade to consumption, along with the social, cultural, and ecological impacts that commodities have had. We have attempted to include as wide a variety of commodities as possible—and not just the most common ones. There is a global spread of regions here, and a balance between those that take a more local approach in their research and those that bring a more general perspective. With the cases ranging from the early modern to the contemporary, the volume provides a comprehensive review of the current state of the field of commodity history.

There are many themes for which there is no specific chapter, but we feel that these are nevertheless well covered through the other contributions. No chapter focuses exclusively on the rise of global capitalism, and yet this is an unavoidable theme throughout, which can be seen from many perspectives. The specific processes of decolonization and neocolonialism have not been included, and yet several actual examples can be found running through other chapters—similarly with merchant networks, labour resistance, and food security.

The volume has been organized in seven parts. In Part One, four of the key approaches to commodity history are examined: commodity chains, *approches filières*, anti-commodities, and commodity frontiers. The chapters in Part Two look at the global histories that have come from commodities, from early-modern trading routes and port cities, through the making of empires and the development of new economic forces as capitalism developed, to the twentieth century and the emergence of a socialist alternative that attempted to challenge the dominant global capitalist system. Part Three turns to key methods of production: mining frontiers and extractivism, plantations and crops, the technological history of commodities, and the use of primary agricultural commodities in the development of modern industry. In Part Four, people and land come into focus, covering migration and slavery, labour, land rights, and circuits of knowledge.

Part Five explores the environmental impact of commodity history: the surveying and mapping processes that opened territories up for exploitation, the varying ways in which land has been utilized in the process, the ecological transformations that this has resulted in, and the contribution that commodities have historically made to climate change. Part Six examines several aspects of commodities and consumption: the exploitation of animals as commodities, drug histories, culinary commodities, and what historical archaeologies are revealing about our social and cultural relationship to these artefacts. Part Seven presents some of the new methodologies that are increasingly being applied to commodity history: the examination of visual representations, the

use of computational methods for mining 'big data', the uses of historical GIS, and the interdisciplinarity that is becoming an increasing feature of contemporary commodity-history research.

While every chapter has a character of its own, they all broadly follow a common pattern. Each is roughly evenly divided into three sections: a survey of the current historiography relevant to the theme under examination and its place in commodity history; a commodity case study, drawn from the research expertise of each contributor; and an assessment of what the case contributes to the wider historical and historiographical understanding. In some chapters, the case study has focused on a single commodity, demonstrating the application of the approaches that the historiographic discussion has revealed; in others, a number of commodities are brought together.

Although it is impossible for a single volume to provide an exhaustive view of such a far-ranging subject as commodity history, the volume ends with a Conclusion in which co-editors Clarence-Smith and Vos discuss the lacunae and prospects for future commodity research, drawing attention to the need for a more multi-centred approach. The intention is that the *Handbook* will not only offer the reader an insight into the state of the art in the field but also nurture future research into the multiple ways in which the study of commodity history can shape our better understanding of the world.

Notes

1. Karl Marx, *Capital: A Critique of Political Economy*, Vol. 1 (Harmondsworth: Penguin, 1976), 125.
2. Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, Vol. 1 (Berkeley: University of California Press, 1995).
3. Terence K. Hopkins and Immanuel Wallerstein, 'Patterns of Development of the Modern World-System', *Review,* 1/2 (1977), 111–145.
4. Terence K. Hopkins and Immanuel Wallerstein, 'Commodity Chains in the World-Economy prior to 1800', *Review,* 10/1 (1986), 157–170.
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PART I

APPROACHES

CHAPTER 1

COMMODITY CHAINS

Analytical Advantages and Challenges Applied to Coffee

PAUL S. CICCANTELL, DAVID A. SMITH, AND STEVEN C. TOPIK

Historical analysis is benefited by an interdisciplinary overview of issues and debates about commodity chains. One of the crucial insights of the commodity-chain approach is that it begins with a historically constituted commodity to study, along with its particular features and intricacies.[1]

Historians have developed a much deeper understanding of how primary products, extracted from nature, became the raw materials and foodstuffs of society, and were transmuted into commercial 'things'. For example, central to understanding the coffee commodity chain is appreciating that coffee is a plant that appeared without human help and only became a 'thing' as part of a long-term (and complex) process, with many uses beside commerce. The word 'coffee' in English refers to the plant, the seed, the harvested and processed bean, the roasted and ground and even trademarked product, the final brewed beverage, and—when 'house' is added—the site of consumption. Each of these things or activities began in different eras and were initiated by different people in distinct geographic sites. Over time, different prices were established in markets for different *Coffea*-derived products as commoditization went upstream. Ever more steps became marketed, and later industrialized and branded. Coffee is much more than just the natural fruit of the earth, although climate, pests, and rainfall are still the ultimate arbiters of the chain.[2] The case study of 'Coffee as a Global Commodity Chain' is discussed below.

Global historians and other students of the world economy have provided many in-depth treatments applied to various other 'things' extracted from nature—often grounded in incisive analysis of ways in which long-term colonial expansion and imperialism interacted with local cultures and societies. Although there are many commodity histories, most concentrate on one strand of the commodity chain, such as

cultivation and extraction, processing and transport, or market creation. Nevertheless, some studies do include discussion of entire commodity chains. Such an approach was made by Sidney Mintz in *Sweetness and Power*, in which he examined the place of sugar in modern history. Giorgio Riello and Sven Beckert more recently have written histories of cotton that explore the central role this plant played in the development of the modern world and global capitalism, something that Erika Rappaport has likewise done for tea. Although John Solari's *Banana Cultures* and Paul Gootenberg's *Andean Cocaine* are more geographically focused, they also take an approach that encompasses the whole of their respective commodity chains, from cultivation to consumption.[3]

There are also a number of edited collections that explore numerous commodity histories. Noteworthy, and influential in the development of this field of study is *From Silver to Cocaine*, by Topik et al., which brings together several Latin American commodity chains in the context of the global economy. Meanwhile, networks such as Commodities of Empire have facilitated research into global commodity histories, and the interactions between different commodity chains—resulting in publications such as Curry-Machado's *Global Histories, Imperial Commodities, Local Interactions.*[4]

A commodity-chains approach enables the combination of insights from studies that concentrate on production (labour, raw materials, and technology); on commerce (marketing, transport, and exchange); and on consumption (fashion, taste, and ethnic preferences). This differs from the approaches of many social scientists who take the commodities as a given—and are often both ahistorical and 'variable-driven' in their approach. Perhaps not surprisingly, across the social sciences with an emphasis on the contemporary world, there is a tendency to shift the focus from extraction of primary products to goods transformed by industrial processes and, more recently, a growing interest in the logistics of commerce and the marketing of products.[5] The interest for many contemporary economists in business and management schools is in recent trade networks of commerce (which are catalogued in the United Nations Standard International Trade Classification [SITC]). Sometimes, this research exclusively involves quantitative modelling of data. In other instances, studies involve specific industrial case studies aimed at mapping out the geographic and organizational dynamics running from extraction through various steps of transformation via manufacturing and the logistical webs of transportation to, ultimately, marketing to end users.

Two variants that are particularly important focus on supply-chain management and global value chains (GVC). The latter term was first coined by Michael Porter in a 1979 article in *Harvard Business Review*, that explored 'how competitive forces shape strategy'.[6] In recent years, the GVC approach has been hegemonic, not only in economics and business literature but even in other social science fields—even leading sociologists who systematized the commodity-chain approach, such as Gary Gereffi, now often use this terminology.[7] However, historians have been reluctant to adopt this approach in part because GVC have been applied mostly to very recent cases, and because the emphasis is usually on 'value added' in the marketplace with less concern about the role of labour, the environment, or state policies. However, recent work in economic geography using the GVC framework seeks to integrate the upstream end of commodity chains and the

material characteristics of resources, their extraction, and processing and consumption into their analysis as essential factors that shape these chains, while recapturing the critical stance of earlier approaches that recognized that incorporation into these chains may lead to development but also to underdevelopment. This literature emphasizes the need to examine the materiality of commodity chains, while also extending analysis to a much longer time frame than is typical in most of the GVC literature.[8] The theoretical model of raw materialist-lengthened global commodity chains presented in this chapter shares the concerns of this reformulation of the GVC framework but anchors our analysis in a broader theoretical framework that links commodity chains to long-term change in the capitalist world economy.

Global Commodity Chains

The global commodity chain (GCC) approach is more historically nuanced and stems from a 1977 article by Hopkins and Wallerstein, in which they sought to offer a new way to understand a global world economy distinct from ideas of capitalism evolving in different national markets, then creating a world market via trade:

> Let us conceive of something we shall call, for want of a better conventional term, 'commodity chains' . . . take an ultimate consumable item and trace back the set of inputs that culminated in this item—the prior transformations, the raw materials, the transportation mechanisms, the labor input into each of the material processes, the food inputs into the labor. This linked set of processes we call a commodity chain.[9]

This was developed in a later paper, which uses seventeenth-century shipbuilding as a key illustration, to define GCC as a 'network of labor and production processes whose end result is a finished commodity.'[10] GCCs explain how local and national economies are integrated by specifying the links among the different processes or segments within the global chain.

While GCCs were initially used to study historical processes, like seventeenth- and eighteenth-century shipbuilding and grain-flour industries, Gereffi adapted the concept to capture the contemporary dynamics of global networked production.[11] This GCC approach does not problematize the social construction of various 'things' as commodities, but it does focus on how the global division of labour and integration of various production/extraction stages are integrated into a world economy that evolved over time—and were an essential component of dynamics like colonialism and imperialism. As Wallerstein observed: '[T]ransstate, geographically extensive commodity chains are *not* a recent phenomenon . . . they have been part of . . . the functioning capitalist world economy since it came into existence in the long sixteenth century.'[12]

While these far-flung geographic chains of natural and manufactured goods are not something new that emerged recently as part of economic globalization (as some

economists seem to assume), we must acknowledge this GCC approach is much more centred on industrial inputs. This shifts the focus somewhat away from that of historians who concentrate their efforts on tracing in detail how 'things' in nature become basic commodities to be traded, marketed, and bought and sold, as well as their social and political consequences. The underlying objective of GCC analysis is to understand an increasingly integrated global economy where countries or regions come to occupy distinct 'export niches' and where 'industrial upgrading' is a key strategy.[13] They conceptualize these chains as consisting of a number of 'nodes' that comprise the pivotal points in the production process: beginning with extraction and supply of raw materials/agricultural products, then moving through stage(s) of industrial transformation, export of goods, and marketing. Each node is itself a network connected to other nodes of related activity, while local, regional, and world economies are ever more intricate web-like structures of these chains.

Ultimately, global inequality and development/underdevelopment are defined by the positions that nations (or their commodities, firms, and localities) occupy in these multiplex networks of worldwide economic production and exchange. Also of importance to the developmental potential of commodities is what economist Albert Hirschman conceptualized as 'forward, backward, consumption and fiscal linkages' to understand the linked 'multiplier effects' production generated.[14] Most commodities undergo a sequence of transformation from raw materials to finished products to packaged and marketed goods: their geographic linkages and connections create a spatially bounded structure for the world economy. For some, like coffee, the material process of transformation may be fairly similar, but the variations on the product are manifold—a joint result of biological differentiation, cultivation techniques, and geographic/geological distinctiveness (not dissimilar to the idea of *terroir* for wine). Others, like sugar or wool or various metal alloys, are usually destined for incorporation into more complex composite products (like cakes, clothing or automobiles).

In the global economy of the post-World War II era, 'export networks and export niches' became 'key units of analysis' in the global manufacturing system.[15] Such global commodity chains have been conceptualized, by Topik and Wells, as the 'sinews' of the world economy; they are the structures that connect various actors across space, linking those in the chain to each other, but also ultimately to world markets as well.[16] Indeed, we can think of them as the underlying conduits of global trade, which makes them particularly appealing to scholars in development studies, especially in recent decades when post-Fordism, outsourced manufacturing, and export-oriented industrialization became widespread—and seen, by among others like Jennifer Bair, as a possible pathway to economic growth in the Global South.[17] Differential profit and surplus are generated at various nodes along these commodity chains—these are the result of a complicated constellation of political, economic, cultural, and historical factors. These patterns are not uniform—the highest profits and the most surplus extraction are *not* always located at the beginning, middle, or end of the commodity chains. There is some evidence in contemporary research on relatively low-cost consumer goods (such as Appelbaum and Gereffi on apparel, or Dedrick et al. on mobile phones) that the marketing end is

increasingly lucrative.[18] But, in fact, the basis of advanced industrial society relies on securing access to necessary raw materials—so there is growing awareness of the critical role of extraction from nature.

Perhaps the most general thing we can say is the pattern varies according to commodity. Even then, there has been variation across nodes producing the same commodities in different places and historical contexts or producing the same commodities in different ways. And there is no guarantee that even production nodes with the highest process technologies, turning out the most sophisticated and innovative products, will be the places where the most profits/surplus are captured. Global commodity chains are more than just sequences of *production*. Both *marketing* of their products and *coordination and control* of integrated global networks are crucial; indeed, they may be much more lucrative.[19]

Gereffi developed his updated GCC framework in the 1980s when the world was undergoing global economic restructuring. He was particularly interested in the dynamics of recent dependent development in Latin America and East Asia.[20] His focus was on what geographer Peter Dicken calls the 'global shift' in the second half of the twentieth century,[21] linked to rapidly changing technologies in communication and transportation, new products and new technologies, unprecedented powers to multinational firms, and the rise of a 'global assembly line'.[22] A limitation of his approach was a tendency to be rather 'presentist': it not only jettisoned the historical depth of Hopkins and Wallerstein's original formulation but also foreclosed the possibility that, perhaps, what he saw as new or unique was an echo of longer-term processes and cycles.

One key aspect of the worldwide production shift was a fundamental change from an industrial capitalist organization form based on vertically integrated giant firm control (in other words, keep everything under their own direct corporate control through what Alfred Chandler labelled the 'visible hand of management'),[23] to a model where 'big buyers' shape the production networks via outsourcing to other firms—and often production units in other parts of the world. The older form was predominant as late as the early to mid-twentieth century (during the period sometimes identified as Fordism). Aglieta and Lipietz note that it involved giant firms and capital- and technology-intensive production in sectors like automobiles, oil, steel, aircraft, and electrical machinery.[24] In these producer-driven chains all the aspects of the process of control are exercised in the headquarters of transnational corporations based in core countries and operating in dozens of countries around the world; and the vast majority of the production processes (the factories themselves) and even the marketing outlets are part and parcel of firms. The giant US auto firms were the prototype: their cars were made in factories that they owned and sold in dealerships that were also controlled by GM, Ford, and Chrysler.

In contrast, buyer-driven chains are those controlled by 'large retailers, brand-named merchandisers, and trading companies' where specifications about product design and volume emanate from these firms, but production is by 'contract' and generally carried out in 'independent factories that make finished goods (rather than components or parts) under original equipment manufacturer (OEM) arrangements'.

Gereffi notes that 'labor-intensive, consumer-goods industries such as garments, footwear, toys, consumer electronics, housewares and a wide range of hand-crafted items' fit into this category.[25] The key buyers are famous brands like Nike, Reebok, The Gap, Liz Claiborne—and Starbucks for coffee—and 'big box retailers' like Target and WalMart (and latterly online giants like Amazon). There is a sense that, in part, this distinction between producer—and buyer-driven chains is about the type of industry, predominant organization of labour relations, etcetera. But there is also a suggestion that the recent trend is away from the producer-driven vertically integrated firms to more flexible production via a buyer-driven organization.

While many social scientists view this economic flexibility as a late twentieth-century innovation, in fact, Braudel notes that it is a periodic feature over centuries of historical capitalism, raising tantalizing questions about historical analogues earlier in the *longue durée*.[26] These changed forms of commodity chains have implications for the relationship between capital and states, business and labour, and also the distribution of surplus along the chain and the developmental impacts where GCC infrastructure is located.

A 'raw materialist-lengthened GCC' approach has been developed by Paul Ciccantell, Elizabeth Sowers, David Smith, and Stephen Bunker precisely because of the lack of attention to the upstream end of commodity chains—parts of the chain that are profoundly different from the labour-intensive factories that were the focus of most of the literature.[27] This raw materialist model begins from a focus on the material process of economic ascent in the capitalist world economy, defined as 'the development of increasing economic, political and military power relative to competing states and the existing hegemon' on the part of a state and its economy that are growing rapidly toward core or even hegemonic status.[28] In contrast to the vague and ahistorical notion of 'stages of development' popularized by Rostow,[29] our materially grounded analysis of the most dramatic cases of economic ascent over the last four centuries (Great Britain, the United States, Japan, and China) revealed a consistent pattern: their rapid development of larger, more complex economies and powerful states and firms capable of restructuring many parts of the world economy and polity. This was in support of their growing power that rested on a foundation of a few fundamental raw materials-based industries—most critically the iron and steel, and transport industries—to move essential raw materials at lower cost and on a larger scale than the existing hegemon, other core economies, and other competing ascendant economies.

A key problem for rapidly growing economies over the past five centuries has been obtaining raw materials in large and increasing volumes to supply their continued economic development in the context of economic and geopolitical cooperation and conflict with the existing hegemon and other rising economies. Economies of scale in resource extraction, processing, and transport offer opportunities to reduce costs and create competitive advantages. However, raw materials depletion and increasing distance create diseconomies of space (increasing costs due to the need to bring raw materials and agricultural products from ever more distant extractive peripheries to the consuming regions). That makes finding economic, technological, and sociopolitical fixes to maintain economic ascent via increasing economies of scale difficult to achieve,

maintain, and eventually reconstruct on an even larger scale. Successfully resolving this contradiction relies on the creation of generative sectors. Bunker and Ciccantell show how these are industries that create backward and forward linkages; create patterns of relations between firms, sectors, and states; stimulate a range of technical skills and learning and social institutions to fund and promote them; and stimulate the creation of a financial system to meet complex and costly capital needs across borders.[30] Such industries drive economic growth of states and economies, but building them is a highly contentious and tenuous process that must be maintained in dynamic tension. Although the unit of analysis is the world system as a whole, this analytic approach focuses attention on the role of states, firms, and the relationships between states and firms in shaping long-term competition and ascent in the world system.

These processes of economic growth, and economic and geopolitical competition with existing hegemons drove long-term change in the capitalist world economy over the past five centuries. The most dramatic and rapid processes of economic ascent restructure national economies and the world economy in support of national economic ascent. The competitive advantages created by organizational and technological innovations in generative sectors and by subsidies in the form of low-cost raw materials from peripheries lead to global trade dominance. Economic and political competition from the existing dominant economy, and other ascending ones, shapes and constrains long-term success, making economic ascent and challenges to existing hegemons extremely difficult. The most successful cases of ascent restructure and progressively globalize the world economy, incorporating and reshaping economies, ecosystems, and space. The historical sequence of rapidly ascending economies from Holland to Great Britain to the United States to Japan and most recently to China led to dramatic increases in the scale of production and trade, building generative sectors in iron and steel, petroleum, railroads, ocean shipping, and other raw materials and transport industries that drove the economic ascent of their economies and states, and often impoverished their raw materials peripheries that supplied key inputs to ascendant economies.[31]

The raw materialist-lengthened GCC model begins analysis of any commodity chain by focusing on raw materials or agricultural extraction. It then traces the steps of processing and the commercial, transport, and communications technologies that link the multiple nodes of the commodity chain from its raw materials/agricultural sources through industrial processing to consumption and eventually waste disposal. This materially and spatially grounded approach allows analysis of the economic, social, and environmental dimensions of these chains at each node.[32] Equally important, this approach provides a lens to examine spatially based disarticulations (the marginalization or outright elimination of particular nodes from a GCC)[33] and contestations over extraction, processing, transport, consumption, and waste disposal across these chains. This grounded analysis can examine development trajectories and the sociopolitical conflicts over the division of costs and benefits in particular nodes and across these commodity chains. This approach highlights the role of contestation and resistance to the construction and reproduction of a particular commodity chain in particular places. This model thus emphasizes long-term historical change in the world system as

a whole, and in particular places and times, and it allows world-systemic comparative analysis that makes nested comparisons within the broader world system and over time comparisons across commodity chains.

Coffee as a Global Commodity Chain

The coffee that became internationally popular, *Arabica*, is native to what is today Ethiopia. Over one hundred species of *coffea* have been identified, yet only two of them became widely consumed: the *Arabica* and the *canephor* or *Robusta*.[34] The popularity of *Arabica* and its global diffusion were human decisions, which, as the name implies, began not in Ethiopia but across the Red Sea in Yemen. Initially consumed as a food, the coffee drink gained popularity in Yemen before 1500, where coffee was planted in the mountains and became a trade good.[35] The Sufi mystics of Yemen made a drink out of the roasted cherry pit or 'bean', which was much less perishable than other parts of the plant. This taste choice would prepare coffee for its precocious long-distance trade. It became widely drunk in the Islamic world as a substitute for forbidden alcohol and a stimulant that was conducive to meditation and worship. Coffee houses replaced taverns. Initially coffee was an international trader-driven chain as mercantile-minded Arabs and Indians experienced in long-distance market-oriented commerce of the spice trade incorporated the bean into the circuits of the Red Sea, Mediterranean, Indian Ocean, and Middle Eastern shipping and caravan commerce.

By the early eighteenth century, a growing taste for coffee in Western Europe and the desire for a profitable commodity and self-financing colonies led Dutch, French, and British merchant companies to move from commerce and transport to production. They began overseeing coffee planting in their newly conquered colonies, creating extractive/agricultural peripheries that supplied coffee to commodity chains controlled by each of these imperial powers. By the 1770s, more than 80 per cent of the world's production originated in the Americas, with rapidly expanding circum-Caribbean output. In 1800, coffee was the most widely spread tropical commodity in the world, stretching from Yemen to Java, from Guyana to the Philippines (and just beginning to expand in Brazil). After the 1870s, merchants and planters were the main entrepreneurs in expanding the coffee trade because European imperial states no longer played a major role in the development of coffee production.

Coffee in the nineteenth-century Age of Empire was treated differently than other major export commodities such as sugar, cotton, bananas, and rubber, which were largely dominated by colonial powers. In the case of coffee, on the other hand, its low technological demands meant that an independent former colony, Brazil, could begin producing on an unprecedented scale. Cheap fertile forest lands and abundant and relatively inexpensive slave labour due to the proximity of Africa and treaty arrangements, allowed Brazil to cause world coffee prices to plummet after 1820 and remain low

until the last quarter of the century. Lower prices broadened the market now reaching middle-class and even sometimes working-class consumers.

Brazil's success was not solely because of European colonial know-how or simply because of natural resource endowment. Brazil emerged as the world's leading coffee exporter also because of developments in core consuming countries and in the world market. Swelling Western European and later US urban markets arose because of their rapid economic expansion and demographic growth; they were supplemented by capital, transportation, and communications revolutions brought by technological advances and British free-trade hegemony. Larger plantations set the standards for cultivation and enjoyed economies of scale in production, though smaller-scale slave-worked holdings in Brazil and coerced peasant production in Java competed successfully for a while. Unscheduled sailing ships carried coffee packed in leather pouches or cotton and jute bags to major markets where it was often sold at auction to wholesalers. Roasting, grinding, and brewing were still done in the home or in the coffee house. The commodity chain was a hybrid; it was partially producer-driven, since many of the improvements in expanding cultivation were financed by reinvested profits of planters, but it was also partially driven by international traders and government policy in the context of what Robinson and Gallagher called free-trade imperialism.[36] The fact that independent Brazil had low export taxes on coffee and the United States abandoned import duties on it in the 1830s stimulated Western European and then US consumption.

During the nineteenth century, there was a remarkable expansion of the world coffee economy and the increase in the chain's length and complexity emanating from Brazil. This was the result of a unique confluence of Brazil's internal natural endowment; the availability of foreign labourers (in Africa until the Atlantic slave trade was abolished in 1850, and in Southern Europe after Brazilian slavery was outlawed in 1888); revolutionary advances in long-distance transportation and communication technology created by the British hegemon and later by German and US inventors; and the vast transformation in the coffee marketing and logistics in the United States and Western Europe.

Coffee commodity chains grew not only because of changes in the relations between growers and consumers on both of its ends in a specific strand, such as Brazil and the United States, but also as a side effect of transformation of the broader world economy. A clear case of an externality that revolutionized Brazilian coffee's relationship to the Atlantic economy (and later that of competitors) was the shipping revolution that shrank the world.[37] This was essential because although Brazil was distant from its northern markets, it was linked by the Atlantic, which greatly reduced carrying costs. The mode of transportation had considerable weight in the construction of the coffee commodity chain. It was not simply an incidental event between production and consumption. The mode of transport helped select what areas could join the world economy and in what capacity.[38]

Other coffee-growing countries in Latin America took advantage of the rapidly growing international demand for the stimulant. In most years until 1929, all Latin American coffee growers increased output. Their inexpensive production, processing,

and transport attracted more consumers in the United States and Western Europe, allowing coffee to overshadow its competing caffeinated drinks such as cocoa, tea, mate, and substitutes such as chicory and grains—though for cultural or fiscal reasons the competitors did prosper in some markets. Latin America turned much of the Western world into coffee drinkers. In other words, Brazil was not just a passive bystander in the world market; it was a market maker and would become a price maker beginning in 1906 with government price intervention.[39]

Coffee was one of the few major internationally traded commodities to enjoy a real price increase in the second half of the nineteenth century and still have a per-capita consumption increase.[40] Again, the coffee chain benefited from an externality: the plunging price of many staples like wheat in the 1870s due to overproduction and cheaper transport in what Alfred Crosby calls 'neo-Europes' reduced the price of basic necessities for the working class of North America and Europe.[41] They therefore found themselves with greater discretionary income to spend on newly available luxuries such as coffee and sugar.[42] Thus, the commodity chain should take into account goods that competed for the consumers' dollars, pounds, and francs. The issue was not just how much coffee was available and at what price and how much discretionary income consumers had but also what other goods were filling similar perceived needs. Once coffee's status declined in the early twentieth century from luxury to necessity, its income elasticity did also.[43] After World War II, Coca Cola, Pepsi Cola, and other similar caffeinated drinks satisfied the caffeine craving. New mass advertising appealed uniquely to the new youth culture, which was at the time the most dynamic niche. The cola craze would only change in the last decades of the twentieth century as specialty coffee purveyors and coffee houses again convinced more buyers that coffee was a luxury and a youth drink.

Social practices in the largest markets (the United States and Germany, the two fastest ascending economies of the second half of the nineteenth century), very much affected the nature of demand and the ability of roasters to respond and modify it. The fact that in the United States and Germany coffee was consumed in the home much more than in coffee houses, as was the case in much of Europe, had important implications for the organization of the trade. Since coffee in the United States was overwhelmingly sold in grocery stores, a few roasting companies such as the Arbuckles and the Woolson Spice Company took advantage of the invention of industrial-scale roasters in the late nineteenth century to create brand names. The proliferation of brands meant that roasters were no longer selling a commodity—the green bean—but were selling a trademarked product such as Arbuckle's *Yuban*. Advertising and other marketing tactics, such as colourful cans and trading cards, attempted to whet the appetite for particular brands and to appeal to the expanding retail grocery sector.

By gaining the confidence of consumers and providing mass-produced roasted coffee, large industrial roasting firms began to control the market and the chain.[44] They lengthened the chain by industrializing and commoditizing roasting and grinding, formerly the domain of the housewife. Brands segmented the market by selling various roasts and blends depending upon regional consumer taste. By 1935, 90 per cent of all coffee sold in the United States was sold roasted and in branded packages. Coffee

roasters became coffee manufacturers who gave a commercial identity to the anonymous commodity (as far as the consumer was concerned) they put into their cans. This vertical integration was characteristic of the twentieth-century Fordism that drove US economic ascent to hegemony by the middle of the century.

The largest brands also lengthened the chain by integrating vertically, sometimes even buying plantations in growing countries, and certainly sending their agents into the coffee interior to purchase directly from producers.[45] The most successful in integrating segments of the chain before World War II was the A&P chain-store empire. The company imported, roasted, canned, branded, and retailed millions of bags of coffee in thousands of its own shops.[46] This in-house strand ran parallel to its many competitors who relied on numerous private outside links to the chain. The A&P's own canned coffee was the prototype for the supermarkets' house brands that emerged after World War II. Command of shelf space and increasing concentration of supermarket companies allowed them to assert ever greater governance over the coffee commodity chain as the power of independent merchants, small-scale roasters, and shippers declined.

As a result, value (in the sense of market-priced processes) was increasingly added as the housewife's unremunerated role in making coffee declined and her opportunities to earn wages outside the home (i.e. buying power) increased. This caused an ever-greater share of the monetary value of coffee to be added in consuming countries. An ever-smaller number of companies took advantage of marketing economies of scale to go regional and finally, after World War II, national.

Until the end of the nineteenth century, coffee beans were sold as a raw material. Industrialization of processing, roasting, canning, and branding added value in European and North American consuming countries in the twentieth century. One calculation finds that the value added in consuming countries grew from 47 per cent of the final price in 1975/1976 to 79 per cent by 2000/2001.[47]

Since roasters' profits came from using coffee as a raw material, rather than as an object of speculation as it had been previously for many merchants, roasters favoured stable, predictable prices. They accepted state-run price controls beginning in 1906 in Brazil, which led eventually to International Coffee Agreements (ICA) and the International Coffee Organization (ICO) from 1962 to 1989. The main objective of the big international coffee cartels was to stabilize prices rather than corner the market and inflate them; roasters in the consuming countries gladly joined. They were perfectly willing to accept paying somewhat higher but stable prices for green coffee in return for guaranteed production, because most of the value was added in the consuming countries. The coffee bean itself was increasingly a low-cost raw material. Governance of the chain was now largely in the hands of state agencies in the cultivating and consuming countries.

The ICO's most successful period spanned 'the transition from developmentalism to globalism'.[48] This form of state capitalism provided conditions for rapid consolidation and vertical integration in the consuming countries while usually protecting smaller-scale coffee farmers in the Global South. As coffee processing became increasingly industrialized, economies of scale grew, and an ever-larger share of the value was added

in consuming countries. Not only were roasting, transporting, weighing, and packaging mechanized and therefore centralized, but new products were created: decaffeinated coffee and, after World War II, instant coffee in which processing added increased value.[49] By this time, the popularity of modern processes, such as the percolator and the automatic *Mr. Coffee* machine as well as instant coffee, drove down the quality of what was brewed. This facilitated the spread of a few very large companies that produced lower-quality, canned ground roasted. Increasingly the chain became buyer-driven.

The nature of the buyer, however, changed. This was because the spread of supermarkets corresponded to two other phenomena at the same time. Giant food conglomerates such as Nestlé, General Foods, Coca Cola, Ralston Purina, and Kraft began to take advantage of their growing market power to buy up smaller successful coffee companies. These conglomerates, which today include JAB, Smuckers, and Massimo Zanetti, had less interest in coffee as a family tradition than did earlier coffee roasters such as Chase and Sanborn or Maxwell House, which are today merely subsidiaries of conglomerates. Consolidation proceeded to the extent that by the 1980s, four companies controlled 80 per cent of the US coffee market. Worldwide, in 1998 five multinationals had a 69 per cent share of the roasting and instant coffee markets.[50] Thus, although coffee was the world's second most important internationally traded commodity in many years, and it was produced in more than a hundred countries while being consumed in virtually every country, it was surprisingly oligopolized and oligopsonized.

Various forces associated with the rise of global neoliberalism led to the dissolution of the International Coffee Agreement in 1989. State governance of the chain shrank even further when most coffee-growing countries dissolved their coffee institutes. They stressed profits and efficiency over social justice. Governments did not step in when world coffee prices fell by almost half after the ICA's demise. This led to ever greater governance of the chain by companies such as Nestlé, which is one of the world's largest diversified industrial multinational conglomerates. According to 2002 data, the world's five largest roasters bought nearly half of the world's green coffee.[51]

This was countered with the specialty coffee movement, which began in the most affluent countries and has diffused to urban centres in developing countries. Specialty coffee houses have peaked demand and created value in what Daviron and Ponte call 'in-house service quality attributes'.[52] The best known of these corporations is Starbucks, which experienced a remarkable growth first in the United States and then globally. Concerned with improving the quality of coffee and the returns to coffee growers, they have educated the palates of American coffee drinkers and accustomed them to much higher prices than they had paid for the 'bottomless cups' of the coffee shops. They have segmented the world coffee market by introducing new standards of quality and often going directly to growers who can gain by playing the specialty buyers off against their traditional buyers. Although in total volume specialty coffee pales against the traditional industrialized brands, their higher prices mean they occupy a substantial place in the US and Canadian national coffee markets. Specialty coffee houses have spread from the Americas to Europe (Western and Eastern), and even to countries that were

not traditionally particularly fond of coffee such Japan, India, Korea, the Philippines, and even China. Unfortunately for the coffee industry, much of the funding for the 'latte revolution' goes to the milk and sugar additives, rents, and coffee-house profits, not to coffee growers.

Conclusions

The coffee commodity chain has shown an historically evolving nature. The raw materialist-lengthened global commodity-chains model allows analysis of the material, socioeconomic, and geopolitical evolution of the coffee commodity chain over the very long term. Coffee's journey from its native Ethiopia to mountains and forests around the world and to globally ubiquitous Starbucks locations reflects the ongoing material dependence on coffee beans, climates, and soils that still shape the coffee commodity chain and human use of coffee. The strategies of firms and states to exert control over and earn profits from the coffee commodity chain have shaped the spatial spread of coffee production, trade, and consumption over the centuries. These strategies were shaped by the evolution of the capitalist world economy as Great Britain and other European countries built empires that incorporated other areas as resource peripheries, including to produce coffee. In the post-colonial era, first in Brazil and now in many other countries, coffee remains an essential component of their economies and their trade and geopolitical relations with core nations.

The coffee commodity chain evolved from imperial control to a hybrid of producer driven and buyer driven, with ongoing conflicts between producing states and firms and importing firms. Importing firms have sought to vertically integrate up the commodity chain but have encountered strong resistance by exporting states and firms to these efforts. The spatial expansion of the coffee commodity chain was shaped by technological changes in transportation and communications developed in core countries to help them control other areas of the world, but Brazil was able to take advantage of these same technologies to exert control over the coffee commodity chain. This illustrates the dynamism, conflict, and historical contingencies that are revealed by our theoretical and methodological approach. The geopolitical and international economic relations in the capitalist world economy shaped the conflicts and cooperation embodied in the ICAs during the era of US hegemony. The shift to global neoliberalism since the 1990s began under US hegemony but opened the door to China's economic ascent and the declining power of US firms, at the same time opening space for resistance and challenges to giant firms that controlled core markets.

More broadly, how can our framework be used to analyze key issues of resource-making, nature-society relationships, and space? A recent case of creating a growing GCC, natural gas extracted from shale via hydraulic fracturing, presents a critical case of the creation and rapid expansion of a raw materialist-lengthened GCC on a large and potentially globally transformative scale. Although these deposits of gas contained

in shale rock formed in geological processes beginning millions of years ago, and geological knowledge about their existence has existed for decades, these deposits were not resources even thirty years ago. Technological innovations in directional drilling, hydraulic fracturing, and exploration turned these previously socially useless natural formations into socially useful resources. The excess capacity and low prices of natural gas in North America spurred a huge rush of potentially hundreds of billions of dollars in investment in pipelines, port and processing facilities, and specialized ships to transport shale gas as liquefied natural gas (LNG) thousands of miles to markets in Japan, South Korea, China, and Europe, rapidly accelerating the growth of a new GCC in LNG. This new resource and new GCC demonstrate the utility of the raw materialist-lengthened GCC approach for analyzing the inseparability of natural and social processes. Without naturally produced gas deposits in shale formations, the potential for social action to build the LNG GCC would have been very limited, while, without social action to develop technologies to explore, extract, and transform this gas into LNG, these gas deposits would have remained undisturbed and particular ecosystems and communities would not have faced air and water pollution, earthquakes from wastewater injection wells, and myriad other environmental and social impacts from fracking and LNG infrastructure.[53]

Another recent analysis using this framework examined the global coal commodity chain.[54] Coal was a key ingredient in economic ascent over the past three centuries in Great Britain, the United States, and Japan and remains essential to economic ascent in the twenty-first century for China and India, despite its contribution to climate change and efforts in many countries to promote a transition towards more sustainable energy systems.[55] The evolution of the coal commodity chain over time demonstrates how coal resource peripheries are produced through dynamic and integrated sociospatial relationships between core and especially ascendant economies and the locations that become their coal extractive peripheries. These sociospatial relations link core and ascendant economies to coal extractive peripheries, creating coal commodity chains that are essential for the functioning of core and ascendant economies. Such raw materialist-lengthened global commodity chains in coal link these economies to extractive peripheries—a sociospatial relationship that creates and reproduces global inequalities and shapes the socioeconomic trajectories of those locations that become coal extractive peripheries. The raw materialist-lengthened GCC model provides an integrative theoretical model to understand the multidimensional causes and consequences of commodity chains over the long term.

Of course, it would be foolish to attempt to reductively argue for some sort of unified 'best' approach to the analysis of commodity chains. Various disciplines revolve around distinct literatures and are engaged in different conceptual discussions and debates. The raw materialist-lengthened GCC framework offers an analytic method to examine central issues of space, processes of long-term change, and the role of raw materials extraction and processing in the political economy of the capitalist world economy, issues of central concern to critical resources geography and economic geography, development studies, and other disciplines. Given these shared concerns, there are clearly significant

opportunities for scholars in sociology, geography, and other social sciences, as well as history, who employ these frameworks to share findings and work jointly to examine pressing issues such as climate change and other products of resource use, consumption, and waste.

But sometimes we operate in intellectual 'silos' in dialogue only with disciplinary colleagues (and probably a rather narrowly focused group at that). With rising interest in globalization, global inequality, and an increasing awareness of the deep global interconnectedness of today's world, combined with enhanced sensitivity to human reliance on nature (and the fragility of the ecosphere), there is increased attention today to the issues discussed in this chapter. There is a great richness to be garnered from an interdisciplinary appreciation of how commodities are created, extracted, processed, marketed, and consumed. We have tried to provide a small window on that here.

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CHAPTER 2

APPROCHES FILIÈRES AND COMMODITY CHAINS

Comparing Approaches in the Study of Cocoa

FRANÇOIS RUF, FRANZISKA OLLENDORF, AND ENRIQUE URIBE LEITZ

With the rise of globalization and its increasingly globally connected economic systems and labour relations, several social science disciplines have dedicated much attention to the drivers and mechanisms behind related processes. Commodities—their extraction, processing, trade, and ultimately consumption—were (and continue to be) of fundamental importance in these. While theoretical approaches and methodical tools emerged that were embedded in the political economies of their times, there is a tendential divide between anglophone and francophone studies. Two quite similar approaches to the study of global commodity flows, and industrial and agricultural labour relations, were developed in parallel: the anglophone commodity-chain approaches, which themselves are further subdivided into several schools, and the francophone *approches filières* (AF). Both theoretical strands go back to the 1970s and aim to describe patterns in global production systems that became increasingly organized in vertical hierarchical chains. However, there has been little understanding of the differences and commonalities between these two research strands and their suitability for application to the study of the histories of economic globalization—in particular, the evolution of tropical commodities and the economics of developing countries. Furthermore, in anglophone commodity-chain studies, there has been rather limited understanding of AF concepts. The present chapter aims to broaden the view on AF by presenting diverse conceptualizations and applying them to the study of cocoa history in Ivory Coast and Indonesia.

From around the middle of the nineteenth century, both anglophone and francophone publishers (as well as in other languages) began to produce numerous commodity-specific books, which they often arranged into series about commodities.

However, no overall theory of commodities was usually deployed, and many of these publications were highly practical and empirical in nature. The anglophone concept of commodity chains emerged around the second half of the 1970s out of the World Systems Theory of Terence Hopkins and Immanuel Wallerstein.[1] In the 1990s, this was developed by Gary Gereffi and Miguel Korzeniewicz into the global commodity chain approach,[2] which since the 2000s evolved towards the global value chain (GVC) with the incorporation of transaction cost theory and its qualification of modes of coordination (market, contract, and hierarchy).[3] The key feature of the GVC approach is its interest in analysing organizational patterns of commodity chains and their forms of coordination and dominance—the industrial governance mechanisms applied by powerful lead firms in their supply chains. One of the core objectives of many GVC studies is the identification of 'upgrading' opportunities for exporting firms, in order to increase the value added in their participation in a global chain, and therewith increase developmental opportunities for poorer economies. By economic upgrading, GVC scholars generally refer to 'the process by which economic actors—nations, firms and workers—move from low-value to relatively high-value activities in global production networks'.[4]

Similarly, the *filière* framework emerged around 1977, in the field of French industrial economics. The *Revue d'Economie Industrielle*, founded in that year, played a major catalysing role for the further development and spread of AF among francophone economists working in different fields, such as development economics, and agricultural and rural economics.[5] Like commodity chain and GVC analyses, AF also emphasized the efficiency of producers' integration into global chains and how specific business actors' strategies shape this process. However, in its traditional application, AF mainly started its analysis at the local level of production and often does not go beyond the context of the national sectors. Nevertheless, as our literature review of AF application to cocoa will show, a number of more recent studies extend the scope of analysis and explicitly examine the role of transnational corporations or the flow of the produce from cocoa bean to chocolate bar.

Until now, there have been only a few comparisons of the commodity chain (or GVC) and AF approaches. One of the most encompassing was developed by scholars from Danish research institutes and published in 2000.[6] The authors (Philip Raikes, Michael Jensen, and Stefano Ponte) highlight the most important commonalities between the two approaches: for example, the study of processes and transactions between all production segments or nodes in a given chain or *filière*. They also point to important differences in geographical focus, as well as their political and theoretical grounding. However, while describing the French school of *filière*, they limit their attention to the influence of agricultural commodity research.

Following is the definition used of a *filière*, as generally applied in AF: 'a set of actors providing specific technical and economic functions in the process of producing and processing a good, from raw material to final product'.[7] However, we will show that other authors argue that the focus remains more technical and mainly within national borders and that the definition of what is at the core of AF is still controversial. Regarding commodity chains, it is equally difficult to find clear definitions in the abundant literature.

Therefore, Raikes, Jensen, and Ponte come back to a definition of the concept taken from Hopkins and Wallerstein: 'a network of labour and production processes whose end result is a finished commodity'.[8] Nevertheless, the authors acknowledge that this is only a minimal definition that does not capture important aspects of commodity chain research, such as specific power and governance structures. Similarly, Jennifer Bair, Joonkoo Lee, and Frédérik Lançon, Ludovik Temple, and Estelle Biénabe, among others, underscore the central role of power and governance in Gereffi's GVC, but do not come to any more precise definition.[9] In the absence of a clear definition, Lee opts for a framework made of three components of GVC: power/governance within the chain; economic upgrading; and the social construction of global chains. Finally, the lack of distinct definitions of both represents a challenge for the comparison of chain and *filière* approaches. Therefore, as Laurence Bush put it in 1989, it requires 'the abandonment of disciplinary boundaries' and it will be 'necessary to go to the places where the commodity goes'.[10]

It is also important to note that these days francophone researchers rarely make use of the term '*filières*', opting instead for the term '*chaine de valeur*' in their French publications, which is a direct translation of the anglophone counterpart. Whether this is only a semantic shift or whether it reflects a gradual convergence with the GVC approach is one of the questions to be addressed.

Assuming these difficulties, it is necessary to take a more precise look at the two frameworks of AF and commodity chain/GVC and then determine whether this looks coherent within the work done on cocoa. Finally, we discuss the hidden costs of cocoa production as a microcosm of global economic history, applying the AF lens to the cocoa value chains in Ivory Coast and Indonesia. Throughout, there is an exploration of the francophone AF in relation to the anglophone commodity-chain concept.

Differences and Commonalities between Commodity Chain and *Filière* Frameworks

In Raikes et al.'s comparison of anglophone commodity-chain and francophone *filière* schools, the authors outline two features that they describe as important differences between the two frameworks. First, they affirm the aspiration of the anglophone traditions to investigate the full length of global chains, whereas they describe the francophone ones as being mainly focused on the local or national levels. Second, the authors see AF studies as ascribing a minor role to actors' strategies and issues of power in comparison to commodity chains, being more interested in the technical aspects of material flows. Moreover, the authors claim AF tends to focus on agricultural commodity chains in developing countries. They explain this as being due to the influence of the French government, which required an analytical framework for its development policies and commodity-centred development interventions in the former colonies.[11]

However, it is in fact clear from descriptions by francophone economists themselves that, contrary to Raikes et al.'s assertion, AF also have a distinct focus on the importance of actors and their strategies. In 1984, Alexis Jacquemin and Michel Rainelli—although not using the term 'governance' (which was not yet widely used)—clearly raise the issue of dominance between the actors of the *filière*. They even suggest that research on domination within a *filière* was already initiated (without using the term '*filière*') by François Perroux and others in the 1950s and 1960s. Jacquemin and Rainelli distinguish two main conceptions of AF, where the first is rather descriptive, focusing on the division of a national production system, while the second goes beyond mere descriptions, seeking to provide a framework for the analysis of business strategies. Accordingly, with this second conception, the identification of corporate strategies and the forms of control that allow companies to exercise domination were already important parts of the studies from the early 1980s—mostly in industry, more scarcely in agriculture.[12]

In 1994, while the work of Gereffi and the concept of global commodity chains was still in its initial stages,[13] Bruno Dorin presented a review of the concept of *filières*, widely used in France at that time, considering the concept as a precious tool and framework for his own research on coconut oil and other agricultural oil-production and processing activities in India. Like Jacquemin and Rainelli, Dorin also underlines the importance of actors' strategies and hierarchies. After drawing the origins of AF research back to industrial economists such as Perroux, based on former work by Rainelli, he distinguishes five concepts of AF that were already present at these early stages: the *filière* as technological space (the sequence of technical process and know-how through which a raw material is transformed into a final product); strategic space (whereby economic agents integrate production segments vertically upstream or downstream, or horizontally through conquering key positions in certain activities); space for state regulation (justification of its functioning within the objectives of economic policy, seeking balance between different business *filières*); an area of added value (breaking down a final selling price to understand how it is composed); and the Input-Output Table.[14]

Contrasting with this, in 1989 Michel Griffon found that the *filières* approach is 'mostly a tool and a concept of meso-economics between national accounting and microeconomic of agents' behaviour' and that it suffers from 'a lack of theoretical framework, which in turn can hamper its potential'.[15] This assessment is particularly important as Griffon can be considered the pioneer of the *filière* approach at the French *Centre de Coopération Internationale en Recherche Agronomique pour le Développement* (CIRAD). At that time, due to the economic crises affecting several francophone African countries, the French government had a vital interest in the *filière* approach to development. For instance, as they studied some innovations in different *filières* in West-Africa, Bosc and Hanak-Freud argued that AF are essential to evaluate the efficiency of smallholders and guide public policies.[16] One of the best examples is the survey composed of ten *filières* studied by CIRAD researchers and coordinated by Griffon.[17] CIRAD, the main French agricultural research and cooperation organization working for the development of tropical and Mediterranean regions, subsequently adapted the concept as an

organizational tool and had all its research units organized by *filières*, such as cocoa and coffee, rubber, oil palm, cotton, rice, maize, teak, meat, and so on.[18]

Griffon's conception is partly reflected in Lançon et al.'s considerations on *filières* and commodity chains, where they see the former to be dealing more with the structuring of productive systems and describe the latter to be looking more at actors' strategies, especially the growing role of lead firms and their governance instruments. Although the role of power analysis is still under debate, there is a broader consent among francophone scholars about AF's role as a tool for agricultural policy development, both for governments in francophone Africa seeking to organize their agricultural sectors, and the French government in designing its post-colonial development interventions. To a certain extent, this specific and operational objective of the AF—namely, to feed development policies hoping to make chains more efficient and more competitive—was also a way to think in terms of power relationships and upgrading. In addition, Lançon and his colleagues also argue that the concept of *filières* gradually became more structured as analyses of power relationships and technological changes were incorporated into it.

Thus, three phases in AF are identified: first, power and strategic elements were clearly part of the early years of AF, mostly dealing with industrial goods; second, this became less prominent than technical and descriptive aspects in studies on *filières* based on agricultural commodities such as cotton, where French public and private interests were part of the *filière*; and third, some francophone economists refocused on actors, governance, and share of added value. Regarding the second phase, one should not forget the programme initiated in Ivory Coast by Jean Chataigner when he was based at CIRES (*Centre Ivoirien de Recherches Économiques et Sociales*). He launched and trained young Ivorian and French economists on the *filières* of plantain, rice, and tomatoes.[19] His objective was to rebalance the heavy weight of research devoted to production and farming systems by integrating studies on marketing and *filières*, hoping to integrate the rationale of traders and also to shed new lights on the understanding of farming systems. For instance, on plantain issues, the series of surveys proved to be successful, among the first to understand the logic of plantain production shifts from one region to another, but also demonstrating that the main driver of high prices of plantain during the rainy seasons were not due to production but rather transportation.[20] During the third phase, the success of the cotton *filière* in Mali was considered by CIRAD researchers as the output of institutional innovations and governance such as 'the specialization and concentration of resources with the creation of the CFDT (*Compagnie Française de Développement des Textiles*), the guarantee of the purchase price of seed cotton, the gradual establishment of an integrated system with the gradual eviction of private operators, the training of village craftsmen'.[21] Furthermore, some CIRAD economists merged their AF with an institutional economics framework, thus devoting a high priority to governance. One of the best examples is the work done by Paule Moustier, especially on food chains in Vietnam.[22] Finally, with Lançon et al., we can conclude that Raikes et al.'s assessment of AF was correct in many ways, especially regarding the second phase, but existing works on power and strategic elements were widely overlooked in the assessments of the framework.[23]

Even though the differences between commodity chain/GVC analyses and AF go beyond the linguistic and geographical frontiers, these nevertheless remain important. A *filière* approach, or a reference to it, is more likely to be found concerning a francophone country, while commodity chain studies tend to focus more frequently on anglophone ones. In addition, the *filière* concept focuses more on the upstream of the chain—it often starts from producers and farming systems and their suppliers, before exploring the downstream components of middlemen, merchants, buyers, and exporters. Even for commodities oriented to export, AF researchers often may have stopped the analysis at the port and the national border. In contrast, commodity chain analysis (and particularly GVC) will often concentrate on lead firms, economic upgrading, and how they enact their power by means of influencing the governance of the chain. Generally, GVC studies focus more on comparative advantages of firms, mainly at the international level, and often assess their strategies in terms of profit maximization. Historically, the *filières* approach has had the objective of informing intervention in national development policies but often integrates actors' strategies, power, and governance.

During a seminar in 1989 on agricultural *filières* in tropical countries, Griffon discussed how the term '*filières*' was considered untranslatable into English.[24] Tentative translations such as 'producer-consumer chain' or 'production and trade networks' were neither precise nor appealing. During that seminar, the only paper written in English, by Bush,[25] used the term 'commodity chain' (at least implicitly referring to Hopkins's and Wallenstein's concept). Indeed, some francophone research papers written or translated into English simply substitute the terms of 'commodity chain' or 'value chain' for '*filière*', without really tackling the substance of the two concepts. Given the above, if we start from the three major themes of GVC studied by Lee (governance, upgrading, and the social construction of global chains),[26] the differences to *filières* seem to be relative and not necessarily more significant than differences within internal applications of the concepts. In addition, both have in common a major missing point: neither provides any precise tool to include issues of social and environmental sustainability. This is an interesting commonality, since questions of sustainability became broadly discussed among social scientists during the same period as both approaches matured.

Both AF and commodity chains/GVC have primarily been employed within contemporary social science studies. But what is of particular interest here is the extent to which each may be of utility in the analysis of commodity history. The following anecdote illustrates the difference between AF and GVC in incorporating a historical perspective. An American researcher working on agricultural innovations asked one of the authors, 'Who are your mentors and why?' The answer was: 'My professors Philippe Lacombe and Marcel Mazoyer, because I learnt from them that any socio-economic situation is the output of history, which forges different interests, even within an apparently homogeneous 'community'. His comment, as an agricultural economist, speaking out of his 'lens' on this discipline in the United States, was: 'A US economist would take any situation as it is, not looking at the past'. Dorin's work on various commodities in India, such as coconut oil and sugar cane, can illustrate the inclination of francophone economists to integrate an historical approach in their AF, including balance of power but also

figures and attempts to quantify.[27] In coffee, the work done by John Talbot and then by Benoit Daviron and Ponte could be considered a showcase of GVC integrating history.[28] However, Talbot's background is sociology and probably inspired by the first school of commodity chain analysis by Hopkins and Wallerstein, while Daviron is an economist coming from AF, although he would probably reject any 'affiliation' to either AF or GVC.

Commodity Chain and *Filière* Concepts in the Cocoa Literature

Cocoa offers a textbook case for how post-colonial structures have shaped research agendas. This can be seen through the example of the world's two biggest cocoa-producing countries: Ivory Coast and Ghana, both in West Africa, with the former having regained its independence from France in 1960, and the latter from Britain in 1957. Until recently, most studies on cocoa in Ivory Coast were conducted by francophones (or at least published in French), while most cocoa studies in Ghana were conducted by anglophones (or at least published in English). Hence, there was a socio-linguistic divide; and as a result, in the study of cocoa in Ivory Coast and other francophone countries, it has primarily been the francophone concept of *filières* that has been applied, while in Ghana and other non-francophone cocoa-producing countries the concepts of commodity chains and GVC are mostly used. This started to change in the late 2000s with more anglophones looking at available data in Ivory Coast and more francophones travelling to Ghana.

Commodity chain analysis has been increasingly used among anglophone scholars to describe and assess various developments in cocoa production and the flow of the produce to the final consumer. What many of these studies have in common is their application of GVC as a tool to trace and better structure the understanding of the sector. This has particularly helped researchers to map the prevailing forms of organization of the chain,[29] existing power nodes and hubs of concentration,[30] or patterns of value and cost distribution.[31] For instance, Neils Fold made a seminal contribution by depicting the bipolarity in cocoa-chain governance, highlighting the role of lead firms not only in the manufacturing segment but also in processing.[32] In general, this governance axis of GVC is a key element for its application to the cocoa-chocolate chain. With the rise of the importance of private sustainability standards and certification schemes in cocoa production, the implementation and coordinative effects of these governance tools are the object of several GVC studies.[33] Over a decade after observing the bipolarity of this chain, Fold, together with Jeffrey Neilson, depicted a new form of hybridization of the governance, which largely goes back to the implementation of sustainability interventions and multistakeholder initiatives.[34]

Another strand of commodity-chain studies analyse institutional arrangements of the cocoa-chocolate value chain, in some cases also from a historical perspective.

For instance, Giel Ton et al. provide a sound overview of important periods of different political economy environments in the cocoa sectors of Ivory Coast, Ghana, and Ecuador.[35] Ajmal Abdulsamad et al. describe the role of the conditionalities of the international finance institutions in cocoa-producing countries, and analyse their reversal by pre-conditioning debt relief for Ivory Coast to re-regulation of its cocoa sector.[36] Fold and Ponte[37] also study the forms of regulation, quality-control procedures, and performance of the organization of the value chain, and analyse the price-building mechanism and several other policy aspects (e.g. liberalization of cocoa sectors). Price transmission in the cocoa-chocolate chain and the impact of strong concentration in the processing and manufacturing segments was studied by Catherine Araujo Bonjean and Jean Brun and UNCTAD.[38]

There are also a few studies that emphasize the effects that sector policies have on farmers' integration into the global cocoa-chocolate chain.[39] Often interconnected with the study of policy issues is the aspect of economic upgrading. Here, two main topics can be distinguished: studies on upgrading of the local processing sector and smallholder farmers. For instance, Jan Grumiller et al. provide policy advice based on their sectoral analyses and conclude that policies should further promote local value added through the processing of cocoa beans in origin countries.[40] Departing from challenges to actually expand local processing, Shashidhara Kolavalli and Marcella Vigneri suggest achieving economic upgrading by maintaining high-quality cocoa.[41] Anna Laven discusses several ways that cocoa farmers have successfully upgraded through capturing higher margins of unprocessed cocoa.[42] The focus on the potential improvement of farmers' benefits with their integration into the cocoa-chocolate chain is also discussed by María Roldán, Ingrid Fromm, and Robert Aidoo, as well as Doussou Traoré.[43] While the former suggest that an improved understanding of the cocoa-chocolate chain might help to derive some more benefits for cocoa producers through improved relationships in the chain, the latter explores theoretical opportunities and constraints of cocoa farmers' revenue-raising through the means of diversification, without field surveys. Through an approach mixing political theory and GVC, Franziska Ollendorf focuses on the producers' level of the cocoa-chocolate chain and investigates the effects of farmers' participation in sustainability certification programs, while placing a special emphasis on linked changes in power positions at the local level.[44]

There are very few historiographic works on cocoa applying a GVC approach, and only a limited number of social scientists who study cocoa from a GVC perspective incorporate historic elements. Historiographic studies on cocoa may be classified into three areas of focus: the early history of cocoa and chocolate in Mesoamerica, the rise of chocolate consumption in Europe, and the spread of cocoa production in the former colonies.[45] It is in the latter field that some elements of GVC can be identified. One important historiographic study explicitly applying GVC was done by William Gervase Clarence-Smith, who describes the different historical stages of the cocoa-chocolate chain.[46] A review of economic history of cocoa applying GVC was realized by S. Jayasekhar and Isaac Ndung'u, who explicitly applied GVC to study the development of cocoa history in India in order to carve out how the prevailing governance structure

in the Indian cocoa chain spurred unequal exchange of trade.[47] The sociologists Jeffrey Leiter and Sandra Harding examine the historical factors that led to a decline of cocoa in Trinidad, Brazil, and Ghana applying a commodity system approach to reveal commonalities related to power, labour control, and state action.[48]

From this overview, five main points emerge. Firstly, many studies use the term of 'cocoa value chain' but do not necessarily follow the GVC framework. Further, as illustrated above, we can find some economic studies with a historic perspective, but these do not really apply GVC methods.

Secondly, most studies that explicitly refer to economics and GVC theories usually put their focus on the lead firms' power and governance strategies, but there are also a number of 'value chain' works that describe the organization of the value chain and seek to identify its impacts on farmers looking for the potential benefits of inclusion in the chain or of their participation in sustainability interventions. A standard reference in cocoa studies became the biennial cocoa barometer by Antonie Fountain and Friedel Hütz-Adams, who continuously document developments in the cocoa-chocolate chain and their impacts on cocoa farmers.[49]

Thirdly, several GVC studies also seek to feed into policy deliberations and in some cases provide explicit policy recommendations. A number of authors have published their work through international agricultural development organizations.[50] These institutions are mainly interested in the adding of value at the local level (International Food Policy Research Institute, IFPRI), the assessment of risks in the cocoa-chocolate chain (World Bank), in the understanding of the market structure and effects of concentration (United Nations Conference on Trade and Development, UNCTAD), and options for farmers' improvements of livelihoods (Food and Agriculture Organization of the United Nations, FAO). Further, in many publications, the economic sustainability of the cocoa-chocolate chain is one significant feature, often tackled in the context of sustainability certification or recently also by companies' in-house sustainability schemes.[51] With a few exceptions, these GVC studies look at the farm level from above.

Fourthly, barely any study using a GVC approach starts at the farm level, or considers the local contexts. We only found the study by Adeolu Adewuyi, Musibau Babtunde, and Abiodun Bankole, where they start mapping the value chain at the farm level; however, not surprisingly, the main aim is to give a policy recommendation in order to improve the position of Nigerian cocoa farmers and exporters in the international market.[52]

Fifthly, the integration of sustainability issues into GVC is a relatively new development. It seems to partly reflect the rising consumer awareness in the Global North and demands of more fair and equitable supply chains, where most of the GVC authors are based. Clearly the GVC and the governance literature is evolving fast; another example for this can be found in Stephanie Barrientos et al., where the authors include the 'social upgrading' concept in the GVC approach. The authors conclude that even environmental upgrading may be included into GVC frameworks.[53]

It would therefore seem that the cocoa case mirrors the theoretical set of GVC outlined above. Whereas there is a tendential focus on governance patterns and the mapping of organizational dynamics and outcomes, research applying GVC also

focuses on upgrading strategies and their institutional environments. All identified studies go beyond national borders and most of them include the roles of the transnational companies in the chain.

Although *approches filières* cocoa studies may tend to focus more frequently on a single country, nevertheless, similar to GVC studies, they comprise important aspects of corporate governance and power, as well as competitiveness. As with GVC, complete analyses of the cocoa-chocolate *filière*, from the bean to the chocolate bar, are rare. However, given the concentration dynamics in the global cocoa-chocolate chain and the increase of the value that has been captured by downstream activities in consuming countries over recent decades, some researchers began to apply the *filière* concept to pay greater attention to such transnational trends in the chain. For instance, Dorin or Christophe Alliot et al. shifted the established focus of evaluating value sharing from producer price shares of the export price to the producers' shares of the price paid by the final consumer in Europe or the United States for a chocolate bar,[54] thereby revealing patterns of the increasing asymmetries in value distribution.

These studies imply questions of private governance (especially of the main exporters), power asymmetries, patterns of value distribution, and policy effects; however, these topics had been already treated in earlier *filière* studies. In 1998, at the dawn of liberalization in Ivory Coast, Antoine Legrand offered one of the most important field surveys demonstrating that liberalization reduced the weight and influence of cooperatives in favour of international firms.[55] Subsequently, Bruno Losch explored the 'missing element' of the by then hardly studied role of transnational exporters in Ivory Coast's cocoa chain. Losch worked on governance of transnational corporations within the Ivorian sector, and started reasoning in terms of resistance of local export firms, finally observing a brutal takeover of the export sector by the transnational giants.[56] A similar process was also observed in Cameroon by François Ruf, with a large part of the added value captured by these firms.[57] Actually, these *filière* approaches during the period of liberalization of the cocoa sector in Ivory Coast and Cameroon show highly interesting results. Expatriate staff sent by transnational corporations to cocoa-producing countries to consolidate their presence in Abidjan or Douala genuinely acknowledged that the liberalization of the cocoa sector was a splendid opportunity. They discovered that it was not so difficult to control the local trade of beans from the farm gate to the port, and to capture the margin at the expense of the disappearing local exporters. Farmers did not benefit much from this change.

Dorin offered the very first complete analysis of the Ivorian cocoa chain, studying the price formation and value sharing throughout the cocoa-chocolate *filière*, from Ivorian farmgate bean to tablet of dark chocolate sold in a French supermarket.[58] In 2001, 61 per cent of the price of a dark chocolate bar went to chocolate manufacturers and retailers, as opposed to less than 6 per cent to Ivorian producers. The global liberalization process has not only fostered processes of concentration among firms downstream (confirmation of an oligopsony of multinationals engaged in fierce competition), but also the exertion of buying power upstream, particularly over farmers. More recent AF studies, such as that of Alliot et al., show a similar if not worsening sharing process in

the 2010s.[59] These studies are good examples of the recent trend towards mixing GVC and AF approaches. In the context of liberalization and an increased firm concentration, Catherine Araujeau-Bonjean, Gérard Chombas, and Jean-Louis Combes measured the impact of these developments on the poverty of smallholders and distribution of wealth in the chain in Ivory Coast.[60] These *filière* approaches during the liberalization period, at the turn of the 1990s/2000s, generated many *filière* studies in francophone cocoa-producing countries, giving strong attention to the changing governance and increasing domination of the transnational firms in the domestic cocoa trade.

Another emphasis of AF on cocoa is on the international competitiveness of both countries and firms. In 1990, Paul Jouve and Hubert de Milly coordinated a survey about the competitiveness of the cocoa *filières* for the French Ministry of Cooperation. Their survey covered several countries—including Indonesia, which was still an unknown emerging cocoa player. This survey had the clear objective of supporting the Ministry in its design of development-cooperation policies. The focus was mainly on producers' strategies and their dependence upon available forest. Moreover, the survey also tried to answer the question of whether investments in the first transformation steps (bean grinding, mass, butter, powder) help to make cocoa farming more sustainable and competitive at the origin-country level.[61]

Thirty years later, the answer is still unclear. On the one hand, investments in the grinding industry in Singapore and Malaysia are still operational but did not help to save cocoa plantations (although it may have played a role in the resistance of cocoa smallholders and traders in the neighbouring Indonesian island of Sulawesi). On the other hand, in West Africa, investments made by the giants of the grinding industry look essential to the sustainability of their own business, partly by taking over local exporters, as already mentioned above. Moreover, AF studies show that the grinding giants built monopolies working through clusters of cocoa farmers organized within 'cooperatives', which are bound and partly controlled by them through 'sustainability' certification programs.[62] As the same international firms apply a similar strategy of vertical integration in most cocoa-producing countries, the old question of competitiveness between countries may look almost secondary to the competitiveness between firms. Cocoa in the 2010s and 2020s is an illustration of the phenomenon that Jacquemin and Rainelli in 1984 described as *'Filières de la nation et filières de l'entreprise'* (nation chains and company chains).[63]

Countries do compete, following at a different level the rules of cocoa cycles during four centuries with costs of production increasing with the deforestation process.[64] The key role of the existence of abundant virgin rainforest land for the expansion of cocoa production in all cocoa frontiers has been captured by Ruf's concept of the 'forest rent'. In his study on cocoa cycles, Ruf describes the evolutionary relation between migration movements of farmers into the tropical forest areas in order to cultivate cocoa and to benefit from the initially high fertility of the soil—the forest rent—which degrades after some decades, and thus leads farmers to open new production frontiers in new forest areas. The importance of producing countries is deemed to degrade once this forest rent has been exhausted and production costs therefore rise—a process that could be

observed in several countries at regional and national levels during different periods (Central America in the sixteenth century, Brazil at different periods, Eastern Ghana and Eastern Ivory Coast in the mid-twentieth century, Malaysia in the late twentieth century, Indonesia in the early twenty-first century).[65]

Alliot et al., along with Frédéric Amiel, Yann Laurans, and Alexandre Muller, have also described how, in the recent period, Malaysia almost disappeared as a cocoa-producing country. They depict patterns of the progressive but powerful concentration of the grinding and chocolate industries (ADM Cocoa being swallowed by Olam and Cargill, and Cadbury having merged with Kraft to Mondelez Int., among others) thereby demonstrating the locus of industry competition. As reminded by recent studies, only four major cocoa grinders and around ten major chocolate manufacturers are creating a bottleneck of cocoa trading and processing through which the produce of millions of producers in tropical countries has to pass in order to reach millions of consumers, mainly in Northern countries.[66]

Of course, despite a potential differential in the nations' adoption of technical breakthroughs prepared by cocoa farmers themselves and possibly multinationals (both often more creative than national research institutes), the fundamentals of cocoa competitiveness per region—such as labour costs, access to forest land, and rainfall patterns—remain important. In 2003, when E. Freud et al. compared the competitiveness of the cocoa *filières* in Ivory Coast, Ghana and Indonesia, the book started with a strong chapter about the physical environment and natural resources available to cocoa farmers in each country.[67] Relatively high labour costs in Ecuador and Peru do not prevent these countries from triggering new cocoa booms. The intensive use of clonal material (developed by a family in Naranjal in Ecuador some thirty years ago), forest clearing, and irrigation with a low cost of energy partly compensate this relatively high cost of labour. However, for decades, they were condemned to remain second-rank producers, far behind West Africa. In 2009, a brief comparison of labour costs in several cocoa-producing countries, by François Ruf and Andres Tschannen in a study of the Jamaican cocoa sector, reflected reasonably well the rank of each country as exporter of the beans.[68]

In several AF studies, the history of cocoa also plays a considerable role. For instance, the cocoa and coffee competitiveness studies respectively coordinated by Jouve and de Milly, and Benoit Daviron and W. Fousse, for the former French Ministry of Cooperation, start from the historical dependency of cocoa and coffee (to a lesser extent) upon forests and migrants, before looking at middlemen, exporters, grinders, and end users.[69] Actually, most francophone economists, geographers, and sociologists who work on many aspects of the cocoa-farming systems do not pretend to be historians, but certainly consider themselves as fervent users of history. This includes the work done on *filières*. For example, in Ivory Coast, history is essential for understanding the emergence and domination of the 'northerners'—coming from neighbouring countries, but mostly Burkina Faso—in the domestic cocoa trade and in command of 'cooperatives'.[70] However, we did not find historians clearly referring to AF, at least in cocoa stories.

The spread of 'sustainability standards' in the cocoa sector has generated an impressive amount of both GVC and AF studies referring to these standards. However, paradoxically

this has generally been without evaluating their full environmental and social costs. Over the past forty years, the world price of cocoa has been rapidly declining (collapsing to $2,300 per ton in 2020 from approximately the 2020 equivalent of $13,000 in 1977) because of these externalized costs—including the reproduction of labour, supported by migration, and deforestation. AF studies started to look at these costs before GVC, showing that the reproduction of forests as the main and historical factor of production of cocoa was not integrated in the world price, which could be somehow compensated by subsidies.[71] However, migrant labour and deforestation costs are not the only ones to be externalized. There are other environmental and societal costs on top. In this context, it is interesting to note that the first study of the cocoa *filière* really taking all hidden costs into account was funded by an institution aiming at policy interventions, when the *Agence Française pour le Développement* (AFD) commissioned a study to evaluate the hidden costs of cocoa *filières* and the impact of sustainability standards in Ivory Coast and Peru.[72] This confirms the historic link between AF studies and public policies.

To our own knowledge, this *filière* approach conducted by Alliot et al. was the first one to quantify all the hidden societal costs. In Ivory Coast, starting from an export value of $3,600 per ton of cocoa beans, deforestation accounts for approximately $500 (14 per cent). They also evaluate child labour at $200 (6 per cent) and missing essential services around $450 (13 per cent), but the main hidden cost is the under-remuneration of smallholders, around $1,400 (39 per cent). The comparison with 'sustainability' standards does not show much difference.[73] Also in 2016, the work done by Vincent Fobelets and Adrian de Groot Ruiz, and coordinated by the Sustainable Trade Initiative (IDH), aimed at quantifying the externalities within the cocoa sector, and delivered similar results to the previous study.[74] Further, the European Commission asked CIRAD researchers to develop a methodological framework for a synthesis of global value chain analysis and *filière* approaches, integrating the issues of inclusive growth and environmental and social sustainability.[75] This has not yet been applied to Ivory Coast and Indonesia but tested in the cocoa sectors of Papua New Guinea and Cameroon.[76] The approach is guided by four framing questions: What is the contribution of the value chain to economic growth? Is this economic growth inclusive? Is the value chain socially sustainable? And is the value chain environmentally sustainable? These are to be answered applying a four-step analytical process (functional, economic, social, and environmental analysis), where evidence-based indicators are applied to each domain.

Approches Filières, Global Value Chains, and the Hidden Costs of Cocoa Production

The smallholder cocoa-plantation economy in Southern Ivory Coast developed in sparsely populated areas. Its rapid expansion since the beginning of the twentieth

century can be explained by the mass influx of migrants coming from neighbouring regions that were ecologically unsuited to cocoa. In 1960, following independence, the easy access to the still abundant forest land was reinforced by Houphouët-Boigny's policies and migrants literally invaded the forest and converted it into cocoa farms. Around 1980, this history generated cocoa farms with a wide range of surface—around seven hectares on average. In 2020, the demographic change induced by continuous immigration and by the emergence of the second and third generation of cocoa farmers widely contributed to the almost complete deforestation of the country and the reduction of farm sizes. The collection of hundreds of thousands of tons of cocoa from a huge number of remote farms difficult to access requires a large network of middlemen who conduct the marketing activities between farmers and exporters, which after the liberalization of Ivory Coast's' cocoa sector are mainly the transnational lead firms from the processing segment while prior to the reforms particularly French firms dominated the international marketing. In most cases, these networks are made of local traders with shops and storage facilities in small towns (*traitants*) who fund the collectors of the cocoa beans (*pisteurs*), who collect beans from farmers. The *traitants* in turn deliver the beans to the processing companies. At independence, the *traitants* were almost all foreigners, mostly of Lebanese origin. Since the 1990s, sons of migrant farmers facing a shortage of land have also become *pisteurs*.[77] In the 2000s, policies aimed at supporting smallholders, promoted cooperatives. These often received the support of transnational companies, looking to secure their supply of beans. Most *traitants* and many *pisteurs* took this opportunity to upgrade their activities and their share of the added value by converting their business into cooperatives and transforming themselves into 'presidents of cooperatives'.

Unlike Ivory Coast, cocoa remains only marginal in Indonesian exports. However, it has more importance at the level of Sulawesi, the main cocoa-producing island. Sulawesi largely follows the universal pattern of migration and deforestation described for Ivory Coast, as many Bugis (an ethnic group from South Sulawesi) and Balinese migrated into the Sulawesi forests to establish cocoa farms.[78] This migration began with the Darul Islam/Islamic Armed Forces of Indonesia (Di/TII) post-independence movement in the mid-1950s, which introduced cocoa from Malaysia as a means to fund their rebellion. They were stopped in the late 1950s by the national army before having time to implement their plans. But in the early 1970s, when the price of cocoa skyrocketed, all the elements were gathered to trigger a new cocoa boom: availability of planting material in two 'experimental' plantations set up by the rebel movement, knowledge about cocoa among a number of ex-rebels, and proximity of the forests. With some ex-rebels and economic migrants based in Malaysia in the 1970s, the 'Bugis network' was fully operational for an accelerated boom in Sulawesi, becoming visible in the 1990s.[79]

What can be learnt from the two examples, similar to the amazing growth of global economies linked to the 'unlimited' access to fossil energies, the continuous growth of cocoa production in both countries, and the world supply of cocoa generally, has been determined by the 'unlimited' availability of tropical forests to be cleared, simultaneously generating access to land and to a precious 'forest rent'.[80] Although it may require

just a hundred years to rebuild a primary tropical forest, there is a similarity to oil reserves, in that the basic factors of cocoa production (the tropical forest and its rent) are fading in the twenty-first century. Humans have found a way to make these forests available for the cocoa industry less through capital investments than by a sudden flow of labour in the form of massive migration waves. With cocoa, owing to smallholder inventiveness (such as the development of labour-saving methods to clear the forest, or the establishment of an abundant food supply during pioneer years) and sobriety (patience to wait until the cocoa grows, and low nutritional standards), the tropical forest, often under the initial status of 'common-land' in West Africa, could be exploited with a very limited amount of capital. Actually, the main capital of cocoa-farming communities are the cocoa trees together with the farmers' knowledge. This translates to millions of West African migrants over the twentieth century who became cocoa smallholders—'foot-infantry' of the chocolate industry. Over decades, as the remaining forests are increasingly far from the coasts and hence the ports to ship the cocoa to the 'developed world', societies reinvent similar *filières* to bring the beans from the remote farms to the industry.

At the turn of the twenty-first century, the chocolate industry started to realise the danger of diminishing reserves of forests for supplying its factories. Like many other *filières* or value chains, the cocoa industry took the opportunity of the declining role of public, in favour of laissez-faire policies in developing countries to build networks of influence. For example, supposed 'support' programs for cocoa smallholders were selective: only those considered as the most efficient received any support, with others finding themselves effectively excluded.[81] The industry then implemented the so-called sustainability certification programmes, with the official goal of establishing 'sustainable agriculture', and at the same time of keeping oversight via third-party certification agencies. Later on, during the second half of the 2010s, due to the complexity and high cost of certification programs (amongst other things), transnational corporations developed their own projects. For instance, in Ivory Coast they belatedly but massively pushed farmers to increase the use of chemical fertilizers through the credit schemes they facilitate. After years of deforestation and soil depletion, farmers need to fertilize their cocoa farms; however, this push to intensive chemical fertilizer use may well be interpreted as another way for extending the use of fossil resources and keeping the cocoa price low.

Nevertheless, several GVC studies and reports focus on 'upgrading opportunities' to the farmers' benefit via certification, idealizing the impact of field schools, training, fertilizer, and credits. But they are rather quiet on the increase in the power of transnational processing and chocolate-manufacturing companies, and the concentration of firms and capital, in which there is a clear link between the consumption of natural resources and this increase of power within the *filière*. In other words, the GVC have been neglecting the hidden environmental costs of cocoa for some time. In contrast, several AF studies have looked at the historical conditions of cocoa booms and considered these costs to be at the core of the cocoa economies.[82] By applying the Ricardian concept of differential rent, forest rent may be defined as the difference in cost between a

ton of cocoa produced on a plantation created after forest clearance and a ton of cocoa produced by replanting on fallow land or after felling of the first plantation. As long as forest is available, cocoa farmers try to avoid these additional costs and tend to clear more trees.[83] The highest rent is obtained by clearing a true primary forest, but there is still a rent to tap with a fifteen-year-old secondary forest compared to grassland fallow.

In Ivory Coast, our first attempt to partly measure this differential was done during the establishment phase of a plantation. In terms of labour, and assuming that farmers do not use chemical inputs but use their own methods of clearing and maintenance, replanting required twice more labour days than planting after clearing forest.[84] In Indonesia, an attempt to evaluate more precisely the forest rent in 1997 concluded that this came to 10 cents per kg of cocoa, the difference between the production costs of cocoa planted after fallow land (46 cents/kg) and cocoa planted after forest (36 cents/kg). In other words, as the world price of cocoa is widely determined by the supply dominantly delivered by clearing forests, one could estimate the externalized and hidden costs of deforestation at approximately 30 per cent of the production cost.[85]

Conclusion

There is still a need for more case studies, especially in the major cocoa-producing countries, to evaluate the relevance for major consumers, such as the European Union, to have an impact on the reduction of externalities in the cocoa *filières*. However, as noted in a report on Papua New Guinea, a diversified farming system is as important as all other improvements in the cocoa chain.[86] Regardless of whether the frame of reference is the 'global value chain' or '*filières*', all the economic, social, and environmental aspects of sustainability imply a consideration of the diversity of commodities and the activities of primary actors (usually smallholders).

The main limitation of the GVC approach for the study of cocoa economics is the perception that everything is being driven by demand and the power of lead firms, who in turn are the main actors influencing the governance of a value chain. Another limitation, which GVC and AF share, is the relatively small number of full studies investigating cocoa chain/*filières* dynamics from consumer to producer. The full 'GVC' theory is not that much concerned with smallholders and middlemen realities—possibly partly for pragmatic reasons, as field surveys are costly and detailed strategies of lead firms regarding producers are far from being transparent.

Although the *filière* approach might not focus on economic upgrading and multinational strategies and/or global governance models, it does reveal significant insights into the main challenges between actors. This is being done by starting with the farming system, the village-level dynamics, the historical processes within the producing regions, and further 'contextual elements' that are essential to understand a certain 'sector'. The migration processes (as well as their driving forces and/or consequences to forest), the production of a certain commodity such as cocoa, and the complexity of

intermediaries, have deep effects on national supplies and on the international markets. At least within the cocoa world, the *filière* approach takes more into account the capacity 'from below'. In addition, we frequently see *filière* studies over a long period of time (historical component), which is a essential to identify the smallholders' innovations and understand their interests and changes.

Finally, this cocoa example reminds us that politics and societal aspects play a role in the emergence of research methods and theories. Unlike the UK and Ghana, the political and economic links between France and Ivory Coast continue to be tight. Ivory Coast experienced fifty years of political stability from the pre-independence period in late 1950s until 2002, and at least thirty years of increasing prosperity. Meanwhile, Ghana faced several coup d'états, and economic collapses. One of the consequences was the limited presence of British social scientists and more generally foreign researchers in the Ghanaian cocoa fields for twenty years. On the other side of the border, in Ivory Coast, the strong presence of French research institutions and hundreds of French researchers facilitated the carrying out of field surveys, which fed their research. This logically used as a basis the *filière* approach developed in France in the 1980s, then relayed by Ivorian agricultural economists and sociologists. Moreover, until the late 1980s, there was also a considerable demand from many French counsellors based in Ivorian ministries, willing to interact with diverse domestic segments, where the *filière* approach could be used. Meanwhile, societal trends in the consumer countries—for example, the emergence of sustainability as a daily subject in the Global North—find their way into established theories, as the 'social upgrading' case demonstrates.

It is clear that the GVC and the *filière* approaches were highly heterogenous internally, sometimes without clear boundaries, but now follow the winds of globalization and converge, voluntarily or not, as some more recent studies of the cocoa sector show. The trend will be, and already is, to evaluate the costs externalized by the *filière*/chain, and thereafter to find the mechanisms to fund the re-internalization of these social and environmental costs. Still, this will be not simple, since this approach sheds light on conflicting interests among the actors. As Michael Odijie or Ruf et al. among others remind us, fertilizers are clearly in high demand among African cocoa smallholders, but these may finally fail to serve the interests of their buyers.[87] As reminded by researchers such as Odijie, G. Lescuyer, the co-authors of this chapter, and many others, diversification is key for cocoa smallholders; however, this is not necessarily a priority for the cocoa buyers along the *filières*—despite the current formal speeches.

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CHAPTER 3

ANTI-COMMODITIES REVISITED

Food, Culture, and Resistance

SANDIP HAZAREESINGH AND HARRO MAAT

The antecedents of the concept of anti-commodity lie in a body of critical research that sought to revisit the social histories of commodity production and consumption from the vantage point of societies in the Global South in response to Eurocentric frameworks privileging Western perceptions, actors, and origins. Here, the crucial initiatives were the Commodities of Empire and the related Commodities and Anti-Commodities projects that came to the fore during the period 2007–2013, providing the framework for annual workshops that led to a series of publications, most notably a special issue of the *Journal of Global History* in 2009.[1] This research attempted to incorporate in a single analytical framework both global spatial movements and exchanges and local staying-in-place of plants and crops with a view to revealing complex commodity histories beyond colonial narratives of successful export-oriented production in colonized societies. One important element identified by this scholarship was the continued resilience and viability of peasant modes of production anchored to local knowledge systems that enabled the maintenance or adaptation of preferred crops and foods in various parts of the world.

This work also drew on previous suggestive studies of peasant agency and creativity, particularly in the context of the main staple food crop of the Global South, rice—notably Paul Richards's work on African farming systems and Francesca Bray's analysis of the productivity of Asian smallholder paddy agriculture.[2] Simultaneously, Judith Carney's and Richard Rosomoff's important book, *In the Shadow of Slavery*, demonstrated how enslaved Africans brought a body of farming knowledge that enabled them both to survive in and to Africanize the food systems of the plantation societies of the Americas.[3] It painted a picture of resilience and agency maintained in the face of overwhelming odds while providing fresh insights into the pervasive influence of African plants and crops in the Atlantic World as they moved from the south to the north. Researchers involved

in the Commodities and Anti-Commodities project specifically sought to give prominence to local counter-movements unleashed by colonial powers' agrarian intrusions into, and dislocations of, colonized societies.

Anti-commodity was conceived as an original lens and a fresh perspective to re-examine local peasant agency in the context of colonial agrarian policies, paying due attention to James Scott's exhortation to understand everyday forms of peasant resistance, 'the prosaic but constant struggle between the peasantry and those who seek to extract labour, food, taxes, rents and interests from them'.[4] This research was brought together in an edited collection in 2016, *Local Subversions of Colonial Cultures: Commodities and Anti-Commodities in Global History*, which defined anti-commodity as:

> an enduring form of production and action in opposition either to actual commodities or to wider social processes of commodification, rather than simply a momentary form of protest or reaction. It refers to a range of local productive processes associated with values other than the purely economic, that are either maintained from the past or originally created to confront the various modes of commodification primarily but not exclusively unleashed by European colonial hegemonies.[5]

This definition has been seen as a productive starting point for further exploration of the subject in subsequent studies, discussed in the next section.

Anti-Commodity Literature in Historical and Contemporary Contexts

Primarily focusing on the colonial period, authors in the *Local Subversions* collection employed the concept of anti-commodity with different emphases reflecting the diversity of the thematic, historical, and spatial contexts of their research as well as their particular theoretical preferences. The concept's versatility meant that it could be employed to productively define a process of sanitary resistance against disease-causing cash crops amongst cultivators in late nineteenth-century Punjab,[6] an unstable pattern of smallholdings in the shadow of commodity plantations during the same period in Cuba,[7] as well as to understand a series of labour strikes against the colonial commodity railway network in late colonial Kenya.[8]

At the same time, a striking feature that emerged from the essays was the importance of food-crop sustainability as a powerful motive for engagement in anti-commodity production. Hence, in nineteenth-century Sierra Leone, free peasants reworked the 'red' and 'white' rice varieties of the plantation system through astute seed-preservation choices geared to achieving food security;[9] while in early twentieth-century Sumatra,

smallholders persisted in cultivating 'upland rice' to maintain their diverse farming systems in the face of the colonial drive to intensify the production of cash crops.[10] Similarly, in nineteenth-century western India, peasant resistance to growing American varieties in favour of local, country cotton was based on the latter's traditional complementary role in a diverse cropping system designed to ensuring sustainable millet-based food supplies.[11] Moreover, staple foods such as rice were also performative of local cultural identity,[12] involving sacred ritual practices that could also sometimes carry religious injunctions against growing 'the white man's crop'.[13]

It is perhaps not surprising that food featured prominently in these exemplars of historical anti-commodity practices. Of all human products, food embodies perhaps most convincingly the primacy of use over exchange values. As producer of life, health, and culture, food possesses a range of values that precede in importance economic and market attributes and have often provided the cultural basis for political and economic autonomy. In a recent historical study of Haiti, Johnhenry Gonzalez has shown how runaway slaves set up rural communities based entirely on subsistence agriculture with cassava, yams, and sweet potatoes replacing sugar, thus 'decommodifying' colonial sugar plantations. Known as *marronage*, this process rapidly came to characterize the entire country with the result that Haiti evolved into a 'maroon nation':

> The Haitian Revolution succeeded because the former slaves were able to create a system of property ownership and labor organization that was new but also rooted in West African economic and cultural lifeways, as well as the system of semi-autonomous provision gardens cultivated by slaves in the colonial era. In place of the sugar economy and its deadly marriage of slave labor and industrial agriculture, former slaves built an economy that was completely nonindustrial, and a labor system based on decentralized and autonomous production.[14]

Indeed, in Haiti, *marronage* formed the launch pad for the 1791–1804 revolution that ended both French colonial rule and the early industrial capitalism of the plantation economy on the island.[15]

The anti-commodity concept has been effectively deployed in some recent studies of crop commodification in the contemporary world, notably an essay by Andrew Flachs and Glenn Davis Stone that examines farmer knowledge in relation to the commodification of rice, cotton, and vegetable crops in Telengana, southern India. The authors make the important point that the least commodified crops (i.e. the vegetable and indigenous rice food crops grown for domestic consumption) are also those that embody the highest level of farmer knowledge rooted in local farming traditions and food culture; however, they also suggest that these crops are less important to local livelihoods than the hybridized varieties of cotton and rice where knowledge and expertise reside in agencies external to the farming household. They conclude that local knowledge of crops, a key feature of anti-commodity production, is destined to pass and give way to 'brands sold by experts' in the course of time.[16] This view is perhaps unduly pessimistic, as it underestimates the distinctiveness of food crops in relation to commercial

crops and their enduring primary importance in the eyes of small farmers both for maintaining food security and preserving cultural heritage—that is their non-market and anti-commodifying attributes.

Indeed, these dimensions have emerged as particularly relevant to the radical critique of the dominant commodified industrial food system historically originating in plantation agriculture. This critical perspective, which has been gathering momentum in recent years, identifies the narrative of 'food as commodity' as the hegemonic discourse about how our present food system is valued as a self-evidently global force for good by focusing exclusively on its tradable features.[17] In fact, geared to producing ever cheaper food through large-scale crop monocultures, this system has, over the past couple of centuries, contributed to environmental destruction, climate warming, loss of cultural agency and biodiversity, and unhealthy diets globally.[18] Instead, an alternative conception of 'food as commons' has been proposed whereby 'the multiple dimensions of food, other than the economic ones, are as equally and properly valued', insisting that the main activities associated with food—cultivation, collection, preparation, consumption, and taste—are inherently cultural practices.[19] In this context, small farms and farmers are viewed as pivotal as they often perpetuate local traditions and cultures of low-energy diversified cropping, thus creating local autonomies from global capital flows underpinned by a 'de-commodifying' logic as compared with large agricultural enterprises.[20] They are therefore seen as crucial to ecologically sustainable and heritage-preserving food futures, potentially heralding a change of direction in the historical trend towards commodification.

Another study of commodification, authored by Dominic Glover and Glenn Davis Stone provides a rich, nuanced analysis of the marketing of 'heirloom rices' grown historically as an anti-commodity crop for cultural and spiritual purposes in the Cordillera mountains of the Philippines. Interestingly, the authors suggest that commodification of these indigenous rices, arising from new opportunities to access an extended network of exchange, actually represents a strategy deployed to benefit the small farming communities and preserve aspects of the original anti-commodity rice culture amidst the vastly changed economic circumstances of the region. However, they view this process 'whereby the rice and its surrounding culture are being changed in order to preserve them' as inherently risky and difficult to achieve in practice.[21] In contrast, Ronald Nigh's and Alma Gonzalez's study of alternative food networks in Mexico and France conveys a more hopeful perspective on this process of partial commodification. These networks are viewed as forms of 'anti-commodity production' involving, in Mexico, organic food produce with an emphasis on taste and nutrition, rural-urban linkages between producers and consumers to promote social solidarity, and a system of participatory certification that provides transparency and mutual learning. The networks also offer opportunities for sharing agroecological values and practices such as seed saving, diversification of crops, chemical-free production, emphasis on traditional local foods, and the organization of women farmers' cooperatives. Such alternative foodways have sprung up in opposition to the dumping of cheap calorie-rich food by transnational corporations such as Walmart, which has had an adverse impact on the health of the population.[22]

While also focusing primarily on the contemporary world, another body of recent research has sought to investigate the historical dimensions of farming and food systems, moving away from presentist economic frameworks of analysis centred on price-driven livelihoods. This research moves beyond conventional archival history and typically deploys interdisciplinary and participatory methods involving archaeology, cultural anthropology, ethnobotany, and oral history. It is concerned both to reassert the importance of non-market, often non-secular beliefs and values inherited from the past through which farmers 'know' and prioritize their crops and foods and to challenge deficit views of pre-colonial food systems in the Global South. In these studies, 'history', in the sense of remembering and valuing local pasts as 'cultural memory', remains an active and cherished influence on the present and future of farmers' lives.[23] Cultural memory continues to shape alternative epistemologies that enable farmers to cultivate 'happy landscapes' offering spiritual and emotional sustenance.[24] Subject to continual reassessment, history can also reveal the vitality of pre-commodified indigenous food crops, such as the pearl millets used by West African farmers to weather the worst drought recorded in the last millennium.[25] It thus also furnishes insights on past strategies used by farmers to meet climatic and other challenges, which remain relevant to the redesigning of future food systems.[26] This research perceives the past and its relationship to the present and future as more open, fluid, and changeable than Glover's and Stone's more conventional view, whereby ways of life that shaped the production of anti-commodities 'have passed into history and will not return'.[27]

The two case studies that follow further elaborate on the relationship between food and anti-commodity production, following lines of inquiry suggested in *Local Subversions* as well as in the more recent literature discussed above. In the first part, we return to the concept of *marronage* but move the historical spotlight from Haiti to the British and Dutch colonial territories in the Caribbean where both colonial powers established an extensive plantation sector based first on the labour of enslaved Africans and subsequently of indentured Asian labourers. We show how fleeing to the countryside, escaped slaves created new maroon communities that produced impressive food surpluses based on an alternative, anti-commodity system of self-sufficient agriculture. In the second part, we travel to the post-colonial world with the primary aim of shedding further light on capabilities derived from cultural heritage, which are increasingly recognized as crucial to anti-commodity production. Based on oral history interviews with women farmers, we explore women smallholders' traditional knowledges and rituals pertaining to *ragi* or finger-millet cultivation in the State of Karnataka in southern India.

Marronage as Anti-Commodity Food Production

The coastal region of the Guianas lies to the north of the Amazon basin and was for several centuries divided between British, Dutch, and French colonial powers—British

and Dutch Guiana becoming the independent states of Guyana and Suriname. The colonial history of the Guianas has strong affinities with the plantation societies in north Brazil and most Caribbean islands where commoditization extended to human beings. The slave trade and, after the abolition of slavery, indenture and other forms of recruitment led to a massive global relocation of people who were valued first and foremost as labour resources for the plantation system.[28] The commoditization of labour was directly challenged by revolts and escape by the plantation labour force. *Marronage*, forms of escape from plantation slave labour leading to the setting up of unauthorized settlements in marginal territories, was premised on the belief that escaping slaves could survive on their own farming skills independently of the food provisions on estates. In the Guianas, maroon groups primarily settled in the eastern region of Suriname.

Plantation production relied heavily on overseas trade. Transporting goods was impossible without carriers, cart drivers, boatmen, and transshipment teams. The seagoing vessels had to be loaded with sugar, cotton, coffee, and other plantation products after food items and other imported products were offloaded. The movement of goods and people comprised the essence of the system of slavery and restrictions of movement imposed on the enslaved workforce became one of its many contradictions. The official trade thus drew 'illicit' counter-movements and transactions, creating extensive informal networks within and between plantation economies.[29] The result was a very lively parallel economy that plantation owners and administrators tried in vain to control. Town or public markets evolved into key places where a variety of marketable goods produced or gathered by smallholders were exchanged to supplement their subsistence crops—most prominently fruits, vegetables, herbs, grains, fish, and meats. These markets were almost exclusively run by enslaved people, free smallholders, and maroons with women often playing a leading role; they functioned as crucial nodes in the network of anti-commodity production in enslaved communities' food gardens, on maroon fields, and on the subsistence farms of freed slaves.

In the Guianas, resistance can be seen primarily as a strategy to protect the spaces in which enslaved workers had established an alternative social world rather than simply the result of enduring discontent with the repressive plantation regime. While tasks and work hours were officially set by estate managers, their implementation often allowed the workforce a measure of autonomy.[30] Teams of fieldworkers were able to vary the daily rhythm and specifics of the set tasks according to the size and layout of plantation fields, the nature of the crops, and the period of the growing season. In particular, timber plantations offered substantial operational space, as concessions to fell trees involved areas of forests that could stretch out over hundreds of hectares.[31] Being far away from the estate premises invited the option of *marronage*, which estate managers could try and prevent by conceding more time for the tasks set and for domestic activities such as preparing meals, collecting forest products, hunting game, or trapping fish. Much of the time won from formal duties was spent on growing food crops, hunting and gathering, preparing meals, and convivial eating. *Marronage* was the ultimate act of creating space for living autonomous lives and for doing agriculture differently. The maroons

formed a 'runaway peasantry' that evolved into full-time smallholders following the abolition of slavery.[32]

As a deliberate movement away from commodity production that characterized the plantation system, small-scale farming became an arena where choice and cultural values could be performed. This anti-commodity process included the rearrangement of labour time and a different mode of land use as well as the subversion of existing institutional, social, and economic arrangements to facilitate new patterns of exchange. Maroon farming functioned as the counterpoint to the commodity-focused plantation system. Provision gardens centred on food crops were at the heart of maroon culture, coexisting with less autonomous activities such as working on the fields with cash crops and other tasks set by the estate manager. The gardens were distinct in the way food was cultivated, including the setting up and tilling of the plots, the selection and planting of different food crops species and varieties, and the use of the harvested produce. More than just a choice of particular food crops, anti-commodity production implied specific crop compositions that reflected a concern for food security. For example, combinations of crops or crop varieties were planted at different times of the year to anticipate availability of labour and secure fresh produce over a longer period. These arrangements were also intrinsically connected to norms and agreements about the division of labour within and between households, community demographics, as well as characteristics of soils, landscape, ecology, and climate.

The limitations of historical records make it difficult to reconstruct in detail farming activities on the provision gardens. The best we can do is to read ideologically Eurocentric and racist narratives of colonial observers 'against the grain' to at least partially recover maroon practices and meanings. Most colonial accounts did not consider enslaved communities' farming activities to be 'proper' agriculture. In a 'handbook' he wrote in 1787 for his fellow estate managers, coffee-plantation manager Anthony Blom went into great detail about the fields for sugar, coffee, cocoa, cotton, and tobacco, and provision grounds that were part of the cropping scheme. These official provision grounds (*kostgronden*) were distinguished from 'negro provision' (sic) (*negerkost*).[33] The former contained mostly starchy crops like cassava, plantain, and taro. Food crops were also grown on newly cleared plantation fields as a way to prepare these fields for the main cash crop. A plantation field thus could have either a food crop or a cash crop and sometimes both, as in the observed case of young coffee plantings surrounded by plantains as a shadow crop for three or four years until the coffee shrubs had matured. When cash crop yields diminished, the fields were cleared and left fallow for some years and then planted with new crops.

Blom observed that the enslaved communities divided their fields amongst themselves and grew a wider variety of crops. Pulses, root crops, okra, yam, groundnut, sesame, pumpkin, and watermelon are specified, but there must have been even more, given the items that he and other contemporary observers mentioned in passing such as pepper, potato, various leafy vegetables, fruit trees, and medicinal plants. It is likely that the immediate surroundings of houses and sheds, pathway edges, embankments, and fallow fields offered additional spaces for the cultivation of edible

plants. For plantation administrators, these small patches of land were negligible and their produce a marginal reduction of the economic costs for provisions. For the enslaved communities, however, every plant grown was part of a valuable, if scattered, agroecology that formed the basis of anti-commodity production: establishing this required both intense bargaining and concealment of their own time at the risk of brutal punishment.

Colonial observers also remarked that slaves used particular foods for special occasions—for example, offerings of meat, vegetables, and rice at funeral ceremonies.[34] It is indeed quite remarkable to see rice mentioned in the Guiana context prior to the first experiments with this grain as a commercial food crop, which began in the mid-nineteenth century. As a grain crop it would require substantial labour to make it worth growing as a main food crop. This suggests that enslaved communities planted small patches with rice for additional consumption and ceremonial purposes. It might also be the case that smugglers, trafficking a variety of goods to and from the Guianas, brought rice and foods that were grown in other places. Another possibility is that rice was one of the items exchanged between slaves and maroons, the latter growing rice on a more substantial scale near their settlements probably at least as early as the mid-eighteenth century.

The escaped slaves who formed maroon communities in the Guianas took up farming in ways that combined the cultivation of crops in their compounds as they had practised on the estate provision grounds with crops grown on more extensive fields created by slash and burn of forests. Pursuing runaway bands and tasked with destroying the deserted farm fields he and his men encountered, mercenary soldier John Stedman has nonetheless provided an interesting insight into not only the variety of crops they ransacked but their rapid re-emergence once the soldiers had gone. He refers to 'several cotton and plantain trees, *okera* or *althea* (okra), pigeon peas, maize, pineapples and some rice. All which had again spontaneously sprung up since our last devastation' (p. 294).[35] This indicates that either the same occupiers had returned or that other runaways had arrived and put the same farming space to good use.

When maroon groups became free colonial citizens in the mid-nineteenth century, colonial sources became somewhat less overtly racist and hostile to their lifestyles. The sawmill owner A. M. Coster, writing in 1866 about his visits to maroon villages, was impressed by their friendliness and hard work, which served him well in purchasing logs. The seasonal variety and patterning of food crops emerge clearly from his accounts. Of the main foods, rice and cassava, the first ran out in the dry season when *napi* (sweet potato), yams, and *tayer* (American taro) became more important. Leaves or stems from a Lobelia species, *amaranth* and *tayer*, were used as vegetables, and peanuts appeared to be their favourite ingredients for all kinds of dishes.[36] Distributing crops and varieties in fields and over seasons allowed the maroons to distance themselves from the extreme commodity-focused production of the plantation sector, manage their societies in the way they wanted, and acquire a new social status as a result.

More details about the variation in food crops grown by the Maroons came to light in the twentieth century when agronomists belonging to the colonial agricultural research

station visited the maroon villages. In the 1950s, entomologist Dirk Geijskes recognized the wider significance of the crops in the maroon fields:

> From a more historical perspective it is relevant to point out some imported plants from Africa that are used by the Bush Negroes (sic), such as *agobo* (bambara groundnut) and *bongila* (sesame). It is likely that there are also varieties, of crops still cultivated today, from the time the escaped slaves took them from the plantations.[37]

Geijskes's observation suggests that there were deep historical continuities in the range of crop species and varieties he found in the maroon fields that had persisted from the time these communities had settled. However, the trade and exchanges between Maroons, people on estates, and city markets implied continuous uptake and marketing of newly introduced crops and crop varieties.

Recent ethnobotanical studies on the diversity of crops and other plants in the maroon villages reveal a much larger set of species and varieties. A study in 2015 by Tinde van Andel and her team in two maroon villages—one located in the same Tapanahoni river area that Geijskes visited and the other on the upper Suriname River—found twenty-five of forty-one of the documented species introduced to the Americas.[38] In 2015, most of the same crops were present as in Geijskes's observations from the 1950s, but, using more fine-grained research methods, the team were able to identify a wider range of varieties. In the case of rice in particular, the varieties used by different maroon groups reveal a dynamic stock open to renewal and adaptation. The 2015 study found a similar number (twenty-five) of named rice varieties as in 1950 (twenty-two) but only six of the names overlapped.

A follow-up expedition by the team in 2017 to six maroon settlements on both sides of the Maroni river revealed even more variation. The rice fields from which samples were taken had up to seven different varieties, and three on average.[39] The women who farmed these fields gave very interesting reasons why certain varieties were preferred. They explained that although different varieties are often mixed for storage purposes, seeds are more carefully selected for their specific qualities in the field and expected tastiness as food in the kitchen. Most varieties had a little story attached to the name. The variety Milly, for example, was credited to a runaway woman 'who introduced this rice to the Maroni River in times of slavery when people did not yet live in the forest . . . when they had not yet created villages in the woods' (p. 10).[40]

In this study, maroons and enslaved workers denied the plantation system's attempted dehumanization inherent in their primary status as resources for the production of valuable cash crops for export by initially wresting time concessions from estate managers, which gradually enabled them to establish an alternative world, imbued with their own priorities and anti-commodity values. This took the shape of provision gardens and small farms devoted to the cultivation of a variety of foods and domestically valued crops, which have tended to persist over time. These autonomous spaces were characterized by self-sufficient farming and culinary creativity, as shown by practices such as changes in land use, emphasis on tasty foods, and the naming of different varieties of rice according to their cultural references and historical memories.

Finger-Millet Anti-Commodity Culture in Southern India

The small, self-sufficient farming settlements established by maroon communities on the coastal Caribbean represented a 'counter-plantation system'[41] that remains a historical exemplar of a non-market food system. This section discusses an important aspect of its historical evolution in the contemporary 'food as commons' movement whereby the cultural dimensions of food, including non-secular ways of knowing, are recognized as particularly significant to anti-commodity practices. We focus on women smallholders' cultivation of *ragi* (finger millet) in the region of Kanakapura in Karnataka's Ramanagara district in the context of a campaign to revive the popularity of millets. This part of southern Karnataka has historically been known as *ragi* country—the traditional staple food of local small farmers.

Millets were one of the many crops on the move from Africa, in this instance to India, over three thousand years ago.[42] Finger millet still predominates amongst cereal crops grown, and smallholders cultivate it mostly under rainfed conditions within a diverse cropping system that includes paddy, maize, sugar cane, groundnut, pigeon pea, and a wide range of pulses, vegetables, and fruits. Crops rely primarily on the south-west monsoon rainfall (June–September), which is highly variable in a dry agro-climatic region. Specifically as food, however, everyday consumption of *ragi* has been declining in the villages of southern Karnataka over the past thirty years as a result of the availability of cheap rice introduced by the Indian State's Public Distribution System (PDS) in the wake of the Green Revolution. Some of the farmers we interviewed observed that during this period, 'it became cheaper to buy rice than to grow *ragi*'.

As in Mexico, this cheap food regime has led to the devaluing of traditional micronutrient-rich food crops such as millets and pulses, resulting in poor nourishment and health outcomes for the local rural population, particularly women and children. In response, an influential millet revival campaign has emerged in Karnataka (and other parts of India) over the past couple of decades, spearheaded by farmer activists, organizations, and trade unions as well as by non-governmental organizations (NGOs) promoting sustainable agriculture. The campaign emphasizes millets' nutritional and environmentally friendly advantages in relation to rice, which include richness in protein, fibres, and micronutrients such as iron, zinc, and calcium, which rural women and children in particular have been found to be deficient in; moreover, they have a higher carbon absorption capacity and use water more efficiently, requiring just one fifth of the amount needed for growing rice while also able to withstand higher land temperatures.

One Karnataka-based NGO, Green Foundation, has drawn on local farmer knowledge and use of indigenous seeds to promote their wider take-up by smallholders in the region. To this effect, it has established three community seed banks in Kanakapura, which are run by *Janadhanya—an* association of women small farmers operating as a network of producer groups. The seed banks provide farmers who require them free

seeds in exchange for a commitment to give back twice the amount they borrowed. One farmer, Hombalamma, has acquired a public reputation as an eminent seed saver or *Beeja Matha* (Mother of Seeds). Historically in India, and the Global South more generally, selecting, saving, storing, and reproducing local indigenous seeds have primarily been based on women's knowledge and expertise. In the villages of Kanakapura, girls are taught by mothers and grandmothers how to sow and preserve seeds from a very young age.

'I have no education, but I have knowledge', Hombalamma tells us. 'Men don't have this knowledge and they can't multi-task'. She perceives seeds as living, almost human, entities. 'They will not grow unless nurtured and loved like a child', she goes on.[43] She explains how for the past twenty-five years, she has been preparing and using a pure, organic castor oil derived from castor seeds to coat seeds from indigenous *ragi* and other food and medicinal plants, thus preserving them from pests and insects. This process of seed preservation underlines the ontological relationship between the natural and human worlds whereby seeds constantly reproduce both their own and human life by making food possible. Moreover, with hotter weather and the increased frequency of droughts, seed saving from indigenous plants that have a high capacity to survive such conditions has also emerged as a crucial climate-adaptation strategy. The *ragi* revival movement thus draws on local knowledge and reverence of indigenous seeds as producers of life. Indeed, these are perhaps the crucial cultural values that underpin anti-commodity food production.

Hombalamma and her family enjoy complete autonomy from the commercial seed market and are 'food sovereign', able to grow more than fifty varieties of organic food crops at the optimal time on their land. Finger millet, pigeon pea, and other pulses predominate in a varied cropping system that also includes foxtail millet, hyacinth and broad beans, bottle gourd, pumpkin, tomato, and other fruits. These crops reach maturation at different times during the farming season, thus minimizing risk to food security and ensuring a varied and nutritious diet. 'As I remember from the days of my grandfather, we have been eating tasty, nutritious food from locally raised crops on our farm', she tells us. 'It makes no sense for our bodies to consume foods from the outside that don't give us strength'. Hombalamma keeps what is required to meet family consumption needs and sells the rest in the nearby city of Bangalore.[44]

The proximity of the urban marketplace only an hour and a half away shortens the usual market distance and enables direct contact with consumers: here, the growth over the last couple of decades of 'reflexive consumers'[45] keen on organic local produce, particularly millets, offering superior taste and nutrition to industrialized foods, has provided her and other women farmers with a regular weekly clientele at a busy urban roadside. Here again we find an alternative, localized food network in operation whereby anti-commodity values pervade both production and consumption processes, connecting healthy farming with healthy eating. For reflexive consumers, the act of buying is no longer primarily dependent on price and involves resistance to the desires generated by contemporary capitalist advertising. It expresses in effect an emerging form of demand that is more thoughtful and discriminating, providing an

impetus to wholesome food production methods based on local seed and environmental preservation.

Moreover, as the example of Hombalamma suggests, the 'alternative' desire for the aesthetic, pleasurable, and nutritious qualities of local millet foods is not confined to middle-class reflexive consumers in urban Karnataka. We found that women in the villages were particularly passionate about the tastiness of millet cuisine, and we were often invited to share in a home-cooked meal of a favourite regional dish, *ragi mudde* (finger millet soft balls). From an anti-commodity perspective, taste represents what Hayden Kantor referred to as 'everyday sensory labour' embodying agricultural and culinary expertise that is primarily centred on women.[46] The cultural practice of tasting expresses a sensual appreciation of food quality by these women who see themselves as the custodians of local cuisines and dishes. Now in her late eighties, Gundamma expressed particularly strong views about the preparation and taste of *ragi* and vividly remembers how they used to prepare this millet when she was a young woman. She expressed regret that the grinding stone has nowadays given way to the flour mill where the *ragi* grains are processed into flour. 'When you use electrical appliances, it spoils the taste', she affirms, 'because it already comes out half-cooked':

> When we were cooking stone-ground *ragi*, it used to be aromatic but with mill-ground flour, the *ragi mudde* doesn't have the right smell and texture, and it's also less good for our bodies. Even now, I tell my daughters-in-law, use the stone to grind, see how tasty it will be, see how strong I am from eating stone-ground *ragi*.[47]

The women of Kanakapura see the delivery of tasty and wholesome meals as the rewarding end product of their daily farm activities, as caring for loved ones and protecting the household from the various diseases that continue to afflict life in the villages. They believe that millet foods are currently undergoing a resurgence on account of their superior nutritional value compared with rice. 'Rice is easily digested and passes through the body quickly, whereas *ragi* has more iron content, is digested very slowly, stays longer in the body, and therefore provides more stamina and strength', Devaramma explains. 'In the villages, people have always known this and are now coming back to *ragi*', she continues, observing that 'even in the cities' people were becoming more health conscious and making *ragi* an important part of their diet.[48] Our conversations also suggest that many farmers are reverting to traditional local varieties of *ragi* and of other crops like groundnut, pigeon pea, paddy, and oilseeds, using home-made manures such as *jeevamrutha* (cow-based fertilizer) and abandoning chemical fertilizers.

Ragi revival also draws on a deep historical ontology that reaches out to the divine and the spiritual, since good crops and food provision are ultimately believed to be the consequences of divine blessing. Kanakapura farmers believe that soils and cultivated land represent one element of the regenerative capacity of the earth, so the earth is worshipped as a giving, bountiful goddess. 'We call her *bhoomi tayi*' (Mother Earth), Shivamma tells us. This worship is expressed in numerous songs, rituals, and ceremonies that are performed in local villages to mark different phases of the agricultural

season. One particularly important ceremony is the *koorge pooja* (blessing of agricultural equipment and farm animals), which occurs at the start of the season after ploughing and before the sowing of seeds, performed in the hope of securing a plentiful harvest. 'We've been doing this *pooja* (prayer) since time immemorial, long before I was born', Kalamma explains.

> We wish to honour and care for Mother Earth so that she blesses our farm implements and animals, so we prepare a mixture of rice, sesame, and *jaggery* (unrefined sugar) from a fresh harvest of sugar cane, which we offer to our Mother; and we also make an offering of coconut, beetle nut, and fruit to our oxen.[49]

'Then three women perform the sowing initiation', adds Lakshmi Bai. 'One picks up some *ragi* seeds, put them in her saree, and starts sowing; the other two follow and do the same with *togari bele* (pigeon pea) seeds'.[50]

Departing from market values, seeds, cattle, and farming implements are not seen merely as economic factors of production but as agency-possessing entities crucial to farming outcomes, and therefore deserving of human care and reverence. But this realm of worship, the very antithesis of the commodity world, is not perceived as a separate, alternative sphere to the secular realm of farming activities but rather as a connected one that provides a guiding light to these endeavours, ensuring that they are carried out in harmony with nature and the cosmos. In the context of smallholding farming in Kanakapura, it illuminates the millet/pulse choice and sequencing, underlining their enduring value as the prime seedlings of local food security and agroecological resilience. For centuries, *ragi* and pigeon pea have remained the dominant crops in Lakshmi Bai's village, with the nitrogen-fixing properties of the latter also enhancing soil fertility and increasing the nutrients available to other food crops.

Anti-commodity values also manifest themselves in the active role performed by tradition and more-than-human entities in influencing farming decisions. Although farmers closely follow official weather forecasts, they continue to rely mainly on traditional knowledge of the various rains including forecasting abilities, acquired from family elders and passed down through the generations. Timings of crop operations are based on their understanding of the twenty-seven different rains occurring during the farming season named after the *nakshastras* or lunar asterisms established by ancient Indian astronomy. The timely arrival of the *adri male* rains in June is regarded as particularly auspicious: for Shivamma, it is the sign to begin sowing *ragi* and groundnut, another nitrogen-fixing crop, and get the season off to the best possible start.[51]

According to the women, farmers can predict the coming of rain when the *coyla* (Asian cuckoo) starts singing or when frogs make loud noises at night, or again, when anthills begin to appear and they see ants carrying grass and *ragi* seeds as food to their dens. Ramakka recalls that during a particularly severe drought that lasted more than two years, there were no *ragi* seeds left to sow, so the farmers dug up the anthills and were able to find and sow some seeds. 'It is the ants who shared and gave us their seeds and preserved us from hunger', she insists. Securing the annual *ragi* crop remains

important for most smallholders, as minimizing risk and building resilience in the face of the threat of rainfall failure continues to take the customary form of stocking up with a sufficient supply of millets for both food and fodder for two to three years. 'We try and build up stock for future years', Ramakka affirms, 'and even if we have a good surplus, we never sell to government or middlemen, but only a sack or two to relatives and friends'.[52]

In the women smallholders' narratives, *ragi* emerges as a sustaining anti-commodity food crop as they seek to move away from the rice-centred commodified food system resulting from the Green Revolution. Anti-commodity processes are rooted in a women-centred cultural repertoire that includes the traditional expertise to preserve the seeds of the many local varieties of *ragi* (and other foods), the culinary art of its preparation to obtain delicious and nutritious dishes, and the religious knowledge involved in its ceremonial uses in rituals marking the seasons of sowing and harvesting, which also provide emotional enjoyment and spiritual sustenance.

Conclusion

The two case studies of anti-commodity production have underlined the centrality of food in sustaining attempts to secure localized resilient lives and livelihoods in the face of commodified production regimes imposed by globalized circuits of capital facilitated by both colonial and post-colonial rule. More than merely an escape from the pressures of market-driven global food systems, the case studies together with the wider literature discussed suggest that producing food as anti-commodity remains anchored to local knowledges, cultural values, and choices based on ontologies that express complex interactions and reciprocities between people, natural environments, and spiritual domains. Nor are anti-commodity practices simply historical phenomena whose times have passed. They remain alive, relevant, and indeed resurgent in the contemporary world. In this light, the original definition of anti-commodity with which we began this chapter can be further refined to mean local productive processes founded on cultural, spiritual, and ecological values as alternatives or in opposition to global market regimes promoting commodification.

Future anti-commodity research might involve excavating the largely hidden histories of peasant modes of diversified farming: first, to multiply past episodes of farmer creativity and resilience in the Global South thereby enriching and decolonizing agrarian histories of territories subjected to European hegemony, and second, to draw from historical landscapes precedents and practices for alternative food futures. For instance, there has been little research on the immediate post-independence era in Africa and Asia, which was, in many countries, marked by a de-linking from global markets in favour of a renewed focus on the local and the strengths of smallholder farming. There are other untold histories, such as those of indentured labourers primarily recruited from India following the abolition of slavery, who opted to stay on as smallholding farmers in colonized territories across different parts of the world. In the Guianas, for

instance, they brought knowledges relevant to the cultivation of various types of rice, lentils, peas, and beans as well as herbs such as turmeric, increasing the diversity of food crops grown in this region. They also faced and resisted colonial ventures to promote rice uniquely as a commodity cash crop for foreign markets. Full accounts of such tales of creativity and resistance would offer an arena for the fruitful deployment of anti-commodity approaches.

In relation to present times, the anti-commodity concept might be used to reveal the under-explored cultural aspects of alternative farming practices, food movements, and networks, including 'food sovereignty' initiatives. For instance, emerging research into indigenous people's food systems suggests that they are highly productive, equitable, and sustainable while also managing to avoid dependence on the global market; an anti-commodity perspective might highlight the various aspects of the rich ancestral biocultural heritage on which they depend.[53] Shining a light on this 'moral economy that stands behind the objective economy of visible transactions',[54] involving traditional knowledges, spiritual beliefs, and more-than-human entities, would help confer both academic and public recognition of these non-secular but foundational aspects of smallholder farming cultures in the Global South.

The anti-commodity approach is also relevant to the food and farming world of the Global North, and there is much scope for further comparative south-north studies on the lines suggested by Nigh and González Cabañas's investigation of alternative food networks in Mexico and France. A related recent field of enquiry focuses on the modes of resistance consequent upon labour-intensive commodity-driven agriculture in contemporary Europe where migrants and refugees form an important and often informal or even 'illicit' labour force. In recent times, social justice claims have led to revolts and strikes as well as alternative local food production initiatives like the Barikama Co-operative set up in 2011 in Italy. Some of the co-operative founders were at the heart of a protest known as the 'Rosarno revolt' by African fruit pickers the previous year, motivated by migrant-labour exploitation and racist attacks on workers in the Italian countryside.[55] The co-operative began producing locally sourced fresh vegetables and dairy products and delivering them directly to local households, with demand reaching a peak during the 2020–2021 COVID-19 pandemic when residents were often in lockdown.[56]

Indeed, COVID-19 has strengthened demands for a radical overhaul of globalized corporate food systems in the direction of localized crop diversity and shorter supply chains based on agro-ecological principles.[57] It is significant that producers focusing on specialized crops for distant markets, such as West African cocoa farmers and Kenyan horticulturalists, have been particularly badly hit by the disruptions in both communications and demand arising from the pandemic. Moreover, the resulting global recession has also undermined food security amongst low-income and vulnerable communities.[58] In response, there are increasing calls for the promotion of agricultural resilience and more sustainable, solidarity-based food systems necessarily involving the reduction of dependencies on long distance food transportation or 'food miles', and further amplified by the urgency of lowering greenhouse gas emissions. In the context of

both the pandemic and climate crises of the early twenty-first century, a favourable historical conjuncture may just have emerged for the rebuilding of food regimes along alternative, decommodifying, and equitable principles.

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CHAPTER 4

COMMODITY FRONTIERS

Linking Global Capitalism and Local Resilience

ULBE BOSMA AND ERIC VANHAUTE

For thousands of years human civilizations have tried to overcome natural limits by geographical expansion and production intensification. Ecological crises antedate industrialization by centuries and even millennia. Extensive research on socio-ecological systems in the Mediterranean, and comparative bio-archaeological research for this region and for Mesoamerica, show that in both the Mediterranean and the pre-Colombian Americas widespread deforestation and soil erosion did occur.[1] Karl Butzer emphasizes that agro-systems evolved through trial and error: 'early agriculture was experimental in nature, and initial techno-strategies were exploitative and often ephemeral'.[2]

Throughout history there have been successful and unsuccessful models of resource exploitation as Edward Barbier has argued in his monumental book *Scarcity and Frontiers*. He defines frontier expansion as frontier-based development that is 'exploiting or converting new sources of relatively abundant resources for production purposes'.[3] In Barbier's view, successful frontier expansion 'must lead to efficient and sustainable management of natural resource exploitation capable of yielding substantial economic rents'. These 'must in turn be reinvested in productive economic investments, linkages and innovations that encourage industrialization and economic diversification'. In his book that covers the long history from the agricultural transition twelve thousand years ago to the present day, he makes the argument that civilizations can only be successful with protracted and sustainable resource management.

Whereas unsustainability could lead to the demise of entire civilizations—or, since the expansion of capitalism, sustainability in one society could be accomplished through shifting ecological costs to less resilient societies—we are now facing an entirely new situation. Ecological collapse is looming at a planetary scale and might severely endanger or even end human existence. In a recent paper, Barbier notes a fundamental twenty-first-century shift in our thinking to accept that there exist ' "planetary boundaries" to human activity'. Acceptance of these ultimate boundaries implies the rejection of economic models that externalize most of their environmental costs. As Barbier concludes:

> Environmental public goods and ecosystems are fixed . . . and thus their irreversible loss should also lead to relative scarcity of their valuable services compared to ordinary commodities. However, these assets and their services are non-rival and non-exclusive, and are generally not marketed, under-valued and under-supplied.[4]

In other words, our dominant economic model has thrived by opening new frontiers and externalizing social and ecological costs, but today, with the planetary boundaries in view, this is no longer sustainable. If we follow Barbier's argument, which seems to be highly plausible, we are at present entering a radically different phase in human history.

Worldwide capitalist expansion derived the impetus for much of its growth from the unstinting expansion of vast rural and agrarian frontiers of labour, food, energy, and raw materials. Slave-based sugar and cotton production, for example, supplied the calories and clothing that industrializing Britain could never have procured from its own soil, providing so-called ecological relief at the expense of others.[5] Up to now, capitalist growth has overcome problems of declining resilience of its production system thanks to the progressive incorporation and appropriation of natural resources and labour through the successive opening up of new, not yet fully commodified, zones.

Based on this understanding, the consensus emerges that the capitalist world economy is different from earlier economies, because of its propensity to address scarcity by relocating entire complexes of commodity production and open up new sites of exploitation. One could argue, obviously, that capitalism is not unique in this regard and that the communist regimes have shown themselves even more relentless exploiters of nature. But it should be noted that these regimes had the explicit aim to 'outperform capitalism' and that they have yielded to the corporate capitalist model within a matter of decades. From a historical perspective we might assess the socialist experiments of the twentieth century as just failed attempts to develop an alternative model that even more ruthlessly externalized social and ecological costs.

The failure of the socialist experiments underlines both the unicity of the capitalist model and the importance of unpacking its inherent tendency to externalize human and ecological costs. 'Commodity frontier' is a powerful analytical tool to elucidate how capitalism as an historical system has been able to persist by only partially incorporating, or to put it differently, externalizing its social and ecological costs. Scholars such as Werner Sombart, Fernand Braudel, and Immanuel Wallerstein have analysed capitalism as a historical process of commodification of labour and nature through systems of private property.[6] It has to be understood from the start in its transnational and global dimension, creating, as Wallerstein's world systems theory posits, macro regions in an unequal relationship. Whereas initially these theories on capitalism focused on ensuing social-economic inequalities, over the past decades the ecological dimension has for obvious reasons increasingly come into focus. This pertains as much to the micro level of individual sites of commodity production as to the global political economy of resource management. Solutions typically pivot, it is argued, on richer and more powerful countries exporting their problems to poorer regions by opening new frontiers of commodity cultivation, extraction, and even waste disposal.

David Harvey refers to this process as capital's 'spatial fix', which can include robber capitalism, the extraction of resources by dispossession of local communities, and highly uneven development.[7] Harvey's spatial fix is a crucial, although not the only, driving mechanism in the expansion of commodity frontiers. Technological innovations in production, transport, and communication are other drivers, and without powerful political systems capitalism would probably disintegrate and succumb to socio-ecological limitations such as soil exhaustion, deforestation, lack of clean water, flooding, yield ceilings, and living bodies (plants and livestock cannot be fully industrialized). In addition to the well-known spatial fix that is endemic to capitalism from its beginnings, there is a growing importance of a widening set of technological and organizational fixes embodied in the realm of government and private enterprise, both gaining momentum in the nineteenth century.[8]

Following this literature, we argue that capitalism has been growing through the socio-ecological crises it encountered. As Jason W. Moore has pointed out, in the hundred years after the Plague, capitalism emerged as a radical new approach to how societies coped with resource scarcities or crises. This included a fundamental departure from localized circular economies to one that relied on interregional divisions of labour. This was 'capitalism's genius' according to Moore: instead of ecology setting limits to economic and political expansion, merchant capital financed the extraction of resources elsewhere.[9] Moore developed the notion of the moving and expanding commodity frontier through the well-known example of the spatial movement of cane-sugar production from the Mediterranean basin across the Atlantic. He later on added the wheat and timber frontiers to this early history of commodity frontiers.

Wheat and particularly timber were central examples in the commodity-chain analysis as developed by Terence K. Hopkins and Wallerstein.[10] There are major differences between the approaches of 'commodity chain' and 'commodity frontier'. Although both perspectives posit the beginnings of early capitalism in the European late Middle Ages, the first starts its analysis with the *end product*, for instance the ships built from the timber, while the second perspective begins at the zones where the commodity frontiers actually operate, namely in the countryside such as the Baltic forests. The frontier approach is much more informed by ecological concerns, while preserving the systemic framework of the commodity-chain approach. Commodity frontiers are thus not just 'spatial fixes', as they have been shaping in a synergetic way new global divisions of labour, technological and managerial innovations, and new commodity chains that have rapidly expanded in terms of space and volume.[11]

Moore's concept of commodity frontiers has gained impressive traction over the past ten years. His book *Capitalism in the Web of Life* has resonated as a formidable critique on how capitalism has severed humanity from nature and became a source of inspiration for many fields of study.[12] It engages with, amongst others, earlier work of John Bellamy Foster that revisited Marx's thesis of the rift of social metabolism, whereby the nutrient cycle between town and country is progressively disrupted, leading to ecological exhaustion in the countryside and worsening pollution in cities.[13] Moore's book with Raj Patel, *The World in Seven Cheap Things*, has become a bestseller whose cover text reads:

> Bringing the latest ecological research together with histories of colonialism, indigenous struggles, slave revolts, and other rebellions and uprisings, Patel and Moore demonstrate that throughout history, crises have always prompted fresh strategies to make the world cheap and safe for capitalism.[14]

It is true that the ways in which capitalist production systems were embedded in the countryside have been extensively studied in myriad books and articles.[15] Nevertheless, due to their limited scope and theoretical heterogeneity, most contributions have had little impact on the dominant neoclassical and structuralist approaches. Over the past decades, global historians and social scientists have tried to overcome this predicament by studying the expansion of commodity production and extraction using commodity-centred and commodity-chain approaches. These have driven the current socio-ecological turn in the study of capitalism as well as a growing historical interest in the subject. Transnational movements, political ecologists, local non-governmental organizations (NGOs), and historians borrow from each other's vocabularies, and some of these concepts have become highly appreciated transdisciplinary currency.

Concepts such as ecological economics, environmental justice, world ecology, and commodity frontiers have taken centre stage in these conversations.[16] They are embraced by a widening circle of academic authors and public intellectuals as they cover a narrative that offers a comprehensive explanation for how capitalism has been transforming the global countryside. The Commodity Frontiers Initiative, initiated in 2015, is a network of scholars, activists and artists, and academic and non-academic institutions that is engaged with these themes. In 2020, it launched the *Commodity Frontiers Journal*, which explores the history and present of capitalism, contestation, and ecological transformation in the global countryside. The network aims to contribute to contemporary political debates on sustainability and ecological conflicts from a long-term historical perspective.[17] To this end it introduces innovative digital humanities technologies to extract, organize, and analyse the immense amount of knowledge that has already been assembled about past and present commodity frontiers. This begs for a robust global historical-comparative framework that takes into account the immense variations in time, space, and commodities.

Commodity Frontiers as Expanding and Interlinked Processes

In the century following the Black Death, Western Europe embarked on a gradual orientation towards the Atlantic world and eventually global economic leadership.[18] The immense extension of maritime networks was premised on the rapid and expansive appropriation of building material for ships, fuel, and food production.[19] The Low Countries increasingly relied on the extensive Baltic frontier, which stretched from southern Norway to Poland and the eastern Baltic, for the import of bread grains. This

allowed them to specialize in dairy production and timber for shipbuilding, amongst others.

Wheat emerged as 'the mother of all trades', imported on a large scale from Poland and the Baltic to the Netherlands, and traded further south in Europe from the late medieval period onwards. In Eastern Europe, serfdom was reinstated and servile exactions increased, in contrast to Western Europe where peasantries became increasingly unable to guarantee sufficient surpluses for the towns. Imported grain produced by Eastern European serfs released rural labour for non-subsistence activities in parts of Western Europe. Market-oriented labour by free farmers in the Netherlands was made possible by bonded labour in Eastern Europe.[20]

From the fifteenth century onwards, the costs of transporting bulky cargoes over long distances fell almost continuously. This allowed the Dutch with their efficient shipping infrastructure to import massive quantities of timber and wheat from the Baltic frontier, to move wheat to the Iberian Peninsula and to bring Brazilian sugar from Portugal back to Northern Europe. To overcome the lack of timber in the Iberian Peninsula, the Spanish navy established shipyards near Havana and Manila. From the early seventeenth century, the Havana shipyard played a central role in building galleons for the Spanish fleet.[21] Thanks to the declining costs of transport, sugar could be shipped in larger quantities over longer distances as muscovado (with a weight almost two or three times that of refined sugar). The expansion of the European-controlled sugar frontier from about 5,000–10,000 tons by the early sixteenth century to 50,000 tons in the early seventeenth century was perhaps accomplished at below reproduction costs. First, this was done through the massive enslavement and exploitation of Africans, who besides their plantation work had to take care of much of their own food production. However, excessive mortality, particularly in the sugar plantations, was not addressed by improving working and living conditions. This increased reproduction and recruitment costs, amongst others, through imports of newly enslaved people. Second, land in the New World was considered to be free to take. When in one location freely accessible natural resources became exhausted, local resistance mounted, and demand of European consumers grew, the frontier moved on to new uncommodified venues. From the small island of Barbados, planters moved to Antigua, Jamaica, and the Dutch colonies of Berbice, Demerara, and Essequibo. After the revolution of Toussaint L'Ouverture in 1791, planters relocated from Saint Domingue to Cuba and Louisiana.

Still, this island-hopping character of sugar production should not be compared with a locust trek, jumping on each time after having ravaged the land. Sugar islands such as the Mediterranean islands, Madeira, the Canary Islands, and São Tomé were remarkably capable of coping with ecological and social constraints, but they lost out to places where nature was cheaper by the end of the sixteenth century. Sugar production in Brazil could rely on immense supplies of fertile land and fuel wood to outcompete these earlier frontiers.[22] The smaller and more precarious sugar plantations islands of the Caribbean, such as Barbados, exploited thinly populated islands in their vicinity for timber and other commodities. These were the freely exploited 'Atlantic commons', to cite Michael J. Jarvis.[23]

Yet these production sites were surpassed by larger and even more easy-to-exploit frontiers. On the eve of the French Revolution, Saint Domingue had succeeded Brazil as the world's largest sugar exporter, and outperformed the British West Indies as the largest sugar producer of the Atlantic world. When the hundreds of thousands of enslaved men and women rebelled and overturned this commodity frontier that had yielded immense profits for France for decades, the revolution of Saint Domingue (Haiti) cleared the path for Cuba to emerge as the world's largest cane-sugar producer, seconded by Java. The exploitative character of these frontiers sustained their profitability as well as exacerbated their vulnerability. The collapse of large commodity frontiers because of social and ecological unsustainability exerted shocks on the entire capitalist system. Sugar offers just one important example of a major transfer. Cotton exhibits a similar or even more dramatic instance. The Civil War in the United States (1861–1865) forced the British textile industry to search for new locations of cotton cultivation almost overnight. They were found in India, entailing an immense geographical transfer of production.[24]

In the nineteenth century, we see an expansion of cane-sugar cultivation, manufacturing, and trade to unprecedented levels. Sugar became what oil would be in the twentieth century: the world's most traded bulk product. Moreover, in the early nineteenth century, sugar joined tobacco as a stimulant that could be produced both in tropical and temperate zones, which happened thanks to a rapidly growing beet-sugar industry. Cane-sugar production became heavily concentrated on two islands of almost equal size on opposite sides of world: Cuba and Java. One was thinly populated and covered with impressive rainforests, the other was already densely populated by the mid-nineteenth century.[25] This example indicates that a commodity frontier conceptually differs from the classical Turner thesis, which presents the perspective of the 'conquistador'. Frederick Jackson Turner advanced the notion of the frontier in 1893 as 'land free to be taken', not compounded by institutional constraints and entering a territory in which a completely new society could emerge.[26] The Turner concept not only displayed an utter disregard for the original inhabitants of the frontiers, but also created the erroneous perception that sites of commodity production invariably emerged where labour was scarce and natural assets abundant.

Compared with earlier centuries, the role of both technology and the state became more pronounced and entwined after 1850. Technological innovations in commodity production went hand in glove with increased state capabilities in terms of improving and constructing physical infrastructure such as roads and railways, the maintenance of public safety, and the institutional arrangements that, for example, guaranteed banks having leverage over their debtors. Both Cuba and Java were colonized by countries that were neither dominant European powers nor early industrializers, but in both cases the central governments in Madrid and The Hague were keenly aware of it and facilitated the import of both equipment and expertise. Much of their boiling equipment, such as the vacuum pan, came from the French company Derosne & Cail, and many of their technicians originated in Britain.[27] The introduction of extremely expensive cane-processing equipment in Cuba, Java, Guadeloupe, or British Guiana would have been impossible without the active support of the state to create the necessary infrastructure

and institutional settings. Last but not least, Cuba and Java would not have been able to maintain their massive systems of labour coercion without the active support of the state.

Cuba's success was based upon large, and increasingly illicit, slave imports, which continued well into the 1860s and sabotaged the bilateral treaty that Spain had signed with Britain on the abolition of the slave trade. This happened with the full knowledge and even collaboration of the Spanish government.[28] Nonetheless, the supplies of labour were never enough to keep pace with the growth of the Cuban sugar industry. Struggling with a permanent shortage of labour, the Cuban planters also imported 150,000 Chinese indentured labourers, whom they treated as merchandise, as they did with their enslaved workers. The island's sugar factories could only survive by economizing on field labour, which resulted in an ecologically rapacious agricultural system that devoured, with the consent of the Cuban state, large tracts of new fertile land. By the end of the Second World War, this island that once had supplied the wood for the Spanish armadas, had become so deforested that the rainfall became unreliable and large-scale irrigation systems had to be developed.[29]

Java's trajectory went in the opposite direction. Rapid population growth provided an abundance of labour, and this allowed for an agricultural system that enmeshed cane-growing in existing rice cultivation. This was done through the so-called cultivation system, introduced in 1830 and gradually phased out from the 1860s onwards. Hundreds of thousands of Javanese peasants were assigned to compulsory cane cultivation, and they had to deliver their cane to government-contracted private sugar mills. While ecologically sustainable thanks to the alternating rice and cane cycles, in which paddy planting helped to regenerate the soil after the exhaustive cane cultivation, its drawback was its high labour intensity and hence low per-capita output. In 1925, Cuba produced five million tons of cane with fewer than 400,000 workers, while Java produced half this amount with 1.4 million workers.[30] In a context of relentless declining sugar prices, Java's sugar plantations did little to alleviate the island's growing poverty.

The frontiers in Cuba and Java produced the same commodity under comparable ecological conditions, and yet diverged widely in terms of labour relations and land use. This contrast may also invite us to think on a more theoretical level how commodity frontier zones set limits to exploitative strategies. Where labour was in short supply, commodity producers were tempted to save labour by ruthlessly destroying nature. Conversely, when nature was in short supply, colonizers became precocious conservationists. At the same time that environmental protection had become part of government policies in resource-poor and densely populated Java, in Cuba nature was comprehensively demolished. Indeed, capitalism may not be able to externalize all costs at the same time and to the same degree, which is just one of the reasons why the concept of commodity frontiers needs to be elaborated in a rigorous comparative framework and needs to take economic theory, for instance, on factor endowments, on board.

The expansion of commodity frontiers has been a global process from its very start. Cane-sugar production proliferated in the Global South, while the production of beet sugar has been concentrated from its origins in the Global North, especially North

America, Western Europe, and Russia. The wheat frontier globalized from Europe and the Baltic towards large parts of the non-European world. Around the middle of the nineteenth century, free family farmers that spread into the American West started to grow wheat for world markets, turning the United States into the largest wheat-producing country for a long time. They were joined by other 'empty' settler lands, in Canada, Argentina, and Australia, which became significant competitors to US wheat exports. As a result, by 1914, Western Europe was dependent on wheat imports from both new world economies as well as more traditional suppliers such as Russia. Industrialization and urbanization made European countries ever more dependent on the big breadbaskets of the world. In the twentieth century, the wheat frontier extended further in Asia: first India, later Western Siberia, Northern Kazakhstan, and Northern China. In Central and East Asia, the area under wheat increased massively from World War I (in Kazakhstan partly the result of the 'Virgin Lands Campaign'), reaching a peak around 1960. Although the list of top wheat exporters is still dominated by the breadbaskets of the late nineteenth and early twentieth centuries (United States, Canada, Australia, and Argentina), Asian countries like Kazakhstan, China, and India have become top wheat producers. Wheat is still one of the most important global food crops, providing nearly 20 per cent of the world's calorie supplies; about one fifth of the world's production is traded internationally.

Commodity Frontier Expansion, Resistance and Regime Change

Privatization of common land—often by dispossession, massive human abduction and trafficking, and almost unceasing warfare—marked the first centuries of capitalist expansion from the middle of the fifteenth century. This produced the increasing quantities of commodities that were shipped and traded over ever-larger distances: wheat, sugar cane, tobacco, cocoa, coffee, and cotton from plantations and estates, and products from forests, marine zones, and mines. This started with the relatively small-scale wheat and timber frontiers in the Baltic, and has culminated, amongst others, in the massive soy frontier in Brazil today. The Baltic provided western Europe with wheat and timber, the Americas supplied tropical agricultural products, whereas enslaved labour was procured from Africa. This expansion was not a singular event, but continuous, cumulative, and often violent. On the eve of World War I, Europe and its settler offshoots controlled 80 per cent of the world's land and resources.

This massive territorial expansion enabled the growth of a capitalist world. It also generated social and ecological crises. In fact, crises are inherent and systemic to capitalism, as are the movements of resistance and the counter-narratives that they generate. These conflicts and tensions have been shaping commodity frontier expansion over the last six or seven centuries. They generated new forms of accumulation, which degraded

resilience (the capacity of societies to protect their members from suffering) and exposed societies to new ecological hazards.[31] The accumulation strategies that work at the beginning of a cycle of expansion, through particular forms and configurations of science, technology, territoriality, and governance, over time lose their competitive edge. The frontiers come up against their social and ecological boundaries—the Revolution in Haiti or the Dust Bowl in the North American wheat frontiers are clear examples—which makes it more difficult to raise profits and reduce prices.

Commodity frontier expansion is neither straightforward nor uncontested. Expansion into new territories, new productive activities, and new bodies, externalizing the social and environmental costs of production and reproduction, are met with resistance. People struggle against exploitation, social inequalities, and degraded environments. Together with demographic and ecological change and in the context of broad political economic transformations, some forms of resistance prefigure and compel regime change, and they drive the push to seek new frontiers for expansion. Desertion of enslaved and servile populations was a permanent feature of the frontier zones during the early capitalist expansion. Late-eighteenth-century Jamaica and Saint Domingue had considerable maroon populations—communities of escaped slaves staying beyond the reach of the slaveholders. Slavery, indeed, became increasingly untenable as a result of slaves' resistance, such as the revolution in Saint Domingue in 1791 and the large-scale uprising in Jamaica in 1832, as well as the emergence of an abolitionist movement. Labour shortages continued to be a perennial problem for commodity frontiers. Later, in the heyday of Western colonialism, rebellion and escape were joined by labour resistance aligning with anti-colonial movements.

Through all these crises, technological advances, changing geopolitical configurations and exponential increase in scale, the global economy has changed beyond recognition over the past six hundred years. This includes tropical plantation agriculture, which, after the abolition of slavery, developed a variety of labour relations varying from indentured contract labourers to sharecropping and to smallholder production, such as the famous case of cocoa farmers in the Gold Coast (Ghana). In the case of sugar, smallholding cultivation combined with huge central factories has even become the dominant model, as over time it proved itself to be the most cost-efficient model.

Examples like these point to the need to elaborate the concept of commodity frontiers into a global, historical, and comparative framework that allows us to take into account these crucial changes and the multiple actors involved. In this respect the work of Friedmann and McMichael on successive 'food regimes' (an analytical device for posing specific questions about the structuring processes in the global political economy) is particularly helpful.[32] This approach views agriculture and food in relation to the development of capitalism on a global scale, and argues that social change is brought about by struggles among social movements, capital, and states.

Regimes are methodological tools for specifying changing relations between 'world ordering' and local agency. A genealogy of regimes shows that episodes of restructuring and transition are bounded by more stable periods of regulation and organization, albeit in a non-determined way. Friedmann insists that we need to give human agency and social

movements a central place in this analytical framework. For her, a regime is constituted by a 'relatively stable set of relationships' with 'unstable periods in between shaped by political contests over a new way forward'.[33] This offers a truly global comparative-historical lens to look at the social, economic, political, and ecological relations within global capitalism.[34] The expansion of commodity frontiers over the past six or seven hundred years was thus not a smooth unfolding of one universal logic, or of unstinting human progress, but consisted of a long series of transformations. These transformations took place because each regime ran into a set of frictions that eventually made a further expansion of commodity frontiers impossible without fundamental changes.

By and large, one can identify three, possibly four, different regimes in the advancement of global commodity production: an early capitalist regime until the Industrial Revolution gained traction by the mid-nineteenth century; an industrial regime marked by the prominent roles of industrial markets and the state, from the mid-nineteenth century to the 1970s; then a corporate regime dominated by a new market ideology and transnational businesses; and since the financial and food crisis of 2008 a still unfolding contemporary regime marked by corporate capitalism co-opting the vocabulary belonging to an increasing environmental consciousness, for which the terms 'green capitalism' and 'greenwashing' are gaining currency. Each regime over the past six or seven centuries had its own trajectory of labour relations, property relations, technological progress, roles of the state, degrees of vertical integration between countryside and end producers, and movements of reaction and resistance. The two key transformations demarcating these regimes were the Industrial Revolution, as it became transnational by the mid-nineteenth century, and the emergence of exceptionally powerful transnational corporations, particularly from the 1970s onwards. The two transitions coincided with the changing role of the state, which was more prominent in economic life between the 1850s and 1970s than either before or since.

Commodity Frontiers, Technology, State and Corporate Capital

The concepts of 'commodity frontier' and 'commodity regime' are transdisciplinary devices to understand the systemic logics of uneven spatial and historical expansion. They help to explain the historical relationship between structural changes at a global scale, and local processes of resilience, resistance, and accommodation. They also have become essential tools to grasp the roots of the global social-ecological crisis of today. In this respect, we are dealing with three crucial research questions. First, how global integration or global capitalism, fuelled by technological change and economies of scale, transformed rural societies and agricultural systems worldwide; second, how successive regimes of appropriation of nature, land, and labour developed; and third, how resistance against these processes of appropriation was instigated.[35]

We have to understand the history of commodity frontiers as more than just a series of spatial fixes, as it is attended by increasing technological, state, and economic power. In the early phases of capitalism, technology could only enhance the productivity of land and labour to a limited extent and postpone decreasing resilience. As early as the seventeenth century, however, technological innovations could avert ecological exhaustion, as was the case in the sugar industry in the Caribbean. Erosion was addressed by new planting techniques, more fuel-efficient batteries of cauldrons were developed, windmills supplied free energy for the mills reducing the need for cattle, and stronger mills squeezed the cane to such an extent that the residues could be used as fuel to boil the sugar. Crop rotation has been a universal practice in sugar cultivation, performed not only by planters in the Caribbean region but also by cane-growing peasants in thirteenth-century China or Egypt. The Industrial Revolution, however, brought about a qualitative change in this respect, expanded commodity frontiers in a differentiated manner, and increased rural inequalities despite rapidly increasing productivity. The application of steam technology accelerated immensely the processing of crops through steam-powered threshing machines, centrifuges separating molasses from sugar, and so on. A worldwide infrastructure of steamships and railways provided the necessary infrastructure for a global commodity market.

Agricultural science produced a range of leaps in agricultural productivity, in which experimental agricultural stations both in the temperate zones and tropical dependencies played a crucial role. Starting in the late nineteenth century, these stations generated a chain of spectacular increases in yield per acre for a broad range of crops. The most famous and consequential success was the Green Revolution, or the Third Agricultural Revolution of the 1950s and 1960s, which reportedly saved a billion lives. Nonetheless, there is also a darker side to this story. Differential access to technology, and the ways in which capitalist agriculture creates new commodified inputs (seeds, fertilizers, pesticides, etc.), increased dependency, and vulnerability of large groups of farmers. Agronomic innovations led to further concentration of power at the commodity frontiers. The current stage of biotechnology enables the integration of the food and energy sectors, and a profound appropriation of life through seed patents and intellectual property protections, leading to large-scale processes of dispossession. This concentration was speeded up by rapid integration of commodity trade and financial institutions in the 1980s, which in turn was furthered by neoliberal emphasis on market institutions. International reports confirm that the vast majority of the world's smallholders are at risk. Globally this has led to unabated urban migration. In sub-Saharan Africa, 14 million people move to cities each year, a migration that is second only to the massive rural-to-urban shift happening in China.[36]

Since the 1980s, countries in the Global South have simultaneously become massive importers of food and exporters of cheap industrial manufactures, as well as agro-industrial inputs. Hastened by International Monetary Fund (IMF) and World Bank Structural Adjustment Programs and by uneven trade rules, scores of local food markets across the Global South have been destroyed, leaving household and community food security vulnerable to the vicissitudes of global food and agricultural markets.[37]

Together with enclosures by large agro-industries, these contemporary developments have led to the weakening and dispossession of peasants across the Global South. Dispossession in the global countryside and concentration of the governance of commodity chains in the hands of a limited number of powerful transnational corporations are two sides of the same coin.

Today, the big corporations of the past that were involved in commodity production are no longer necessarily controlling the commodity frontiers through ownership but through control of the circulation of the commodities, through encapsulating the agricultural side of the production process or through consultancy and management services. Big corporations might supply seeds, fertilizer, and agricultural advice while further down the chain they own processing and refining plants. The most well-known name in this regard is Monsanto, now taken over by the German firm of Bayer. Started in 1901 as producer of saccharine for companies such as Coca Cola, it gained notoriety for its production of pesticides and is now widely criticized for its role in the plant seeds and their genetic manipulation.

The intensification of commodified land rights since 1850 has been driven by colonial conversion of communal and peasant land into private land titles facilitating the expansion of plantation agriculture, by developmental state-sponsored collectivization schemes, and by a massive contraction of land rights and accelerated de-peasantization on a world scale. Today, food multinationals and speculative investors acquire millions of hectares of land in the Global South, and it is not exceptional that they are assisted by military or paramilitary force to expel peasant communities.[38] Over the past decades, agribusiness companies have been increasing their production of palm oil. Between 2000 and 2015, more than sixty-five large-scale land deals for oil palm plantations in Africa have been signed, covering over 4.7 million hectares. Community lands especially have been a prime target for the expansion of the plantations. Nevertheless, not all these projects worked out as planned. Partly due to increasing resistance by local communities, the area under concession has been turned back to almost half.[39] Cane-sugar cultivation has witnessed the same massive expansion over the past decades. Whereas in 1961 the world's acreages under cane and beet were almost equal, today almost five times as much land is covered by cane as by beet, an expansion that is driven by subsidies on biofuel. This obviously diminishes the availability of land for food production and drives up food prices. A quarter to a third of the rapidly rising food prices of 2008 can be attributed to the increase of land use for biofuel. The tragedy is that conversion of forest land to cane land for ethanol will result in even more carbon emissions (taking into account a diminished capacity to absorb carbon emissions) than the fossil alternative.[40]

The Urgency of a Commodity Frontiers Analysis of the Countryside

There are compelling reasons to shift academic attention to the global countryside: global poverty is overwhelmingly concentrated in rural areas, while a considerable share

of global warming is caused by industrial agriculture, and the loss of biodiversity leads to a decreasing capacity for ecological regeneration. Current debates on 'sustainability' are unduly optimistic, as they leave out the historical trajectory of commodity regimes and tend to overlook the fact that centuries of global commodity production have seriously weakened institutional capabilities in the global peripheries.

Global capitalist expansion since the mid-fifteenth century incorporated massive tracts of land and replaced many millions of people. Along the margins of social and economic systems, hybrid cultures originated as well as deep and hardened new racial boundaries. Rather than lines, frontiers must be envisioned as historical and dynamic processes of both incorporation and differentiation that created and reorganized spatial settings or frontier zones. This attests how the frontier perspective grasps the imbalances of incorporation processes, emphasizing the role of the margins and friction zones, and integrating nature and ecology as a defining part of the global economy.[41]

Despite the overall trend of weakening social and ecological resilience, we still see different outcomes. Today, a substantial peasantry worldwide is still in control of their land and ecology. Conditions of production and reproduction are often predicated on peasants' position in global, regional, or local commodity chains. As transnational commodity chains replaced the colonial division of labour over the course of the twentieth century, resistance today has also acquired a transnational character: workers struggle against capital's global 'wage race to the bottom', indigenous communities struggle against the polluting and degrading activities of transnational corporations that operate in local spaces with near legal impunity, and peasants struggle against the incursions of transnational capital into agrarian spaces and practices.

The historical and spatial complexities of our current global ecological predicament and social inequalities require an historically informed and comparative analytical approach. This unites the myriad case studies about how local rural societies resist, accommodate, or even benefit from capitalism, combining fragments of knowledge spread over disciplines. The commodity-frontier concept invites us to study processes of incorporation and transformation of the countryside in a historical, interconnected, and dialectical way. It helps us understand historical processes rooted in a profound restructuring of rural societies and their relation to nature. Combined with the analytical device of the commodity regime, this will enable us to connect core processes of extraction and exchange with degradation, adaptation, and resistance in rural peripheries. The concepts of 'commodity frontier' and 'commodity regime' offer us a crucially needed world-historical bottom-up perspective on economic and ecological change, giving space to agency on the margins.

Attempts to further the cause of global sustainability are hopelessly flawed if they circumvent the 'distributive, political and cultural dimensions of the global environmental problems'.[42] Historical configurations rather than objective physical conditions and technological limits endanger our common future. As agronomists have argued, technological innovation can prevent nightmarish scenarios, in which the future of the world hinges on keeping the majority of the world population poor. While the recent scramble for land in Africa, Latin America, and Russia may seem inevitable to avoid

food shortages in the world's megacities, the ensuing dramas of dispossession and destruction within local rural societies are no less than tragic.

Notes

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PART II

GLOBAL HISTORIES

CHAPTER 5

EARLY-MODERN COMMODITY ROUTES

Ottoman Silks in the Webs of World Trade

SURAIYA FAROQHI

Commodity routes and commercial exchanges, as they broadly appear from an Ottoman perspective, are an enterprise demanding some intellectual effort. An understanding of early-modern commodity routes is skewed because so many sources are of Italian, Iberian, French, English, and Dutch origins. Nevertheless, between the Ottoman Balkans and Japan, Asian trade without any European involvement was enormous. Studies of shipwrecks have shown that in the early fourteenth century, Japanese monasteries and elites imported tea and Chinese luxury pottery,[1] while in the fifteenth century, Chinese porcelains and faience reached Iran and from there the Ottoman Empire, by means of the embassies that Timurid princes sent to China—in reality, disguised trade missions.[2]

Given Chinese primacy in silk manufacture, silk textiles must have travelled from East Asia to the Near East as well, but surviving pieces are few. By the fifteenth century, however, silk fabrics from Iran, then ruled by the Timurid and Aq Qoyunlu dynasties, reached Ottoman palaces, where members of the sultans' court had them sewn up into kaftans.[3] The essential concepts through which people have conceptualized these movements of luxury silks are, namely, import substitution, struggles for political control, and commerce in silk cloth and raw silk, as well as consumption. Lack of space prohibits a discussion of silks circulating as royal or imperial gifts, now also a topic in the historiography.[4]

Before the early sixteenth century, the Ottoman sultans ruled over an empire on the borders of the Islamic world, encompassing Anatolia and the Balkans, with most of their subjects being non-Muslims. But when, between 1516–1517 and 1535, Selim I and Süleyman conquered the Mamluk Empire, the Ottomans became rulers of the Fertile Crescent and what would become modern Iraq—all core lands of the Islamic world. After these conquests, Muslims came to predominate among the sultan's

subjects. Moreover, already from the mid-fifteenth century, Ottoman expansion in the Mediterranean and Black Sea regions sharply curtailed the activities of Italian traders, with mostly Muslim Ottoman merchants taking their places.[5] Iranians were involved as well; only during certain Ottoman-Safavid confrontations did sultans and shahs attempt to close off the silk trade. Once the wars had ended, both Muslim and Armenian traders from Iran returned to marketing Iranian raw silk in the sultans' domains.[6]

Fernand Braudel and Immanuel Wallerstein propose the concepts of early-modern 'world economy' and 'world-empire' which will help to make sense of these relations. As late-medieval Venetian domination of the Eastern Mediterranean appears as a 'world economy' and the Ottoman Empire as a classic version of an early-modern 'world-empire', these categories are germane to any discussion of silk economies. After all, Iranian raw silk, demanded by Ottoman, Venetian, and English merchants, had a place in both the European-dominated 'world economy' and the Ottoman 'world-empire'. Three interrelated questions prominent in the recent historiography on Ottoman silks are considered: import substitution, trade, and consumption, followed by the example of the manufacture of silk cloth in the city of Bursa in north-western Anatolia, and to a lesser extent in Istanbul, with inter-empire trade in raw silk necessary for the survival of this industry. Moving from east to west, the focus is then on the importation of Venetian luxury silks into the Ottoman realm, despite the many Veneto-Ottoman wars that in the sixteenth and seventeenth centuries dramatically reduced the Venetian domains. The chapter ends with a discussion of courtly and urban consumption, a category that has entered Ottoman economic history only during the last thirty years.

World-Empires, World Economies, and the Historiography of Ottoman Silks

Ottoman historians in general, and economic historians in particular, have traditionally imported paradigms from European history. Today, this is even more obvious than it was in the 1960s or 1970s, with young scholars finding post-doctoral research and entry-level teaching positions difficult to access if their topics are insufficiently attuned to current tendencies.[7] Some of the more 'nativist' scholars have accused their colleagues of 'levantinizing' Ottoman history—devising a hybrid past comparable to the French- or Italian-speaking Levantines, much despised by Turkish nationalists. Even so, the critics have rarely proposed workable alternatives, and therefore, one-sided importation has continued, and no doubt will continue to do so until Ottoman history matures as a discipline and develops models of interest to current world historiography.

Ottoman economic historians, especially those concerned with crafts and trade, have taken a great deal of interest in the models proposed by Braudel and Wallerstein.[8] Braudel undertakes a *tour d'horizon* of the various 'world-empires' and 'world economies' that flourished during the early-modern period, and attempts to explain

how these entities interacted. While Braudel does not deal with the nineteenth and twentieth centuries, by contrast, Wallerstein's concern is squarely with the present. He focuses on the question of why a 'world economy' contains a privileged core region, whose inhabitants profit most from whatever opportunities may emerge, while peripheries and semi-peripheries bear the costs of the enterprise. Wallerstein assumes that early-modern capitalism operated like a grain harvester, gobbling up everything it encountered unless a strong state controlled access and prevented that from happening, at least temporarily.[9]

From Braudel's work, Ottoman economic historians have learned to situate their field of study within the world at large—although they have more often engaged with his work on the Mediterranean than with *Civilisation and Capitalism,* of predominant interest in the present context. Wallerstein's model, by contrast, has answered a more specific need, as it attempts to explain why Ottoman producers, who had satisfied local demand without significant competitors at least until the mid-sixteenth century, by the nineteenth century were supplying the industrial centres of Europe with raw materials and foodstuffs.

Braudel emphasized that until at least the eighteenth century, the Ottoman administration controlled the long overland trade routes and thus functioned as a world-empire that remained autonomous—politically, militarily, and in terms of economic exchanges.[10] European merchants, while present, did not control any territory and had to negotiate with the sultans' officeholders for permission to trade. In the seventeenth century, the commercial and proto-industrial core was still tiny, consisting of Great Britain, the Northern Netherlands, and, to a decreasing but still significant extent, northern and central Italy. Given the limits of their power, merchants from European states had to provide political and/or commercial services appreciated by the Ottoman elite. Around 1600, the political aspect predominated, for England and the Netherlands had shown that they could cause major problems to the Ottomans' principal enemy, namely, the Habsburg world-empire. By contrast, Venice, a former commercial centre now in retreat, was of interest to the Ottomans as a purveyor of luxuries including silk cloth, and perhaps more importantly of insider information on the major powers of Latinate Christianity.

Whether traders from Venice, Britain, France, or the Netherlands could even at this early stage distort Ottoman economic arrangements for their own benefit has been a subject of debate, at least in the case of Izmir. Today the third city of Turkey, sixteenth-century Izmir was very small, but grew during the seventeenth century until it was home to some 90,000 inhabitants. In 1990, Daniel Goffman envisaged the rise of Izmir as resulting from sultans and viziers having lost full control of the Anatolian coastlands. Therefore, the Ottoman administration could no longer channel all the produce of this fertile territory towards Istanbul, as had been true in the early and mid-sixteenth century: an early case of 'incorporation into the world economy'.[11] As for the export of Iranian silk through Izmir, Goffman emphasized that it became important only at a later stage, after traders had found local cotton remarkably profitable.

Recent historians, however, assume that the early 1600s are an unrealistically early date for any 'incorporation into the world economy' to have occurred. When working

with this paradigm, it makes sense to see incorporation as starting quite late, from the late 1700s and mostly after the conclusion of the Ottoman-British commercial treaty of 1838. Wallerstein, Hale Decdeli, and Resat Kasaba suggested as much in the late 1970s.[12] Furthermore, Ottoman historians have hesitations concerning the incorporation paradigm because it seemingly presupposes that the victims (as, in the case examined below, the Bursa silk weavers) were completely passive, or at least that whatever countermeasures they devised were ineffective. However, in his book on nineteenth-century Ottoman manufacturing, Donald Quataert has pointed out that even when exposed to English competition, Anatolian manufacturers did not disappear.[13] On the contrary, they used cheap imported yarn to weave fabrics, competing successfully with British textiles, because as local men they had superior knowledge of the local market. Therefore, Anatolian manufacturing as a whole survived and some sectors even expanded. Yet, producers paid the price of sometimes extreme self-exploitation and exploitation of family labour, with dependence on the vagaries of the world market a further handicap. Even so, Quataert showed that contrary to what earlier authors had thought, 'incorporation into the world economy' did not necessarily imply 'de-industrialization'.

In addition, in the 1960s many scholars assumed—perhaps unconsciously assimilating a paradigm suggested by the economic historian Sabri Ülgener—that Ottoman producers were unwilling to take up market challenges, likely due to their Sufi convictions, and therefore easily victimized.[14] However, from the late 1980s onwards, the real-life background for this assumption disappeared, when market opportunities increased due to the opportunities provided by the new export orientation of the Turkish economy. At this time, historians such as Eunjeong Yi showed that economic initiative was possible, even within the constraints of seventeenth-century Ottoman guild organization.[15]

As noted, the historiography on Ottoman silks deals with several distinct though interrelated questions. Firstly, we encounter Ottoman 'import substitution', which perhaps began in the late fourteenth century, when sultans and grandees began to patronize local manufacturers of luxury cloth, perhaps seeking alternatives to the highly priced silks sold by Florentine and Venetian merchants. Admittedly, Ottoman elites did not spell out this intention, and especially Venetian products remained in frequent use in the Ottoman palace throughout the sixteenth century. Perhaps the Ottoman court wanted to put itself on the map as a new commercial-cum-cultural centre of the Islamic world. Nevertheless, we have no documentary proof for such an assumption, perhaps rather a historiographical manifestation of present-day identity politics.

On the Italian side, import substitution came into play as well. After all, the previous dependency of the Western Mediterranean on luxury silks from eastern sources ended in the fifteenth century, with silks from Lucca, Florence, and Venice now dominating the market.[16] In Italy, the demand for Iranian-style silks, strong in the fourteenth century, thus disappeared, and Ottoman silks did not capture the fancy of Italian consumers.[17] Apparently, the few items extant were diplomatic presents or else exotica.

By contrast, in Russia there was a significant demand for Ottoman silks, especially for those custom-made for Orthodox ecclesiastical use; as there was too in Moldavia and Wallachia, both of which were part of the Ottoman world-empire.[18] Moreover, in the

early 1700s, the dukes of Saxony (at this time often kings of Poland as well) purchased Ottoman textiles for use at their Dresden court. As for Polish aristocrats, they often made their purchases in Istanbul, as is evident from the quantities of Ottoman silks and velvets still surviving in Polish museums and churches, despite the horrendous destruction that Poland suffered during World War II.

After the manufacture and commercialization of silk cloth, sometimes but not always connected to import substitution, the second focus of discussion is the trade in raw materials—in this case of Iranian origin. From the late fourteenth century if not earlier, manufacturers operating out of the city of Bursa in North Western Anatolia (the first capital of the emergent Ottoman Empire), and later on workshop owners in Istanbul as well, bought Iranian raw silks as a significant input for Ottoman luxury cloths. At least in the sixteenth and seventeenth centuries, moreover, the political and commercial interests of Sultan Selim I, Shah ʿAbbās I, and the East India Company determined the ups and downs of the silk trade. Imported Iranian raw silk remained the mainstay of Bursa manufactures well into the late sixteenth century, when locally grown silk became important too. Furthermore, the extent to which merchants working out of Latinate Europe bid up prices for Iranian silk, and thus made life difficult for Bursa weavers, has been the focus of serious debate.[19] In the course of these discussions, historians have used the duality of Braudel and Wallerstein's concepts of world-empires and world economies.[20]

A third major focus is consumption. While in the 1980s and 1990s, Ottoman historians studied silk only from the producers' point of view, in recent years they have begun to focus on the demand side as well. Among Ottoman historians, there is a still unresolved difference of opinion concerning the extent of consumption. While Şükrü Hanioğlu thinks that there were almost no changes in the goods available to the moderately well-to-do of Istanbul until the end of the nineteenth century, Eminegül Karababa has concluded that there was indeed an expansion of consumer goods in Bursa between the mid-sixteenth and the mid-seventeenth centuries.[21] Karababa's findings show that in the early-modern Ottoman world, consumption did not rise in times of imperial prosperity and decline in times of defeat. At the same time, the work of Murat Çizakça has made it seem likely that the wars of the sultans, victorious or not, resulted in resource transfers from civilian subjects to the military.[22]

Moreover, as wealthy women consumed textiles and jewellery in quantity, does the study of consumption contribute to our understanding of the *condition féminine*, Ottoman-style? In this sector, scholars have focused on jewellery. Colette Establet has discussed the terminology covering the usually rather modest ornaments owned by Damascene women of the years before and after 1700, with weights and monetary values emerging from the post-mortem inventories compiled by the scribes of the Islamic judges in Damascus.[23] Hedda Reindl Kiel has discussed the diamonds that a grand vizier apparently accumulated in view of his forthcoming cohabitation with his young princess-bride, demonstrating that in the late seventeenth century, diamonds were 'must haves' at the highest levels of the Ottoman court.[24] Suraiya Faroqhi has dwelt on silk textiles, including the tendency of wealthy Bursa women to acquire household

goods made out of silk as opposed to silk clothing, perhaps to prevent gossips from decrying the owner as spendthrift.[25] Even so, many unknowns remain, including the feelings of women concerning their jewellery.

In recent years, Amanda Phillips has produced a number of path-breaking works on silk historiography and silk consumption in the Ottoman central provinces.[26] She has argued that the sultan's court was not the only source of demand for luxury textiles. While the most valuable silks certainly were an appanage of members of the dynasty, the Ottoman market offered smaller pieces of silk velvet, usable as cushion covers, for the well-to-do wishing to ornament their reception rooms. Thus, Phillips has demonstrated that even if Ottoman consumption outside a narrow elite was quite limited, it is unrealistic to discount customer preferences altogether. People did find ways of circumventing the rules emitted by sultans and viziers.

In 2018, the sinologist and historian of science Dagmar Schäfer, the historian of global textile trade and production Giorgio Riello, and Luca Molà, whose specialty is the history of Italian silk, have co-edited a volume focusing on the global context, in which silks became available mostly to the elites of different societies, but from the late 1600s onwards, to 'the middling sort' in England and North America as well.[27] The first section focuses on 'Asian origins' but imperceptibly moves westward from China, including Ottoman manufactures at the very end. Continuing on its westward route, the second section introduces the limited but culturally significant markets for Ottoman silks in Eastern Europe, followed by studies on Italy and England, both major silk consumers in the early-modern age. As for the third and lengthiest section, it deals with silk in long-distance trade. Rather than imposing a set of questions for all authors to tackle, the editors have permitted contributors to discuss whatever they considered relevant. Thus, the volume reflects what silk historians in different parts of the world presently consider important: be it door-to-door peddling, the trans-Pacific galleon trade, or the East India Company trying to introduce Piedmont-style silk reeling in Bengal.

Manufacturing Silk Cloth in Bursa and Elsewhere

The discussion of Ottoman silk cloth began at a time when the *qadi* (Islamic judge) registers—the principal source for this kind of research—were a new discovery, and historians knew little about the possible pitfalls. Today's researchers, by contrast, are especially conscious of the highly selective coverage of cases that entered the registers in accordance with criteria presently still opaque. Therefore, we know very little about the real-life situations behind the legal formulas that alone made it into the *qadi*'s record. When a guild accused a manufacturer of silk yarn or fabric, of being insufficiently trained and producing shoddy work, were these accusations realistic? Or were they

merely a way of putting an unwelcome artisan in an awkward position, perhaps after bribing a scribe?

About 1960, Fahri Dalsar and Halil Inalcık began the study of Ottoman silks by means of archival documents in the registers of the *qadis* of Bursa.[28] These begin in the mid- to late fifteenth century, and thus reflect Mediterranean trade and manufacture before the appearance of English and Dutch merchants a century later. İnalcık studied Bursa as a commercial centre connected both with the West and with the East, and focused on the appearance of Indian, Iranian, and Florentine traders in the business centre of the city. He drew attention to the prevalence of Ottoman Muslim traders, thus showing that they did not shy away from commerce, including trade with the infidel: today few specialists assume otherwise. However, in the 1950s and 1960s, when İnalcık began his work on Ottoman trade, the notion that this was a non-Muslim specialty was widespread. In those years at least, İnalcık viewed the manufacture of silk cloth as a commercial matter, and the material aspect remained in the background. In later life, however, he became interested in the materiality of fabrics and assembled a textile collection of his own.[29]

A highly regarded professional historian, İnalcık probably determined the course of twentieth-century Ottoman historiography much more than anyone else did. By contrast, Dalsar was an outsider, who when publishing his book was an employee of the Turkish Ministry of Labour.[30] It was part of Dalsar's originality that he saw Bursa silk production as involving the triad of manufacturers, traders, and consumers. Although this approach seems obvious today, it was quite unusual around 1960 when Ottoman economic historians had little interest in consumption. Real-life concerns must have been at play: before the 1980s, the range of goods available to the Turkish customer was very narrow. The import-substitution policy dominant at the time protected local manufacturers by high tariff walls, so that the latter could sell their products with little concern for quality. Thus, to think about consumer preferences must have seemed pointless and almost a little indecent, being inimical to the contemporaneous drive to increase production and induce sections of society hitherto barely involved with the market to try out its possibilities.[31]

A major figure among economists and sociologists of the 1940s and 1950s, Ülgener worried about the lack of market orientation among Turkish craftspeople, positing that the Sufi orientation of many artisans was partly responsible for their lack of interest in material gain.[32] However, in the first half of the twentieth century, the minimal opportunities for profit available in Turkey probably were the decisive factor since, in all likelihood, many craftspeople did not think that market opportunities would increase in the near future. After all, calamities followed one after the other in quick succession: the war period of 1912–1922 with its many expulsions and deportations, the resulting lack of workpeople familiar with silkworms and silk, the world economic crisis following 1929, and the deprivations of World War II. Whatever his reasoning may have been, Dalsar's emphasis on the supposedly 'traditional' popularity of silk fabrics was an acknowledgement that no manufacture can exist without consumers. It was another originality of Dalsar's that he took note of the court records that referred to women, although these were admittedly few in number. Some Bursa females invested in the silk

trade with Iran, reeled silk, marketed the products of their labour, and on occasion even wove silk cloth.[33] As for professional historians, their interest in women of the subject class on record in the *qadi* registers only goes back to the 1970s and 1980s, long after the publication of Dalsar's book.[34]

At the time İnalcık and Dalsar published their works, normative texts emitted by sultans and *qadis* were much in favour. With respect to manufacturers, the essential texts were regulations that the market supervisor (*muhtesib*) needed to enforce. These texts mostly listed the prices at which artisans and shopkeepers were to sell their wares, occasionally including regulations to secure quality. Known as *ihtisab* or *es'ar kanunları* (laws of administratively decreed prices or market inspection), a few of these texts were relevant to silk production, and one of the most detailed exemplars has been available in print since the early 1940s. This even contained specifications regarding the number of threads that weavers were to employ in the warps and wefts of the silks produced.[35] However, this regulation, compiled in the very early sixteenth century, was an exception; most other registers of administratively decreed prices paying far less attention to silk weaving.[36]

Between the 1960s and the 1980s, the study of the international economy of silk, and the place of the Ottomans in it, made great progress, but few people were interested in the material aspect. However, the situation changed after the millennium, when the work of Nurhan Atasoy and her colleagues appeared, both in English and in Turkish.[37] Regrettably the follow-up that Atasoy co-authored with Lale Uluç excluded the eighteenth century, although the Central European market for Ottoman silks expanded around 1750, due to the widespread fashion for *turquerie*, which included both real and imitated Ottoman fabrics.[38] Opulently illustrated and enriched by many published documents, İnalcık's textile book of 2011 contained a chapter on fabric types and fashions as well.[39]

Atasoy knew that silks surviving in Turkey were limited in number: shortly after World War II, a catalogue of the holdings of the Topkapı Palace Museum, the principal depository, had already appeared in print.[40] Therefore, she broadened her search to include European and American museums. Resources in Romania and Russia turned out to be substantial, and Polish collections were a veritable treasure trove.

The next major advance in the study of Bursa and Istanbul silk cloth was a set of studies by Phillips.[41] Combining the skills of the historian and those of the textile expert, Phillips compared large numbers of surviving cushion covers made of silk velvet, with price lists promulgated in the name of the sultan. By a careful survey of early-modern Ottoman silk fabrics, she clearly stated what earlier historians, working from a limited number of written sources, had only dimly recognized: Bursa silk weavers routinely ignored official prescriptions concerning quality. While sometimes Ottoman historians had persuaded themselves that only a small number of miscreants did not follow the rules, Phillips showed that contraventions were far more widespread than previously assumed. After all, possibilities for control on the worksite were limited, and it is misleading to view the sultans' bureaucracy as an organization of machine-like efficiency. However, officials were often excellent record keepers, and their precision has allowed

Phillips to establish exactly which fabrics described in the written sources survive in today's textile collections. As for deficiencies, it emerges that thread counts were often lower than specified, and dyestuffs denounced as being of poor quality remained in frequent use.

To an outsider, these findings are unremarkable, but for Ottoman historians they are intriguing because of their political implications. Today, historians widely assume that the sultans asserted their 'good government', and thus promoted their legitimacy, by promulgating rules that humble artisans (mostly) followed.[42] Certainly, in some cases manufacturers sold low-grade fabrics more cheaply than the better varieties, and the Ottoman administration accepted such 'pricing by quality' as legitimate. Even so, we cannot explain all the contraventions observed in this exculpatory manner, and thereby the methodological caveats against the *qadi* registers as expressed by Iris Agmon, Yavuz Aykan, Boğaç Ergene, and other scholars become even more urgent.[43]

Although the heavy palace-quality silks that are the pride of today's museum curators were no longer a major line of seventeenth-century production, small but often sophisticated pieces of figured velvet ensured that Bursa looms and designers remained active throughout the seventeenth and eighteenth centuries. While documents covering the silk manufacturers of the island of Chios are less numerous than the Bursa records, the Chiots were also important because their skill enabled import substitution for foreign silks. In 1720, Sultan Ahmed III decided that he would no longer buy expensive Venetian fabrics, and he ordered the establishment of a silk workshop in Istanbul, whose managers were to be specialists from Chios, as they already possessed the looms and skills that allowed them to produce silks resembling those previously imported from Italy.[44] In addition, a European source of the mid-1700s claimed that the Chiots were just as skilful in imitating Iranian and Indian fabrics, and the islanders exported these products as well, marketing them in Poland through the commercial centre of Lviv.[45] These silks had been known to historians of the island for a long time, but Ottoman historians mostly took note only after Atasoy and her colleagues included them in their work on surviving Ottoman silks.[46]

Exporting silks 'made in Chios' was possible because of the networks of Ottoman Orthodox merchants, some of which were already functioning in the late sixteenth century, but greatly expanded about 1750.[47] Chiot sea captains made money by transporting goods throughout the Mediterranean, especially when French shippers, who normally supplied this service, could not circulate because of the many Franco-British wars. Likely, some of the money earned in this fashion served to promote the expanding silk industry.

However, around 1600, the popularity of Chios silks was still some fifty to eighty years in the future, and textile experts have located quite a few sixteenth- and early seventeenth-century Venetian silks in kaftans made for the sultans and surviving in the Topkapı Palace.[48] Some of these textiles must have been the gifts of diplomats to the sultans and their viziers, perhaps in the hope of future orders to Venetian manufacturers. However, we cannot distinguish the gifts from the purchases, which probably existed as well.

After comparing Ottoman and Venetian silk fabrics, textile experts have concluded that while the technical characteristics of the two weaving traditions normally were different enough to permit identification, there were some pieces that could be either Ottoman or Venetian.[49] Sometimes the resemblance was deliberate, as Venetian manufacturers seeking to please Ottoman buyers made their products look as 'Ottoman' as possible. On the other hand, certain Venetian decorative motifs, including crowns, appear on fabrics of Ottoman manufacture, although no sultan ever wore a crown. Thus, the materiality of certain silk fabrics demonstrates that even when Ottoman silk weaving was at its height, in the late sixteenth century the Veneto-Ottoman connection remained important.

As noted above, Ottoman silks frequently survive in Poland, where in the seventeenth century, male nobles and gentry had invented a special fashion, which they claimed was 'Sarmatian', after a people of antiquity who disappeared many centuries ago.[50] Through this clothing, the wearers projected a special identity, dressing up in a manner substantially different from the French fashion dominant in the European court culture of the period. Most of the so-called Sarmatian textiles seemingly were of Ottoman or Iranian origin, especially the sashes that the wearers tied around their jackets, which vaguely resembled Ottoman kaftans. While some such sashes survive, they can also be seen being worn in deathbed portraits—and such sources are significant, as this area of Ottoman textile history probably would otherwise not exist due to the scarcity of written evidence. In addition, Polish aristocrats often gifted Ottoman textiles to churches and monasteries for use in church vestments. Art historians have discussed the manner in which the new owners 'Christianized' Ottoman textiles. When cutting up a cushion cover to recycle as a cope, they often attached embroideries in the current baroque style. Probably in this case, the 'Ottoman' aspect of the piece was only recognizable to cognoscenti.[51] Some aristocrats donated hangings of Chios silks to Polish churches and convents, with the recipients reusing them without making any changes.

Specialists on Orthodox liturgical vestments have carried the discourse on 'Christianized' Ottoman designs a step further. In this case, the owners did not recycle items meant for secular use but rather ordered purpose-made silk textiles from Istanbul or Bursa workshops. In particular, Orthodox dignitaries visiting Moscow in search of patronage commissioned such items for presentation to the tsars.[52] Ottoman documents are not very informative, for unless special conflicts occurred, officials rarely concerned themselves with the affairs of non-Muslims.[53] Elena Papastavrou and Nikolaos Vryzidis have pointed out that the reuse of Ottoman silks in churches and monasteries sometimes relayed social meanings, conveying the high status of the donor, who might be a clergyman with access to elite Istanbul textiles.[54] In other cases, religious messages were at the forefront, namely when the monks recycling precious textiles 'Christianized' these pieces by adding crosses to make the transition visible.

In the 1970s, historians of the Ottoman Empire assumed that by about 1600 cheap textiles, in particular woollens from England or even Venice, were crowding out locally manufactured goods. Some empirical evidence did in fact support this assumption: around 1600 the Jewish woollen weavers of Salonika, moderately prosperous until

that time, did suffer from English competition and by the mid-seventeenth century they were no longer of much commercial significance.[55] However, this case was exceptional. Historians soon realized that imported fabrics, for example, rarely were serious competitors for local manufacturers before the 1830s. While Ottoman elites bought Indian cottons, Iranian silks, and English or French woollens in modest quantities, non-elite people consumed local textiles, as attested by numerous studies of post-mortem inventories. Thus, even the better-off inhabitants of Damascus during the years before and after 1700 did not buy many imported woollens and silks.[56] Intra-empire trade must have been modest too, as Bursa silks did not show up in the Damascus records—or if a few people did possess them, the *qadi*'s scribes did not bother to identify these items.

Iranian Raw Silk between Ottoman, Italian, and English Buyers

Following this discussion of Ottoman textiles traded abroad, we return to Wallerstein's paradigm of 'incorporation into the European-dominated world economy'. How does the debate surrounding this paradigm relate to the Ottoman-Iranian silk economies? Inter-empire and inter-state competition for raw silk was fought out by political means when the Ottoman and Safavid dynasties confronted one another, and by economic means when the demand of manufacturers in Western Europe was at issue. The 'incorporation' paradigm comes into play because, as noted, in the 1970s historians assumed that the Ottoman Empire suffered de-industrialization—in this case, the collapse of the Bursa silk manufactures—and had already become dependent on textiles produced in North-Western Europe in the late sixteenth century. Today, this argument is mostly of historical interest. Debates concerning the non-emergence of capitalism in the Ottoman world have taken its place, but they have no connection to the silk economy.[57] In its time, however, the incorporation paradigm was both influential and relevant to the silk trade.

Iranian raw silk differed from its counterparts produced in North-Western Anatolia, the Peloponnese, or the Lebanese Mountain, in that it was of significance to European purchasers. Silk weaving in Latinate Europe, which before about 1600 had been an Italian near monopoly, spread to other European countries including England and France. In fact, by the seventeenth century, supplying these emergent centres with silk was so profitable that both the Levant Company, working out of Aleppo, and the East India Company trading in Bandar 'Abbas and Isfahan, purchased Iranian raw silk for distribution in Europe.

Fifteenth- and sixteenth-century Bursa silk weaving depended closely on raw silk from Iran. While the dues payable from Iranian silk imports were a significant revenue spinner for the Ottoman exchequer, the treasury of the Shah of Iran collected its share as well. Thus, the silk trade became an object of political conflict: when Selim I was at war against Shah Ismā'īl I, he prohibited the importation of Iranian silks, confiscating

the wares of merchants caught with the now contraband goods and imprisoning the owners.[58] However, after Selim's death in 1520, his successor Süleyman liberated the merchants and restored their goods, having been warned by his advisers that confiscating the goods of traders not directly involved in the conflict was illegal according to the *sharia*. Furthermore, financial reasons came into play: for once raw silk was unavailable, the exchequer could not collect any significant dues from unproductive shops and workshops.

When in conflict with the Ottomans, Shah 'Abbās I used Iranian silk as a political weapon as well. In 1619, he declared silk a royal monopoly and had it marketed by Armenian merchants deported from their hometown of Julfa and settled in a suburb of Isfahan. By this time, English merchants affiliated with the East India Company traded in Isfahan, and at one point the Shah proposed that the latter should buy all the silk that he wanted to sell and carry it to Europe by sea, thus bypassing the Ottoman lands. However, the project failed and the quantity of silk rounding the Cape of Good Hope remained minimal.[59]

In the sixteenth century, demand for Iranian silk in Latinate Europe burgeoned as few other sources for this valuable raw material were available. Italy had not yet become an exporter of raw silk, as was to happen after 1600, when these exports became so profitable that the region of Milan, for instance, became an exporter of raw silk and silk yarn rather than of silk cloths.[60] During the same period, machine-based reeling *alla bolognese* diffused in northern Italy despite Venetian efforts to halt the process, so that there was an additional incentive to focus on semi-finished rather than on finished goods.[61]

In consequence, English merchants bought up quantities of Iranian raw silk for distribution in newly emergent European silk-weaving centres, causing great difficulties to Bursa manufacturers. In the years before and after 1600, the latter worked mostly for a small elite clientele, who dictated prices and were unwilling to pay more because of rising production costs. A comparison of prices paid for raw materials and finished fabrics has shown that in the late sixteenth century, a process described as 'price scissors' threatened the survival of Bursa manufacturers.[62] While the prices of silk textiles stagnated, those for Iranian raw silk were driven up by European demand, with the many Ottoman-Safavid wars of the sixteenth and early seventeenth centuries also disrupting silk production. Ottoman raiders carried away silk as booty and Safavid rulers resorted to scorched earth tactics to make survival difficult for the invaders. Even in regions where mulberry trees continued to exist, insecurity must have induced many peasant families to give up on silk—labour intensive and likely to attract robbers. Moreover, in Anatolia, the years before and after 1600 were the high point of the so-called Celali rebellions, when plundering mercenary armies disrupted trade and twice occupied the silk-weaving centre of Bursa.

Thus, it was easy for scholars to assume that the production of silk cloth ceased, and, in consequence, Ömer Lütfi Barkan (another 'founding father' of early-modern Ottoman history) once commented that the Ottoman Empire did not 'decline'. Its destruction was due not to internal dynamics but rather to the 'economic aggression' of its European neighbours. Able to pay high prices because of access to American silver, these

competitors 'sucked out' the raw materials needed for craft production and thus had already made the Ottoman economy into a dependent annex of the English or French economies in the late sixteenth century.[63] While Barkan did not refer to Wallerstein's model, this vision fits well into the incorporation paradigm.

At the time Barkan wrote, few monographs on regional crafts and trade existed; however, in the following years, this situation changed. Özer Ergenç in his work on sixteenth- and seventeenth-century Ankara, showcased a city where producers managed to hang on to the locally produced angora wool, sometimes more costly than silk, and weaving coexisted with the exportation of mohair.[64]

In Bursa too, the manufacture of silks revived during the seventeenth century. As the extensive cultivation of mulberry trees attests, local manufacturers now focused less on expensive Iranian silk and more on the locally grown variety, for which there was as yet no European demand.[65] Moreover, Bursa manufacturers worked less for the sultan's court while concentrating on modestly prosperous urbanites, who bought articles less costly than the textiles demanded by the Ottoman court. In addition, manufacturers probably switched from slave to free labour. In the late fifteenth and early sixteenth centuries, Bursa was still quite small, and traders supplemented the labour force with the numerous slaves brought from the Balkan fronts.[66] By contrast, in the last quarter of the sixteenth century, the city had grown, and it must have been more profitable to hire poor young men—or even women. After all, in this case, it was unnecessary to feed the workpeople until they had recovered from the trek through the Balkans, learned a modicum of Turkish, and acquired at least the basic skills needed by silk weavers.[67]

Given the adoption of cheaper raw materials, orientation toward a wider market and a less costly labour force, the Bursa manufacture of silk textiles revived, and the city's artisans were still weaving cushion covers and light silks in quantity during the early nineteenth century. In fact, Murat Çizakça, who drew attention to the late sixteenth-century 'price scissors' and incorporation crisis, conceded in a later article that demand for Iranian silk in Latinate Europe receded in the seventeenth century, allowing Ottoman manufacturers a breathing space.[68] As Ottoman tax-farming data showed, the decline of local manufactures when confronted with English or French competition was not a linear process, and in Çizakça's perspective, the speed of 'incorporation into the European world system' slowed down in the seventeenth century.

Consumption

While Ottoman historians often follow trends in European or American historiography, they do not do so blindly; thus, scholars dealing with the sultans' domains in the early-modern period have not given up as readily on economic history as has happened in certain European contexts. Once again, historians respond to real-life situations: most Ottoman historians are Turks or of Turkish background, and in Turkey, economic crises often have consequences far more dramatic than recessions in Western Europe or North

America. On the other hand, increasing export orientation since the 1980s has enabled more people to consume more goods, and in consequence the history of consumption in Latinate Europe has attracted interest among Ottoman historians, especially when involving books, foods, and textiles.

A few scholars have undertaken large-scale projects using inventories from the *qadi*s' registers, usually several hundred at a time, to investigate changes in consumption patterns. Karababa's study of post-mortem inventories compiled in Bursa has shown that the number of consumer goods owned by people wealthy enough to have inventories made, increased between the mid-sixteenth and mid-seventeenth centuries, although the political position of the empire certainly had deteriorated during that century.[69] A comparative study of the clothes of well-to-do Bursa women of the late 1400s and the 1730s leaves a similar impression, although the lack of data for the earlier period makes conclusions less reliable than those of Karababa's study.[70]

On the other hand, a series of very thorough investigations, covering Damascus in the late seventeenth and early eighteenth centuries, has concluded that the people at issue, although mostly from among the better off, had so few possessions that their houses were almost empty.[71] Moreover, Hanioğlu's investigation of book ownership has concluded that in this sector as in others, consumption remained at the same low level until the very last years of the nineteenth century.[72]

While it is too early for hard and fast conclusions, it makes sense to look closely at the circumstances peculiar to the periods and places under investigation. Thus, perhaps in the mid-eighteenth century, with the demands of warfare somewhat less crippling than they had been or were to be, there was a moderate rise in consumption. This positive development ended and even turned into a decline after 1768, with the beginning of a long series of wars that continued, almost without interruption, into the mid-nineteenth century. We should not assume that advances in consumption were linear. Gains made in periods of relative peace might disappear so thoroughly that people forgot that they had ever existed.

Other problems are due to the technical difficulty of obtaining data permitting the comparison of consumption habits over lengthy periods of time. Especially in Istanbul, the *qadi* registers show significant gaps, and we cannot guarantee that recording conventions remained the same over a period of fifty or eighty years. Changes in terminology occurred as well, and these uncertainties probably have discouraged most historians from aggregating data over long periods. Only Hüseyin Özdeğer has had the perseverance to cover nearly two centuries, focusing on Bursa, while other scholars, at most, have tackled periods of one hundred years each. Said Öztürk has studied seventeenth-century Istanbul, and Karababa the period between about 1550 and 1650, while Establet and Jean Paul Pascual have concentrated their efforts on a few decades before and after 1700.[73]

Perhaps due to these frustrations, Phillips and Olivier Bouquet recently have taken a completely different approach. They both start from the—doubtless correct—assumptions that the most instructive inventories are those containing many items, that the richest inventories are those of high officials, and that the requirements of

office conditioned what a dignitary may have owned at the time of his deposition or death. Thus, Phillips has focused on the inventory of a provincial governor and Bouquet on a set of records covering the possessions of a late eighteenth-century grand vizier, deposed and killed on the sultan's orders.[74] Estate inventories can highlight both competition between officials and assertion of rank, issues much in the foreground of today's consumption studies.[75]

When focusing on early-modern searches for comfort and status, Ottoman historians have not paid much attention to imported silks, although this neglect is probably unjustified. Apart from Venetian silks in the sultans' palace, previously mentioned, we should study the consumption of Iranian and Indian textiles more attentively. For if there had not been many exchanges between the Ottoman world, Iran, and India, it would be hard to explain why in the eighteenth century, we find the same fashions in fabric design in all three polities.[76] Iranian silks are emerging from the treasuries of Orthodox monasteries, and on occasion, the Ottoman archives provide evidence of merchants from Iran doing business in Anatolia as well.[77] A lot of research remains to be done.

Conclusion

From the present discussion, we can derive five conclusions. First, the study of surviving textiles has shown that Bursa silk manufacturers quite often disobeyed official prescriptions concerning quality, even if emitted in the name of the sultan. Therefore, we need to look carefully at the debates concerning the reliability of entries in the *qadi* registers or, put differently, the circumstances under which the scribes entered a particular command into their registers. Even if we cannot remedy the attendant uncertainties, we can be aware that a command emitted by the sultan did not mean that people always followed it. If at all possible, we have to look for evidence of compliance or non-compliance.

Second, perhaps we should be hesitant about attributing to the sultans' orders concerning the marketplace a major role in legitimizing their domination. If modern scholars have found that contraventions were frequent, surely sultans and viziers of the early-modern period were aware of the problem as well. If so, would they have staked their legitimacy on such commands? At present, legitimization is the watchword, but we may well have overestimated the importance of this concern.

Third, while the concept of incorporation into the European-dominated world economy makes a great deal of sense when looking at the nineteenth century, and in some cases even the late eighteenth century, the same model is unhelpful when dealing with the Bursa silk manufacture of the late sixteenth and early seventeenth centuries. On the contrary, it makes more sense to assume, as Quataert has done even for the nineteenth century, that local manufacturers found ways to cope with adverse market conditions. They invented new products, employed hitherto little used raw materials, and likely switched from slave to free labour. In the same vein, the versatile silk

manufacturers of Chios produced imitations of expensive Venetian, Iranian, and Indian fabrics: if they could satisfy their elite customers, it probably showed a case of import substitution *avant la lettre* rather than 'incorporation and de-industrialization'.

Fourth, we need to make allowance for the small but significant market for Ottoman luxury textiles in Russia, Poland, and present-day Romania. Even if the historian does not read the relevant languages, summaries in English, which now have become frequent, and occasional queries to the authors by means of the internet, can fill the gaps, at least partially.

Fifth, it is not certain that, given the 'patchy' survival of inventories and our frequent ignorance of the relevant terminologies, we will ever know for sure whether in an empire-wide perspective, the wealthier inhabitants of Ottoman towns enjoyed increasing standards of living at least over certain periods—or else suffered from war-related declines. Micro-studies of officeholders and their families, anxious to maintain socio-political status, certainly provide a temporary solution, as do studies of specific items, such as books or jewellery. At the present stage of research, we can only say that looking at production alone is insufficient: when luxurious goods were at issue, consumer demand was often primary.

In this context, I return to Braudel's observation, that into the eighteenth century, Ottoman strength derived from the government's control of land-based trade routes, for the latter might be less vulnerable than the pirate-infested Indian and Atlantic Oceans, to say nothing of the Mediterranean. Once we take account of Ottoman commerce, the land-based trade between Northern India and Central Asia, Indian moneylending in the emergent Russian Empire and Armenian merchants active between Bengal and Amsterdam—Anatolia included—we need to give up the notion that in the early-modern period, the Dutch and English companies ousted their Asian competitors from inter-empire trade routes.[78]

Notes

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CHAPTER 6

PORT CITIES AND COMMODITIES

Luanda in the Early-Modern Period

CÁTIA ANTUNES AND JELMER VOS

Commodity production and trade involves the circulation of raw, semi-processed, or finished products across different social, economic, cultural, and geo-political environments, which have both shaped and been shaped by the movement of commodities. Ports have been essential geographical nodes through which such movements occurred, and the cities built around them some of the best studied environments in commodity history. Ports are not necessarily cities, however. Depending on the number of inhabitants and what the German geographer Walter Christaller called urban functions, a port can be a village, a town, or a city with a harbour.[1] Ports can be found in four specific environments. They can be situated along river shores, where the harbour can be part of the river system itself. They can also be located in the confluence of two or more rivers. In this case, the residential area is sometimes located on one shore, while the harbour is located on the other, so that the harbour encompasses an enlarged local function not always dependent upon the activities of the settlement itself. Ports can also be set by the sea, with the harbour occupying the maritime front and serving as one of the settlement's guiding spatial elements. Finally, ports can develop in the estuary or delta of a major river, usually at a point just before the river flows into the sea from which, over time, they often expand in size along the riverine shore to reach the sea itself.[2]

Exploring how urban and maritime historians have defined port cities in the early-modern era (1500–1800), a period of growing global economic integration, should help disentangle the symbiotic relationship between port cities and commodity production and trade.[3] This conceptual overview is followed by an examination of the ways in which commodity trades shaped urban functions in early-modern port cities; how these functions enhanced the development of larger commodity chains; and how these same commodity chains, in turn, influenced the development of port cities and their position in the global economy.

A case study of Luanda from its colonization in 1575 through its consolidation as major slave-trading port in the eighteenth century shows the historical entanglements between urban growth and processes of commodification. The functionalities of Luanda as a port, the importance of commodity trade in its early formation as a city, and its growing participation in global markets after the trade in enslaved Africans massively expanded in the early eighteenth century demonstrate the way commodity exchanges and the construction of commodity chains affected urban development. From the late sixteenth century, Luanda changed from a small commercial hub where people bought and sold locally produced goods to a regional node for the distribution of currencies and commodities. These hub-and-nodal functions allowed Luanda to become Africa's largest transatlantic slaving port and a gateway, or nexus, for several global commodity chains.

The history of Luanda, showing the intricate relationship between the growth of early-modern port cities and the formation of global commodity chains, has wider implications for the study of port cities in relatively disadvantaged regions of the world economy, especially sub-Saharan Africa. By concentrating on urban functions, historians can examine major pre-colonial African ports like Luanda on a par with better-known gateways in Europe and Asia. Moreover, since commodity trading contributed significantly to the development of these cities, they were more than 'ports of the slave trade', as historians of the Atlantic world have come to label them.[4]

Early-Modern Port Cities and Commodity Trades

Urban historians of the early-modern period have used different terminologies and criteria to define human settlements as villages, towns, or cities. Traditionally, two main guiding principles have defined the conceptual borders of these spaces. The first is that of demographic stock, where the number of inhabitants determines whether a settlement can be defined as an urban space.[5] The limitation of this definition is that in regions with an overall low demographic density, where the ratio of available space to the number of individuals is high, agglomerations that might elsewhere be considered villages can quickly acquire the status of town or city. In relation to early-modern settlements, it is therefore important to combine the demographic benchmark with the criterion of functionality, the second guiding principle. Three specific sets of activities define the functionality of human settlements. Firstly, villages have usually been characterized by agricultural and other small-scale economic activities organized around the nuclear or extended family. Secondly, towns provided spaces where outputs from villages in the surrounding hinterland were exchanged, stockpiled, or used as raw materials for manufacturing activities. Finally, cities have traditionally combined these primary and secondary sectors of production with a tertiary sector built around the provision of institutional protection to market exchanges and political, social, and cultural life.[6]

As Oscar Gelderblom has shown for the early-modern Netherlands, cities have provided mechanisms to facilitate the institutionalization of marketplaces through a broad array of services, including banking, monetary exchange, the issuance of insurance and mortgages, and specialized courts for settling disputes.[7] Politically, cities have been sites of government and representation for specific segments of the population (often starting with 'tax-based elites'), where governance includes the extension of military protection to the broader regional hinterland with its multiple towns and their village networks. Cities have traditionally also harboured important social and cultural functions, such as religious services, theatres, press, and festivals associated with religious worship, as well as charitable and knowledge institutions, often sponsored by local political or religious elites. The contributions to Peter Clark's *Oxford Handbook of Cities in World History* amply demonstrate the multitude of such functions across time and space.[8]

Several early-modern ports matched the demographic and functionality descriptors of cities. As such, historians from different schools have alternatively portrayed these port cities as quintessential drivers of economic growth, central nodes in world systems, or main bolts in the development of the 'first global age'.[9] The histories of the main European ports of this era—including Venice, Seville, Lisbon, Antwerp, Amsterdam, and London—are relatively well-known. One historiographical tradition, starting with Fernand Braudel and continuing through recent studies like David Abulafia's work on the Mediterranean region, or Avner Greif's work on medieval trade, has placed these port cities at the vanguard of the development of merchant capitalism and modern economies.[10] Other historians, like Cátia Antunes and Amélia Polónia, have seen these ports as essential nodes in global trading circuits, and linked them to European maritime and colonial overseas expansion.[11] Scholars of the Indian Ocean world, meanwhile, have stressed that these iconic European cities had early-modern counterparts in South, East, and Southeast Asia, where ports were connected to one another in such a way as to form a so-called urban complex.[12]

While this new scholarship pays attention to asymmetries in the world economy, it has often explicitly distanced itself from the deterministic logic of world-systems theory (WST) to analyse relationships between dominant and peripheral regions in global trade. WST argued that some European and Asian port cities were central places in 'core' areas of the world economy that dominated semi-peripheries and peripheries according to a structural hierarchy in the global division of labour and resource exploitation.[13] Influenced by central-place theory and network theory, which define, rank, and analyse cities according to the services they provided to their surrounding areas (their 'functionality') or the roles they played in regional and global economic networks, recent scholarship in urban history pays more attention to regional economic contexts and local agents to explain uneven economic developments.[14]

While many urban historians working in global history have adopted functionality as a lens to study the development of port cities, few have yet applied this principle to African and American contexts. The role that African and American port cities played in regional economic systems was, in fact, comparable to those of their Eurasian counterparts, although they often differed substantially in demographic terms.[15]

Moreover, port studies have so far failed to recognise the symbiotic relationship between the emergence of early-modern port cities after *ca.* 1500 and the formation of global commodity chains. They mainly tend to discuss commodities in the context of trading activities in and between ports but do not sufficiently stress that early-modern ports became drivers of globalization *through* the exchange of commodities. Indeed, a focus on the interaction between commodity flows and port functions makes it possible to draw comparisons and identify similarities between continents without prematurely dividing the world hierarchically into core and peripheral regions.

To understand how the commodification of specific goods and the exchange of commodities stimulated the growth of port cities in the early-modern era, it is useful to think of ports as local 'hubs', regional 'nodes', and global 'gateways'.[16] From a commodity-exchange perspective, port cities functioned as local hubs for a system of—usually hierarchically—connected towns, villages, and rural areas in their hinterlands. The functions of these hubs were clearly marked in the urban space, with walls or natural defence systems separating the urban area from the hinterland. Local hubs had prominent markets, with specialized sections for foodstuffs, manufactures, and political and financial services (like houses of exchange, conflict resolution institutions, and fiscal institutions). An infrastructure of paths, roads, bridges, and the like physically connected the hinterland to the city's central market. Legal access to the market was often a concession that local authorities granted to traders based on birthright, taxation, or privilege. In this context, the function of a local hub not only encompassed a specific economic and social hierarchy in relation to the hinterland but also reflected a pretension to political control—for example, through claims of sovereignty, taxation, or military dominance combined with generous offers of physical protection.[17]

Besides functioning as local hubs drawing foodstuffs and other goods from their immediate hinterlands, early-modern port cities operated as regional nodes connecting different urban commodity markets. In this regional context, port cities often became prominent by developing competitive advantages over rivals in the same urban system.[18] Specifically, open political institutions, reliable infrastructures, and cheap access to markets—for instance, through low taxation and reduced transaction costs—promoted the preferential use of a specific port.[19]

These hub-and-nodal functions formed the pillars to the gateway function acquired by prominent regional ports in the early-modern period. Gateways bundled the outputs of their rural hinterlands and regional systems and exported them to a global system of exchange.[20] As such, port cities leveraged the economic integration of local and regional markets in the world economy. Localities and regions contributed significantly to the level of specialization and competitiveness of specific port cities, which largely determined the position of these ports in the global system. At the same time, as gateways, port cities developed a capacity for exchanging and distributing commodities on a global scale. This capacity was based on a port city's unique combination of urban functions (as described above) and the retention by resident merchants of specialized know-how for placing commodities in the world market.

While port cities hence became essential to the creation of global commodity chains, it is important to emphasize the multidirectional nature of the commercial flows through global port cities. As producers in rural hinterlands and regional systems used gateways to export raw, refined, or manufactured products to global markets, they also had consumer demands of their own, giving rise to new commodity chains. In short, the ability to combine in one place the differing demands of local, regional, and global consumption markets sustained the critical role of port cities in the development of commodity chains.[21]

Two economic conditions were often fundamental to the emergence of commodity chains: imbalance in terms of trade and commercial specialization. In regions that were unable to meet their terms of trade because they lacked a diversified offer of produce, manufactures, or services, ports at the forefront of these regional systems could compensate for this deficiency by either offering attractive access to harbours and markets or supporting maritime trade through insurance, crew, or ship supplies. In fact, the competitiveness of a specific port in a regional and global system often depended on its ability to provide such compensatory options. Imbalance in terms of trade could also arise from a lack of capitalization in a specific market. The import of currency or the monetarization of raw materials or natural resources in high demand in regional markets, like salt, silver, cowry shells, or copper, could diffuse this problem. However, currency imports and monetarization of natural resources were often short-lived and tended to drain capital gains. In several early-modern ports, entrepreneurial elites found a more structural solution in their ability to mediate co-dependencies between different locations in a global system of exchanges.

Thus, by associating the import and export of specific goods, port cities established worldwide chains of exchange of commodities that addressed the issue of continuous unbalanced trade. The history of Canton, as analysed by Dennis Flynn and Arturo Giráldez, provides a clear example of this process. As China became the sinkhole for the world's silver production, chains of extraction, transformation, and commercialization of silver developed in Spanish America, Europe, and Japan, while industrial products like porcelain and silk textiles and agricultural products like tea inundated world markets. As silver payments and porcelain, silk, and tea imports became interdependent, silver itself became a bulk commodity, instead of a precious metal alone.[22]

Commercial specialization of ports also played a role in the development of commodity chains. When ports became dependent on the export of a specific product, with most of its regional and local partners specializing in the production and delivery of this product, entire regions became dependent on importing foodstuffs and manufactures from distant markets. Product specialization also contributed to the transformation of the urban service sector in support of that product. Specialization often resulted in highly efficient and institutionalized systems that reduced transportation and transaction costs, which in turn contributed to the competitiveness of ports on a global stage.

In the context of commercial specialization, ports became highly dependent on inputs from local and regional markets. They therefore had to answer promptly and adequately to the needs and demands of different inland markets, particularly concerning

tastes and trends in production, consumption, and capitalization. As the case of Luanda will show, early-modern port cities developed distributive infrastructures to import commodities from elsewhere in the world and deliver them throughout the regional system, while profiting from being the sole distributer of specific products. In short, commodity trade often resulted in specialization—a process that became especially salient when global markets structured their demand towards a specific port or a small group of competing ports.[23]

Luanda: A Port for Early-Modern Commodities

Portugal colonized Luanda in 1575 to gain a permanent foothold in west-central Africa, the main source of the Atlantic slave trade in the sixteenth century. The colonization of Luanda was a key moment in a long process of Portuguese commercial expansion in this part of the African continent. In the early 1500s, the Portuguese Crown developed diplomatic ties with the kingdom of Kongo, on the south bank of the Congo River, which then became the main supplier of captives to sugar planters in the Portuguese archipelago of São Tomé and Príncipe, in the Gulf of Guinea, as well as an important source of ivory and copper exports.[24] To undercut Kongo's monopoly on the regional slave trade, however, Portuguese merchants simultaneously started a clandestine trade on the Island of Luanda, about 400 kilometres south of the Congo estuary, known for its vast deposits of *zimbu* shells, which served as currency in the Kongo region. As these Portuguese traders gained access to the shells, they were able to purchase raffia cloth, another important regional currency, in the eastern Kongo region and so their commercial influence in the African interior increased. Growing involvement in the political and economic affairs of west-central African states culminated in the conquest of Luanda and parts of the Ndongo realm to the east—lands that Portugal renamed the kingdom of Angola.[25]

Portugal's main interest in Angola was slaving. The conquest of Luanda coincided with the development of sugar plantations in the Brazilian provinces of Pernambuco and Bahia. Access to growing supplies of enslaved labour from Angola allowed Brazil to quickly surpass São Tomé and Príncipe as the world's largest producer of cane sugar. In addition, Angola was an important supplier of slave labour to the Spanish Americas, especially sugar planters near Veracruz and food producers in Cartagena Province.[26] In the 1590s and 1600s, Portuguese and Spanish traders in Luanda exported on average between five thousand and eight thousand captives per year to Brazil and New Spain. These figures increased to about fourteen thousand in the 1610s and seventeen thousand in the 1620s, after which decline set in as the Portuguese had to contend with growing Dutch interference in the South Atlantic slave trade.[27]

Luanda was, however, more than a slaving port alone. From the moment it was founded, it became an important marketplace for foodstuffs from the immediate

hinterland, manufactures and raw materials from the wider region, and imported wares from Europe and Brazil. Under the influence of the slave trade and related commodity trades, Luanda developed from a small fishing and shell-gathering settlement into a port city. Shortly after Portuguese colonists settled in the bay of Luanda, Africans began to flock to this new colonial centre to establish trade links between the hinterland and the urban market.[28] As the town grew demographically through this influx of Africans and incipient migration from Portugal, the harbour became the major artery linking Luanda to the outside world, while new roads connected the town with marketplaces in the interior. A municipal council was established upon the city's founding in 1575 to represent settler interests in the governance of the colony.[29] Newly erected defensive structures—notably the fort of São Miguel, built to fight off European rivals—further helped define Luanda as an urban space.[30] Demographically, Luanda long remained a small town at best, although by the end of the eighteenth century the size of its population ranged between six thousand and ten thousand inhabitants, surpassing the generally accepted demographic benchmark of five thousand to qualify as a city in the pre-industrial era.[31] Because of its functionality, however, by early-modern standards Luanda was already a small city in the seventeenth century.

This period also witnessed a geographical reorientation of Luanda as an Atlantic port city. In the early decades of the century, the harbour of Luanda was mainly used for importing foodstuffs and manufactures from Lisbon and Seville. Trade was balanced by the steadily growing export of enslaved Africans to Brazil and Spanish America, where sugar and silver production developed in tandem with Luanda's urban space. Slavers from Seville and Lisbon sold their captives in Vera Cruz, Cartagena, Rio de la Plata, Recife, and Salvador da Bahia. They shipped the sugar and silver they received in return to Spain and Portugal, where traders re-exported most of these products to markets in northern Europe and the Mediterranean.[32] This triangular trade between Iberia, Luanda, and the Americas gradually gave way to a bilateral trade between Angola and Brazil. From the temporary occupation of Luanda by the Dutch West India Company, between 1641 and 1648, most slavers arriving in Luanda came directly from Pernambuco, Bahia, and Rio de Janeiro. Favourable wind and ocean currents gave merchants in these Brazilian ports direct access to Indian manufactured cottons, allowing them to import textiles for the African slave trade independently from Lisbon.[33] Meanwhile, after the Portuguese Restoration War (1640–1668) ended the union of the Iberian Crowns, the Spanish empire found alternative sources of captive labour in Africa outside Angola by subcontracting Genoese, Dutch, French, and British merchant companies.[34]

Besides transatlantic imports, Luanda traded in large volumes of products from nearby regions, especially foodstuffs, palm cloth, *zimbu* shells, and dyewood. Locally produced foods, like palm oil, cassava flour, cereals, and dried and salted fish, fed people in Luanda and along the trade routes but were also important to sustain the thousands of captives who annually passed through the port and boarded the slave ships.[35] The textile belt that ran along the edge of the central African rainforest from Loango in the west to Luba in the east produced fine cloth from the fibre of the raffia palm, which had a monetary function in different African regions, including Luanda and its extended

hinterland, where it was an essential means of payment for captives. Luanda traders acquired most of this cloth by sea from Loango and, especially, overland from eastern Kongo, mainly in exchange for *zimbu* shells. However, after the Battle of Mbwila, in 1667, which pitted Portugal against the kingdom of Kongo, Luanda lost access to these valuable supplies of raffia cloth. In search of an alternative high-value currency, the Portuguese turned to importing quality textiles from Asia and Europe.[36] At the same time, local merchants began to trade in cotton cloth from other parts of Africa, particularly *panos da costa* from the Gulf of Guinea. In the second half of the seventeenth century, therefore, cloth became a widely used commodity throughout western Africa, from Benin down to Angola.[37]

Traders imported *zimbu* shells from the Island of Luanda as well as from Benguela, the second Portuguese conquest in Angola, where people collected them as raw material. For the Portuguese, these shells were a means to purchase commodities such as ivory, copper, and palm cloth as well as enslaved Africans, especially from the kingdom of Kongo. In Kongo, meanwhile, they were an everyday currency. As in the case of American silver in Europe and Asia, therefore, *zimbu* was a commodity for some and money for others.[38] However, as supplies dried up in the middle of the century and alternative shell monies from Brazil and the Maldives failed to take hold in Luanda markets, African and European traders increasingly came to rely on salt as a means of payment. Salt originated from Cacuaco, a coastal village north of Luanda, and from the Benguela region to the south. The duality of currency and commodity, observed in *zimbu* shells, also characterized salt.[39] As a commodity, salt continued to circulate between Angola's maritime frontier and its hinterlands well into the nineteenth century.[40]

Another African commodity that shaped Luanda's early transformation into a coastal port was *tacula*, or *bicesse,* a redwood used for dyeing cloth. In Angola, *tacula* was a vital product for textile manufacturers supplying the urban market of Luanda as well as clients further away, such as the Kongo court, the entourage of Queen Nzinga of Matamba, and the chiefdoms of Benguela.[41] Traders imported *tacula* from the Mayombe forests north of the Congo River and made it available to cloth manufacturers in Luanda and its hinterland.[42] Regional commodity trades like this, which occurred alongside the export slave trade and largely depended on African production, labour, and management, were an integral part of the development of Luanda's hub-and-nodal functions in the late sixteenth and early seventeenth centuries.

Although Europeans founded Luanda as a port city, Africans dominated commercial exchanges in its harbour and market, at maritime landing points along the coast, and in the hinterland markets connected to them.[43] Therefore, while Portuguese law officially regulated Luanda as a marketplace, this market could not function exclusively within a foreign legal framework. The parallel existence of traditional customs regulating the many African marketplaces linked to Luanda required the development of a legal *modus operandi* to accommodate African commercial interests in Luanda, which implied the frequent suspension of Portuguese law.[44]

Three institutional arrangements underpinned the integration of Luanda's African hub and Atlantic gateway functions. In the first place, the Portuguese adopted elements

of African customary law to settle legal disputes involving Africans. The best-known example was the *tribunal dos mucanos*, an official appeals court that dealt with different civil and criminal lawsuits, but which came to concentrate mainly on freedom claims by enslaved people. Occasionally, Portuguese authorities also presided over another local practice to settle disputes: the *juramento de ndua*, an oath-based ceremony by which Africans resolved land disputes, criminal acts, unpaid debts, and the like. The Crown tried to ban this practice in Luanda in 1770, but to no avail.[45] Secondly, pawning was a credit-protection mechanism used by Africans and Europeans alike, although Portuguese law forbade the practice in 1770 because creditors often abused it to illegally enslave people offered as collateral for loans. In fact, in Angola, the *tribunal dos mucanos* was both a mechanism that pressed Africans into debt slavery and a court where families appealed against the illegal enslavement of kin. Finally, European and Eurafrican traders usually had to offer presents to local authorities to gain access to specific markets, trade in specific commodities, or obtain advantageous prices for seasonal products. These ceremonial transactions to support the commodity trade in Luanda created a parallel economy of gift-giving, as many of the gifts originated from commodities and exotic items traded in and distributed through the harbour.[46] Institutional arrangements like these consolidated the economic dominance and political autonomy of Africans, Eurafricans, and Portuguese agents in the Luanda marketplace above and beyond formal colonial rule.

In terms of urban functions, Luanda was a nexus for trade between the coast and small towns and rural areas in its hinterland. It distributed several commodities imported from the coast to places in the interior like Ambaca, Massangano, Cambambe, and Pungo Andongo, at the same time importing and allocating agricultural produce, raw materials, and finished goods from these hinterlands. Of central importance to Luanda's hub-and-nodal function, therefore, was a logistical capacity to redistribute goods to satisfy multiple consumption markets. Rather than the slave trade, it was conceivably the exchange of commodities like palm cloth, *tacula*, salt, *zimbu* shells, cereals, copper, and ivory that cemented Luanda's position as the most important coastal port in west-central Africa by 1600, ahead of potential competitors like Loango, Malemba, Cabinda, Mpinda, and Benguela.[47] The colonial government's ability to impose taxation, develop infrastructures, and use military force further consolidated the city's central place in a contested political landscape.

Specialization in the slave trade accelerated Luanda's development from an African hub into global gateway. In the seventeenth and eighteenth centuries, Luanda became a key distributor of foreign commodities to local and regional markets and simultaneously an all-important nexus for the trade in enslaved Africans to Brazil. For much of this period, the bilateral trade in African captives between Angola and Brazil was the largest branch of the transatlantic slave trade, as urban and rural labour markets in Rio de Janeiro and, to a lesser extent, Bahia and Pernambuco, became heavily dependent on supplies of enslaved Africans from Luanda.[48] To satisfy local supply chains, African, Eurafrican, and European commercial brokers in Luanda demanded barter goods from their Brazilian partners to pay for captives. Local consumption patterns determined the

choice of commodities, which played an important role in the maintenance of patron-client relationships and the reproduction of social hierarchies in the Angolan hinterland.[49] It is important to emphasize, however, that commodity trading continued in Luanda alongside the highly specialized slave trade and that the latter built on the city's capacity to satisfy demand in various markets for specific imports associated with the slave trade.

By enabling, managing, and supplying these multiple demands, Luanda became the focal point of several global commodity chains.[50] Local and regional markets surrounding Luanda showed a particularly strong demand for three different categories of foreign commodities, which, since they did not originate in the continent, were extraneous to the intra-African commodity trade. As a result, three new commodity chains emerged around the slave trade. The first consisted of European commodities, such as foodstuffs and weapons, for which there was a special demand in Luanda and other colonial outposts in the Angolan hinterland. For example, flour, wine, and cod fish became essential items in the Luanda market, mainly to meet the consumption habits of European and Eurafrican households.

A second set of commodity chains linked Luanda directly via the slave trade to Brazilian ports, notably Rio de Janeiro, Salvador da Bahia, and Recife. In Brazil, transformative industries emerged in the seventeenth century to produce tobacco and *cachaça* (rum) for the African market. Tobacco was ground and sweetened in a way that satisfied the tastes of African consumers, although demand for Brazilian tobacco was greater in West Africa than it was in Angola.[51] *Cachaça* was first introduced in Luanda as a niche product, but it developed into an indispensable trade good. From a crucial item in the gift-giving economy, it became a consumer good that was accessible to large segments of the Luanda population and elites throughout the Angolan hinterland. High demand for *cachaça* in Luanda stimulated the industrial processing of sugar-cane leftovers into rum in Brazil. In addition, the packaging and transportation of *cachaça* fuelled the production in Brazil of wood barrels to store the liquor.[52]

A third commodity chain created by the slave trade from Luanda originated in Asia. From the last quarter of the seventeenth century, textiles from South Asia were in high demand across western Africa. In Luanda, they replaced raffia cloth as the main currency in trade with the Angolan hinterland. While produced in the manufacturing areas supplying the main ports of the Indian subcontinent, their designs responded to the tastes of African consumers. Merchants in Bahia and Rio de Janeiro imported Indian textiles directly from Goa, without the mediation of a European gateway, and re-exported them to Luanda, although this was forbidden by Lisbon.[53] Local African elites used them as currency to purchase captives, as capital that could be used as credit or bride wealth, as gifts for both clients and patrons, and as markers of social standing. Imported cloth was, therefore, an essential barter commodity for the acquisition of enslaved Africans as well as a means of social structuration.

Luanda merchants also captured part of the capital gains made from bartering enslaved Africans for imported commodities and the redistribution of African commodities to inland markets. One important source of such rents was the auctioning

of Portuguese contracts for the slave trade. The importance of these contracts increased in Luanda in the 1620s, when they were bestowed mainly on men who had been born in the overseas empire and based their commercial operations in the South Atlantic. These were the slave-trading elites of Luanda and Bahia, who occasionally received backing from financial consortia in Madrid and Lisbon.[54] Another important form of capital gains emerged from the Luanda elite's close association with Brazilian slave traders during the eighteenth century. From the 1720s, especially, Brazilian gold production introduced a new level of capitalization to the South Atlantic trade system, facilitating the provision of credit to merchants in multiple locations, including Brazil, Angola, and Portugal.[55] If debt was issued in the form of bills of exchange, liquidity was attained through tax farming or participation in royal rents or endowments. However, while merchants could reap and use some of these financial gains in Luanda, investors from Portugal and, secondarily, Brazil, pocketed the lion's share.[56]

Conclusion

Port cities have often become gateways for global commodity chains based on the hub-and-nodal functions these ports developed through commodity trades with their hinterlands and adjacent regions. A case study of Luanda, which became a port city of global importance in the early-modern period, has illustrated this process. The Portuguese colonized Luanda and its hinterland in the late sixteenth century to gain a permanent foothold in west-central Africa and consolidate their control of the regional export trade in captives. Very quickly, Luanda became a prominent regional port where Europeans and Africans exchanged foodstuffs and commodities like copper, ivory, palm cloth, *zimbu* shells, and dyewood, which were as important for the development of Luanda as an urban marketplace as was the trade in enslaved Africans. These trades stimulated the growth of ancillary economies, like food production, porterage, and maritime transport, and they required the development of port facilities, roads, and a variety of legal, political, and social institutions to facilitate cross-cultural trade.

In a historiography dominated by the transatlantic slave trade, the importance of commodity trading to the development of African port cities in the pre-colonial era is often neglected.[57] But these trades were fundamental to the creation of linkages between regional markets within Africa and the Atlantic and Indian Ocean worlds. These linkages were arguably not strong enough to deeply integrate regions beyond the coastal hinterlands in the global economy, but by connecting African consumers to foreign markets, they gave rise to several significant transoceanic commodity chains.[58] In the case of Luanda, these included, in addition to the transatlantic slave trade, trades in Brazilian rum and Asian textiles. Port cities like Luanda were, in short, crucial distribution points in commodity chains linking local, regional, and global markets.

By focusing on the urban functions of port cities and the transformation of hubs and nodes into gateways, commodity historians have learned to pay more attention to

local contexts, as opposed to global structures, to explain the role of port cities in the world economy. Moreover, a commodity-chain perspective encourages historians to revise the relationship between centres and peripheries in the world economy. It is no longer sufficient to view early-modern port cities in the Global South merely as outlets for raw materials for technologically more advanced regions in the world. In the case of western Africa, ports like Luanda have long been seen as a 'periphery of a periphery' in the Atlantic world, as suppliers of slave labour to American plantation economies that in turn supplied raw materials to Europe.[59] As historians of eastern Africa have shown, however, African port cities served domestic consumer markets at the same time as they were gateways for major global commodity exports.[60] Not only were these ports often more oriented towards their hinterlands than their maritime forelands, but it was precisely the linkages with producers and consumers inland that allowed them to occupy a central place in the flow of global commodity trades.

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CHAPTER 7

COMMODITIES SHAPING A NEW IMPERIAL HISTORY

Tobacco and the Iberian Empires

SANTIAGO DE LUXÁN MELÉNDEZ,
JOÃO DE FIGUEIROA-REGO,
VICENT SANZ ROZALÉN, AND JEAN STUBBS

For the Iberian monarchies, tobacco became a fundamental source of revenue and a key driver articulating a system of imperial rule and shaping a colonial dynamic that transcended political and institutional arrangements and fundamentally reshaped social and property relations and labour regimes. Until the last part of the twentieth century, that tobacco history was little studied in its full dimension and not until the first decades of the twenty-first century as having at its epicenter an Atlantic tobacco system that extended across the Pacific to become global. For the Portuguese and Spanish Empires, tobacco was a commodity on which the very process of colonization was grounded, making it one of the commodities that most shaped imperial and colonial spatial relations.

There was a process by which the Iberian tobacco monopolies established networks of transimperial and transcolonial connections in the Americas, Africa, and Asia, which changed over time in the longue-durée of monopolistic Iberian rule. To understand this, we begin here by looking at a select historiography situating Iberian tobacco historiography and tobacco monopolies in the formation, consolidation, and demise of the Iberian empires from the sixteenth to the nineteenth centuries. This highlights work of recent decades, in particular that spearheaded by Hispanic and Lusophone tobacco historians, exploring the ways in which the Iberian empires strived to harness resources, revenues, and people.

This is then illustrated in two case studies. The first traces facets of the Brazil-Africa-India connections in Portugese imperial tobacco history, while the second charts the Spanish imperial and colonial monopoly system through to the early

nineteenth-century demise of the Cuban monopoly and subsequent rise and fall of the monopoly in the Philippines.

After losing out to the British in India in the eighteenth century and crucially losing Brazil in the Americas in the nineteenth century, Portugal met with limited tobacco success in Africa. After the end of the Spanish monopoly in Cuba, Spain's designs with the tobacco monopoly in the Philippines, in an attempt to reconfigure its waning empire, were similarly chequered, and by the end of the century both Cuba and the Philippines were occupied by the United States in what was the start of a new era of US expansionism.

The concluding section signals ways in which the Spanish and Portuguese monopolies converged and diverged and the relevance of Iberian imperial tobacco history for the broader study of commodities and empires. The tobacco monopolies of the Iberian Empires might have fallen by the end of the nineteenth century, but this was by no means the end of tobacco monopolies or many other continuities into the post-imperial period.

Tobacco Historiography of the Iberian Empires

A spate of historiography since the late twentieth century has furthered our understanding of how tobacco, a plant of the indigenous peoples of the Americas, became an imperial global commodity. While many studies are quite narrow in focus, prioritising cultivation, processing, trade, or consumption, overview histories such as that by Victor Kiernan traced tobacco's global journey across the centuries, while Jordan Goodman's post-1800 social history of tobacco cultivation and trade cemented a persuasive concept of tobacco as a 'poor man's crop' bound up in 'cultures of dependence' that harked back to earlier times. Among the more popular commodity histories, James Walvin included tobacco as one of several 'fruits of empire', which Wolfgang Schivelbusch characterized as 'tastes of paradise', while for Ian Gately tobacco was 'La Diva Nicotiana', 'an exotic plant that seduced civilization'.[1]

Venerated by the indigenous peoples of the Americas for its therapeutic properties and spiritual properties, bound up in shamanism, tobacco was initially looked down on by European colonizers and thereafter periodically demonized by European powers, with the persecution of those seeking its pleasurable consumption, as under the Portuguese and Spanish Inquisition.[2] Sander Gilman and Zhou Xun's edited collection on smoke through the ages, however, encapsulates the seduction of tobacco in tandem with the rise and fall of empires, covering a rich array of the many variations of the habit, through to the late nineteenth-century rise and twentieth-century global predominance of the cigarette.[3]

Within this wider framework, the focus of much Iberian tobacco historiography has been on the Spanish and Portuguese tobacco monopolies. Early examples in the

Spanish case include the work of Edilberto de Jesús, exploring the bureaucratic and social underpinnings of the Philippine monopoly, and Susan Deans-Smith on the role of bureaucrats, planters, and workers in the making of the monopoly during the Bourbon period and Guillermo Céspedes del Castillo demonstrating the importance for Spain of the tobacco monopoly in the Viceroyalty of New Spain. This was the first viceroyalty created by Spain in the Americas, in 1521, one that came to comprise much of what is today part of the southern and central United States, central and northern parts of South America (principally now Mexico), and extended to Pacific Ocean archipelagos, namely, the Philippines and Guam. The significance of the metropolitan tobacco monopoly in shaping Spanish history was also evidenced in the work of Francisco Comín and Pablo Martín Aceña, and that of the royal tobacco monopoly in the Viceroyalty of Peru, created in 1542 to administer much of Spain's South American Empire, by Catalina Vizcarra.[4]

A growing consensus among historians confirmed that the Spanish tobacco monopolies generated an immensely important economic sector, one which had, by the late seventeenth century, become an indispensable resource for the monarchical state. Tobacco was second only in value to silver crossing from the New World to the Old and central to the very shaping of empire. The significant role played in this by Spanish imperial fiscal design was highlighted in studies by Herbert Klein, John Fisher, and Laura Náter,[5] while the importance and associated problems of the fiscal transfer known as the *situado* operating among the Spanish tobacco monopolies in Mexico and other Spanish territories such as the Philippines, Cuba, and Peru lay at the core of works such as those by Leslie Bauzón, Carlos Marichal, and Matilde Souto, and a later collection edited by Marichal and Johanna von Grafenstein.[6]

Náter highlighted the important broader imperial networks of the Spanish tobacco monopolies in the seventeenth and eighteenth centuries, while the context for tobacco reforms was set out in the work of Allan Kuethe and Kenneth Andrien on the eighteenth-century Spanish Atlantic world, war, and the Bourbon reforms. The centrality of tobacco in shaping Cuba and the Atlantic world was cemented by Charlotte Cosner, who also highlighted opposition to Spanish monopoly impositions with the uprisings of tobacco growers in Cuba, precursor to the late-nineteenth-century worker opposition to Spanish colonial rule documented earlier by Jean Stubbs and Joan Casanovas. Stubbs also later looked beyond the Iberian Atlantic to broader transimperial connections accounting for the rise of the Havana cigar to nineteenth-century pre-eminence in what was tobacco's 'century of the cigar'.[7]

In Spain, the standard reference for Spanish tobacco history had been the work of José Pérez Vidal published in the 1950s. That began to change with the 1990s publication of the historical dictionary of tobacco in Spain by José Rodríguez Gordillo, followed by his later compilation of essays on Spanish tobacco.[8] Rodríguez Gordillo was one of a group of Spanish historians involved in a 1998 Spanish symposium on tobacco and economy and the subsequent creation of the GRETA tobacco study group, which continued until 2012. Attention turned to the imperial and colonial dimensions of Spanish tobacco history, connecting the organizational, administrative, and fiscal aspects of the

metropolitan monopoly in Spain with the creation of tobacco monopolies in the colonies in the eighteenth century.

This gave rise to a series of publications, the earliest of which was the collection edited by Agustín González Enciso and Rafael Torres on tobacco and economy in the eighteenth century. Later collections followed on the economic history of tobacco from the seventeeth to the twentieth centuries, edited by Luis Alonso Alvarez, Lina Gálvez Muñoz, and Santiago de Luxán Meléndez and on the political economy of the eighteenth-century tobacco monopoly, edited by González Enciso.[9] Among new regional studies of tobacco in Spain, those by Andrés Arnaldos Martínez and Jorge Arnaldos de Armas, as well as Luxán, evidenced the important positioning of the Canary Islands on Spain's route to the Americas. This was explored further by Luxán, Montserrat Gárate Ojanguren, and Rodríguez Gordillo, to develop the concept of the Atlantic tobacco system and the Cuba-Canaries-Seville axis within this.[10]

Further confirming the crucial importance of tobacco revenue for the royal coffers, these studies evidenced how the metropolitan monopoly depended on cultivation and trade in the colonies through controls, fiscal arrangements, and local networks of privileges granted in the seventeenth century (except for a brief interlude in the years 1684–1687); was later combined with direct administration over Seville and Madrid (1701–1730); and was thereafter brought under the *Administración Única* in which the Cuba-Canaries-Seville connection played a significant part.

Much of the debate on the eighteenth century centered around, on the one hand, the success of reforms seen by some as stemming from a more 'free trade' approach, and, on the other—as argued by Marichal and Vizcarra—the negative impact of fiscal policy of the tobacco monopolies aimed at maximising the extraction of resources to underwrite the monarchy's costs of war.[11] The very extractive fiscal success of the imperial monopoly was depicted as one of the principle causes of the backwardness of Spain's American colonies, while the tobacco monopolies were also seen—for example, by Náter—as the very economic backbone of those colonies. What remains best known to date is the history of the metropolitan monopoly, and in the Americas the privileged positioning and workings of the Cuban monopoly documented among others by Luxán and Gárate.[12]

In the case of Portuguese imperial tobacco historiography, studies as of the late twentieth century also documented the significance of tobacco in the Portuguese imperial period. These ranged from the importance of tobacco for the Portuguese nation in the work of Raul Esteves dos Santos to the monopoly and contraband in the early Portugese tobacco trade of the late seventeenth to early nineteenth centuries by Carl Hanson.[13]

Portuguese Brazil occupied a prominent place, with pioneering studies including that on the Portuguese tobacco trade and tobacco growers in the late colonial period of Bahia and the Recôncavo region of northern Brazil by Catherine Lugar and on the colonial system of administering tobacco production, trade and labour by Jean Baptiste Nardi. B. J. Barickman, taking his cue from the influential—and controversial—work of Fernando Ortiz on the counterpoint of tobacco and sugar in Cuba (first published in 1940), explored the counterpoint of tobacco, sugar, and cassava in the late colonial and early post-colonial period, and Paulo Henrique de Almeida charted four centuries of

tobacco growing and manufacture. Gustavo Acioli Lopes undertook a historiographical overview of the ascent of the Portuguese American tobacco 'primo pobre', prelude to his later study on tobacco, sugar, gold, and slaves in the Atlantic trade with Costa da Mina, and Philomena Sequeira Anthony subsequently explored relations between Goa and Bahia.[14]

A new boost was given to Portuguese tobacco historiography when Portuguese historians started collaborating with Spanish historians on the Iberian tobacco monopolies. The collaborative focus was on the creation and consolidation of complex structures of tobacco cultivation, trade, manufacture, and distribution across diverse colonial and metropolitan spaces from the end of the sixteenth century through the seventeenth and early eighteenth centuries and how this changed during the late eighteenth and nineteenth centuries.

This resulted in a series of publications on Iberian tobacco, from the political and fiscal history of the seventeenth to the ninteenth centuries edited by Luxán, to tobacco and slavery over the same period and the lucrative history of Iberian tobacco, as much as it was a 'vice' edited by Luxán, João de Figueiroa-Rego and Vicent Sanz Rozalén, and a special themed issue of the journal *Millars* on the Iberian tobacco monopolies, guest-edited by Luxán, Stubbs, and Figueiroa-Rego.[15]

Documenting in detail the workings of Portuguese and Spanish tobacco history and the tobacco monopolies confirmed their early convergence in economic and defence terms between the Atlantic extremities of the two empires, as argued by John Elliott,[16] and on a scale that made it possible to see them both as components of an Iberian Atlantic system. This was articulated primarily in tandem with the trafficking of slaves from Africa in the triangular trade between Africa, Europe, and the Americas, in which tobacco played a significant part, with expanding incursions into Asia.

In the early global context, there were three main axes to the tobacco trade. The Chesapeake-Britain-France axis (that of Virginia tobacco) was dominant in terms of the volume of trade, and its greater competitivity due to its inferior quality and therefore much lower price, for use in smoking. Britain and France did not establish monopoly regimes per se but rather tariff trade systems. The second axis was that of Brazil-Portugal-Spain-Italy, with two secondary axes—Brazil-Africa, which was fundamental in the slave trade, and Brazil-India—and with the Atlantic archipelagos of the Azores and Madeira under the Portuguese monopoly. This was mainly in the form of rope tobacco that on the European market was processed for smoking or as snuff.

The third axis was that of Spain's Empire in the Americas, which was a tobacco monopoly to regulate all colonial trade. After the frustrated attempt to create a colonial monopoly in Venezuela in 1620, the Havana-Cadiz-Seville axis was established, the financial backbone of which was New Spain, with a secondary Cuba-Canaries-Seville axis. In 1760, a change in Spanish imperial policy extended to the creation of tobacco monopolies in other American colonies, establishing them in regions that were designated to be tobacco-producing—principally Cuba and New Spain—and others that were to be tobacco-consuming, where sales would be the source of revenue for Spain. The tobacco that was consumed in the latter regions was primarily in the form of snuff

from leaf originating in Havana and processed in the Real Fábrica de Sevilla, although local populations were already smoking tobacco from Virginia and Brazil. This third axis functioned more completely under a monopoly regime, with an additional axis connecting the Pacific archipelago of the Philippines with New Spain, of which the Philippines was an administrative dependency. From the Philippines, tobacco was introduced into China, where by the seventeenth century there was mass tobacco consumption, and by the end of the century tobacco was a global product.

By embracing a comparative perspective the interconnections became more apparent beyond the Atlantic framework of Europe-Americas-Africa, with the structural dependence of the Portuguese colonies in the Indian subcontinent and the incorporation of the Philippines into the Viceroyalty of New Spain. In the Portuguese case, topics investigated included the connections between Brazil and Africa by Figueiroa-Rego; the administration of the Portuguese royal monopoly in India in the seventeenth-century and early eighteenth century by Susana Münch Miranda; and the small but significant Spanish commercial interests in Lisbon in the early eighteenth-century tobacco trade with Brazil by João Paulo Salvado and Leonor Costa Freire.[17]

A first approximation to a comparative history of the Spanish and Portuguese middle-Atlantic archipelagos of the Canary Islands and the Azores and Madeira from the seventeenth to the nineteenth centuries by Luxán and Margarido Vaz do Rego Machado highlighted how each had long operated under metropolitan monopoly control and then exhibited similar nineteenth-century strategies with the loosening of metropolitan strictures. This was not without strong local opposition in the Azores to the Portuguese tobacco contract in and through Lisbon in the last half of the nineteenth century, as documented by Vaz do Rego Machado, while María de los Reyes Hernández Socorro and Luxán broadened the scope of analysis to evidence the widespread smoking habit in the Canaries through a study of portraiture.[18]

Parallel work undertaken on the Philippines, meanwhile, underscored the importance of the Philippines in a new imperial construct of the Spanish monarchy, the laboratory it in effect became for colonial administration to finance the empire, and how it was a focal point for colonial tensions among European powers. The argument highlighting tobacco in the rearticulation of Spanish colonial power was substantiated, among others, by María Dolores Elizalde, Josep María Delgado, and Xavier Huetz de Lemps.[19]

Findings such as these were linked to a wider process of transformation of the Spanish empire, which Josep Fradera encapsulated in the concept of the 'imperial nation'.[20] He related this to the turning point of the late eighteenth and early nineteenth centuries when imperial monarchies collapsed and modern nations emerged, and saw this pivotal moment as a bridge rather than a break, during which the legacy of monarchical empires shaped relations between imperial centres and their sovereign territories. The early nineteenth century saw tobacco being redefined in the reconfiguration in the metropolis, with the consolidation of the liberal State, and also the remaining colonial spaces, such that in Spain's last main colonies tobacco was prioritised in the Philippines, coffee in Puerto Rico, and sugar in Cuba. Burgeoning Cuban sugar interests were instrumental

in securing the 1817 abolition of Spanish tobacco monopoly in Cuba, as documented by Sanz Rozalén,[21] and hence the renewed focus on the Philippine tobacco monopoly.

The growing corpus of historical work thus highlighted the importance of tobacco in the Atlantic and Pacific extremities of the two empires and the connections between them. This was articulated in the early phase with the trafficking of slaves from Africa in the triangular trade between Africa, Europe, and the Americas in which tobacco played a significant part, the expanding incursions into Asia, and the constant losing battle to contain illict trade and smuggling. The first of the two case studies that follow illustrates facets of this in Brazil-Africa-India connections in Portugese imperial tobacco history. The second charts the Spanish imperial and colonial monopoly system through the rise and demise of the Cuban monopoly and subsequent repositioning of the Philippine colonial monopoly.

Portuguese Imperial Tobacco History: Brazil-Africa-India

The early history of tobacco under the Portuguese Crown was inextricably linked to the Hispanic axis, involving colonial defenses, tensions, and open conflict with other powers.[22] The Dutch threatened Brazilian sugar and tobacco, the slave trade from Angola, and metropolitan salt, which led to war during the reigns of Philip III and Philip IV.[23] After the fall of Secretary of State Miguel de Vasconcelos in 1640, a first action was to raid the tobacco held by Castille,[24] and in 1648, former Jesuit Manoel de Moraes, in a letter to the King regarding possible secession of Brazil to the Dutch to end the conflict, argued it was totally unacceptable that Portugal lose a territory so rich in sugar and tobacco.[25]

This changed with the Braganza dynasty and the Portuguese tobacco monopoly. After a short parenthesis (1642–1644), when the monopoly was replaced by a customs-tariff regime, the monopoly centralized the production and distribution of tobacco under the *Junta de Administração* and set up tobacco manufactories in Lisbon, Porto, the Azores, and Madeira. Tobacco underwrote much of the military and diplomatic outlay during the War of Restoration (1640–1668). However, a key year to underscore is 1674, when the ordinances of the *Junta de Administração do Tabaco* were drawn up for administering the new monopoly. This implemented fiscal and institutional reforms, which coincided with the colossal financial needs that would lead Regent Dom Pedro to request a substantial annual subsidy from the Cortes.[26] As of 1680, the *Junta Directiva del Estanco Real do Tabaco* was set up in Goa to regulate all facets of the trade and the *Fábrica Real de Lisboa* began to supply snuff to the Asian monopoly.[27]

The vicissitudes of the monopoly in failing to meet its normative framework and contractual obligations and suppliers and to navigate illicit trade and smuggling, conflict between the magistratures, and discord with monastic institutions[28] were almost

permanent features from the late seventeenth and throughout the eighteenth centuries. Such failings did not, however, appear to dissuade any of the actors involved from their activities linked directly or indirectly to tobacco.

In 1697, the tobacco contract system came into force in Río de Janeiro to cover the costs of building the city's fortifications and the upkeep of the troops.[29] The *Junta de Administração* maintained it would not be possible to raise the sums needed were the system to be opened up. For a year, the Crown administered the trade directly but again failed given the sheer amount of contraband.[30] Contracts decided annually in Portugal were then changed to three-year contracts. By this time, tobacco was one of the principal sources, and possibly the main source, of Crown revenue, and the objective was to achieve greater stability and compensate for the habitual delays in the annual handing out of contracts on the part of the *Junta de Administração*.[31] Growers in Brazil were duty bound to sell their tobacco only to those merchants who had been licensed to operate as such, and only licensed merchants had the privilege of buying tobacco from the *Fábrica de Lisboa* and distributing it through a network of local outlets. In Goa and neighbouring Bardés and Salsete, contracts with local merchants were also entered into on a three-year basis.

The permeability of bodies such as Treasury, War, and Overseas Councils, *Junta de Administração,* and local authorities was such as to allow Bahia to become the main driver of tobacco production and distribution in the Portuguese dominions. At the start of the seventeenth century, it accounted for 90 per cent of tobacco in Brazil, in large part destined for Portugal. In addition to the tobacco produced in Bahia, there was the tobacco of Pará, Maranhão, Minas Gerais, and Pernambuco, but in much smaller volume. Tobacco made up a considerable part of the trade between Bahia and Costa da Mina, bolstered by this being tobacco of an inferior quality that was not distributed in the metropolis and also by Bahia tobacco being party to a trading monopoly in Dutch hands.

Until 1775, tobacco from Bahia was processed as snuff in Lisbon and from there sent to Goa, where the income generated was used to buy pepper and textiles, as well as diamonds, salt, porcelain, tea, and other products. From 1775 on, a significant new aspect of Portuguese intracolonial relations was the direct export of leaf tobacco from Bahia to the Goa monopoly. Goa became the principal Asian tobacco distributor for Bahia tobacco to Damão, Diu, Baçaim, Chaul, Mangalore, Costa de Coromandel, Solor, and Timor, as well as Macao, where a monopoly was set up for the whole of China under the Qing (Manchu) dynasty. Direct trade between the two colonies transformed the Goa-Bahia dynamic, enabling the two colonies to develop such intensive trade relations that these were only interrupted during the Napoleonic Wars and the opening of Bahia and Goa to the British, and only came to a complete end with the independence of Brazil in 1822.

The African trade was crucial for the link between tobacco and the slave trade, whereby the price of tobacco produced in the American colonies underwrote the purchase of slaves. In terms of the Asian market, however, the metropolitan design for Goa and later Macao to become the platform for Portuguese tobacco throughout the region did not come to fruition. The sweet taste of Brazilian rope tobacco did not appear to suit

the palate of Asian consumers and the poor revenue generated was a problem for those attempting to manage the Portuguese Indian monopoly, unable as they were to meet the high volumes set out in the contracts they themselves had signed.

In terms of Britain's role in this, the transfer of Bombay to the British in 1661 eventually dealt a heavy blow to the Portuguese trade and Crown revenue. Goa was slowly overshadowed by Bombay, which became a base for the sale of tobacco, largely under the control of the British, many of whom were heavily involved in smuggling.[32] Mozambique also played a considerable part in the trade in snuff, the profits generated finding their way to Goa in the form of ivory, gold or copper, then to be invested in other products in high demand in the trade to Bahia and Lisbon. Moreover, the eighteenth century saw the economic rise of Portuguese footholds in Gujarat and the Coromandel Coast, but not with the same success as Brazilian tobacco, which had gained recognition and prestige on international markets.[33]

The tobacco trade in Portuguese India can be divided into three periods: the first from the early years of the introduction of tobacco in India until 1675, when locally grown tobacco was consumed; the second until 1775, when snuff from Bahia was shipped each year to Goa and sold through Lisbon under the Crown monopoly; and finally, the period after 1776, when Bahian leaf tobacco went directly to Goa, cutting out Lisbon.[34]

A key element in this latter period, the final phase of which coincided with the territorial breakup of the Portuguese Atlantic Empire, was the abolition of the Goa monopoly. In its place came the *Junta do Tabaco*, building on the *Mesas de Inspecção* that had been introduced in Brazil in 1751, part of the reforms introduced by the Marqués de Pombal in response to British pressures in India. It was Pombal who had in 1756 imposed a limit of three thousand rolls of tobacco in each shipment for Costa da Mina trade, and decreed that slaves not be traded in the same ships, to maintain the tobacco-slave link favorable to trade interests in the metropolis and Brazil. After 1662, the Dutch and the British started buying slaves on a mass scale to meet the demand created in the tobacco-producing regions of the Caribbean and Virginia.[35]

The Angola-Brazil axis was important for the slaveship connections, but after its decline, Costa da Mina filled the vacuum left to become the epicentre of the slave trade. The tobacco produced in southern Pernambuco financed the slave trade from Costa da Mina, especially between the mid-seventeenth and mid-eighteenth centuries.[36] In 1778, Spain and Portugal signed a treaty which gave the former trading rights, as in Gabon, Cameroon, and Cabo Formoso, committing the Crown to purchase Brazilian tobacco over a period of four years to buy slaves on the African coast.[37] The changing interests of Brazilian tobacco producers, who acquired slaves in the Costa da Mina, produced not only a substitution but also a distinct organizational model linked to the waning Portuguese colonial system and the rearticulation of European hegemonic powers.[38]

The Portuguese tried to make up for the loss of Brazil in 1822–1825 by cultivating tobacco in the overseas possessions that they retained in a relatively free context. While hopes of turning Angola into a new Bahia did not come to fruition, the colony produced enough tobacco for most of its own needs and exported modest amounts of leaf and cigars, and later cigarettes, to Portugal.[39] The other overseas possessions became more or

less self-sufficient, except Macau, and the Azores even exported leaf and manufactures to Portugal.

In Continental Portugal itself, debates raged over the future of tobacco. The state monopoly ended in 1865, but cultivation remained prohibited. A *Régie* along French lines briefly emerged in 1888.[40] Three years later, it was leased to the private *Companhia dos Tabacos de Portugal* for thirty-five years—a lease that was prolonged for twenty more years. An exception to the ban on cultivation was granted in 1884 to the wine region of the Douro, to combat the phylloxera crisis. However, neither the *Régie* nor the *Companhia dos Tabacos de Portugal* was prepared to buy much of this low-quality leaf, and cultivation ceased in the late 1890s, as the wine economy recovered.

The Spanish Tobacco Monopoly System, Cuba and the Philippines

Understanding the nature and reach of the Spanish tobacco monopoly has to be seen as a process that can be divided into two broad phases: a pre-monopoly phase (1606–1717) and a monopoly phase (1717–1817). It was a process during which an institutional framework was created for structuring Atlantic transfers of tobacco, revenue, human capital, means of defence, and resources. It was to coordinate exchanges taking place in different colonial spaces and to arbitrate friction between large administrative entities, aimed at unifying practice and acting as a safeguard against smuggling.[41]

The underlying features of the monopoly were to restrict cultivation to designated areas under *factorías*, to control production through permits issued for manufacturing establishments, to create a network of third-party sales outlets—all of which operated with a certain degree of autonomy in comparison with the rigidity of other colonial Crown institutions.[42] A centralized pricing mechanism was designed to maximize fiscal revenue, with a powerful coercive instrument of control in the form of advance credit, which in practice was often delayed, causing much discontent.

The prime characteristic of the monopoly emanated from the political decision to reserve for the colonies the raw material production and certain forms of processing with the *Fábrica de Sevilla*, founded in 1620, as a general distribution and manufacturing centre.[43] With the *Real Cédula* of 1620, a centralized structure was devized for tobacco from Trinidad, Cumaná, Guayana, and Barinas to supply a factoría in Cartagena de Indias. A further *Real Cédula* of 1636 established the tobacco monopoly of the Crown of Castille, to be supplied from the same sources and Cuba, and the *Real Cédula* of 1684 laid down that the *Fábrica de San Pedro de Sevilla* receive all tobacco from the colonies for manufacture and redistribution, including back to the colonies for consumption. The prohibition on cultivation in Spain was formalized in the *Real Cédula* of 1701, although prohibition had been in place since the creation of the metropolitan monopoly in 1636.

There were cornerstones defining the structure of monopoly during the eighteenth century. The metropolitan monopoly was both administrative and fiscal, prohibiting the cultivation of tobacco in the metropolis and operating through a formula of monopoly leasing or direct control. The *Fábrica de Sevilla* became part of a complex of the *Almacenes de Madrid* and especially the *Factoría de Alicante*, for receiving and redistributing tobacco from Brazil, along with a wider system of *factorías* across Spain after 1768.[44]

The *Factoría de La Habana* was the main source of supply and was not replicated in other parts of the Americas such as Santo Domingo, Puerto Rico, or, with certain provisos, Venezuela. In 1760, the *Segunda Factoría* was established in Cuba, strengthening Cuba's privileged position in relation to the Spanish monopoly, with increased financing from the New Spain *situado*, and the establishment of the monopoly in New Spain in 1764.[45] The attempt to increase tobacco from Havana was designed to reduce dependency on supplies from Brazil and Virginia, streamline administration under new administrative regions, *Intendencias*, and gain greater fiscal control.

During 1764–1765, the creation of the imperial monopoly ran parallel to that of creating the new *Intendencias*, with the objective of building a more effective structure behind the monopoly, in the form of fiscal mechanisms, officials, and governing mandates, including in Spain itself. Throughout the Americas, with the exception of Cuba, areas were designated for tobacco cultivation, and, with the exception of Cuba and Venezuela, and at times Santo Domingo, Louisiana, and Puerto Rico, tobacco was not grown for export but to generate revenue. The main characteristic of the imperial monopoly was, to reiterate, defined by the political decision to demarcate production of the raw material and certain forms of processing.

The policy to create other monopolies in the Americas was ratified in 1765, and with the Anglo-American War of 1779–1783, the policy was extended across Spanish American territories. Colonial monopolies were established in the Viceroyalties of Peru, New Spain, and New Granada (which had been created in 1717, covering what is today Colombia, Ecuador, Panama, and Venezuela), all under the imperial monopoly, whereby Seville was the manufacturing centre for tobacco, which was then sent back for consumption in the colonies. Each had under its orbit other territories.

New Spain was the most successful from the imperial viewpoint: cultivation restricted to certain areas, control of distribution, and above all a source of fiscal revenue, accounting for 65 per cent of liquidity for Spain between 1765 and 1795, and financing Havana and also Manila in the Philippines.[46] Major reforms contributed to the articulation of the New Spain-Havana-Seville axis financing growing, manufacture, and redistribution in the first half of the eighteenth century and the expansion of the monopoly to all the colonial territories of the Americas during 1760–1786. With these reforms, especially the *Real Orden* of 1765, a uniform administrative structure was created along existing ecclesiastical lines. From a fiscal point of view, this swelled the Crown coffers, contributing net revenue above all other sources of revenue accruing to the Crown. However, it failed to increase production, sales or import substitution,[47] and, by the end of the century, liquidity from tobacco was 36 per cent from New Spain and 52 per cent from the other viceroyalties.

In effect, the eighteenth century ushered in a new phase. The end of the War of Succession, the presence of French companies in Guinea, and British expansionism led to the creation of the *Factoría de Tabacos de San Cristóbal de La Habana*, which established Cuba as the main source of supply for Spain. Figure 7.1 shows approximate figures for how Cuban tobacco shipped to the Spanish peninsula during the period 1705–1812 increased as a result. The curve indicates a moderate supply throughout the century of less than two million pounds in weight a year; an asymmetry between the period of the first *Factoría* (up until 1761) and the second *Factoría*, which, after the trauma of the British occupation of Havana in 1762, reached a high point between 1765 and 1773; a second peak after the Paris Peace Treaty of 1783; and a subsequent decrease that continued until the monopoly in Cuba was abolished in 1817.

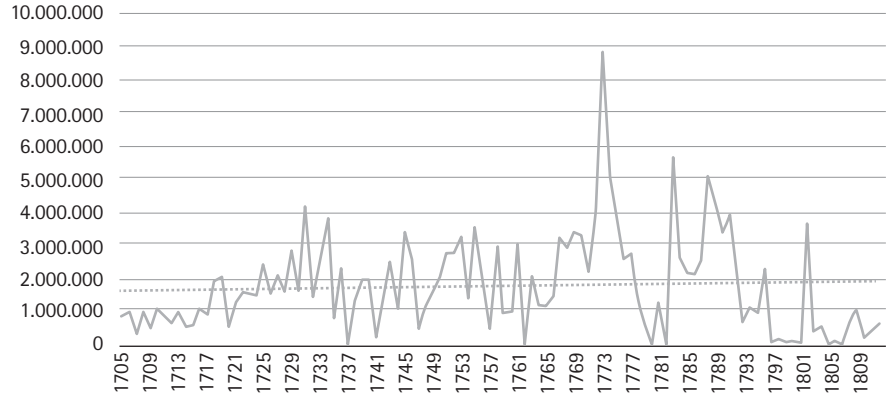


FIGURE 7.1 Tobacco shipped to Spain from Havana, 1705–1812.

Source: Archivo Histórico Provincial de Sevilla, Real Fábrica de Tabacos de Sevilla, Contaduría, Contaduría general, Cuentas del cargo y data de almacenes y gastos, leg. 2.762 a 2.786 (1705–1739); Libros de cargo y data general de las Reales Fábricas de Sevilla (1740–1761); Archivo General de Indias, Santo Domingo, 2023 (1762–1812).

The nineteenth century thus opened a new era for the Spanish imperial tobacco monopoly. Throughout the eighteenth century, as a result of the reconfiguration of European colonial powers and the need to create bigger and better defenses against the French and the British, the Spanish crown saw itself forced to reform its mechanisms of domination and revenue extraction in its imperial territories, with tobacco as a fundamental bulwark in its edifice of colonial rule. So much so was this that towards the end of the 1700s it was evidenced that tobacco revenue underwrote capital and loans taken on by the Crown to meet state demands,[48] and this remained so in the early 1800s, by which time tobacco revenue was seen to be the very backbone of the State.[49]

Reforms implemented, however, proved insufficient against the backdrop of change taking place in the nineteenth century, in Europe and the colonial world, especially the Americas.[50] Turn-of-the century independence struggles in Spain's mainland colonies, the 1791 slave revolution in French Saint Domingue, and the creation of the independent state of Haiti in 1804, completely changed the geopolitics of the Caribbean region. Cuba replaced Haiti to become the world's main producer of sugar at a time when the balance

of power between European colonial powers was in flux. Spain's need to hold onto Cuba, its 'pearl of the Antilles', as a source of revenue for its disintegrating empire meant meeting the demands of the Cuban elites tied to sugar and the slave trade, which in turn gave rise to what has been characterized as a 'second slavery'.[51]

In Cuba, the attacks on the tobacco monopoly of the last decade of the eighteenth century coincided with the expansion of sugar destined to fill the void left by Haiti. Francisco Arango, a leading proponent in attacking the Spanish tobacco monopoly, argued that the control of the *Real Factoría de Tabacos de La Habana* meant, among other things, not having sufficient tobacco without the threat of sanctions against the smuggling that went with it, to defray the necessary costs of acquiring slave labour. It fell to *Intendente* José Pablo Valiente, a close associate of Arango in La Ninfa sugarmill, to decree the abolition of the tobacco monopoly, freeing leaf cultivation and manufacture from monopoly constraints, on the sole condition that manufacture be duly registered.[52]

The end of the tobacco monopoly in Cuba ushered in an inevitable reorganization of tobacco production in Spain at a time of tensions between absolutism and revolutionary liberalism coming to a height after the death of Ferdinand VII in 1833, and the Philippines emerged as Spain's new tobacco protagonist. Since the mid-1700s, importance had been attached to tobacco cultivation and establishing a tobacco monopoly in the Philippines, and in 1765 and 1766 Francisco Leandro de Viana, *procurador* of the *Audiencia* of Manila, took this position in the context of the need to reform the finances of the colony. To generate revenue, he argued, incomparably preferable to a monopoly only on snuff, the main form of consumption in the metropolis, was a monopoly on leaf tobacco and cigars, the main form of consumption among the indigenous population.[53]

The *Real Cédula* of 1766, which reached Manila in 1768, stipulated that Governor José Raón set up the monopoly, but it wasn't until 1782 after José Blasco y Vargas had become the new captain general and governor that the new colonial policy became effective, with the necessary funds at its disposal in the form of the *situado* from the Viceroyalty of New Spain to buy the leaf and defray other costs.

By the 1830s, the Spanish Empire comprised only a handful of territories, among which Cuba and the Philippines were two where tobacco had played an important role. With Spain's loss of control of this in Cuba, the Philippines became essential to the colonial project of maintaining effective territorial rule. It was no coincidence that by 1817, with the abolition of the monopoly in Cuba, tobacco leaf from the Philippines was already beginning to reach Spain as raw material for the Spanish factories—years before this was formally set out in the *Real Orden* of 1834.[54] This continued until the abolition of the monopoly in 1881, during which time every attempt was made to avoid making the mistakes seen as depleting revenue to the Spanish state coffers by opening Cuban tobacco to foreign capital—an example of which was German capital in the 1840s and 1850s, spearheaded by Bremen bankers Hermann and August Upmann, among others.

The tobacco monopoly in the Philippines, however, was very different from the Cuban monopoly in designating specific regions, *colecciones*, exclusively for tobacco growing. The first was Gapán, which included eight settlements in the central part of the island of Luzón, north of the capital city of Manila, then Bulacán, also close to the capital, and

finally Cagayán, in the north of Luzón. The leaf was procured through intermediaries, either local indigenous authorities, *principalías*, or *mestizo* merchants under specific contract to the mononoply.[55]

Implanting this tobacco monopoly model meant forced cultivation, at the cost of other crops in the *colección*, upending existing structures and cultures of peasant production. It also monetarized relations since tobacco growers had to acquire foodstuffs and other consumer goods produced in other regions. This in turn meant that any delays in payment for the tobacco harvest on the part of the monopoly led to greater indebtedness among peasant communties and a further strengthening of the dominant social and political order to control peasant labour when demand was at its height.

An additional complication was that the new tobacco monopoly system in the Philippines was erected on a model in which tobacco was the lynchpin of the new fiscal system that emerged in Spain in the early nineteenth century, whereby the state borrowed money from foreign bankers, pledging colonial tobacco revenues as collateral. In the case of the Philippines, this led at times to tobacco being handed over as payment, often in arrears, of the sums owed on these loans.

Tobacco thus played a role whose reach was far more than merely fiscal, reconfiguring property relations and thereby social relations which shaped the future of the colony—and the metropolis—throughout the nineteenth century. At the end of the eighteenth century, tobacco was the protagonist in reshaping the colonial empire, and in the nineteenth century was destined to play a similarly protagonist role in articulating the new 'imperial nation'.[56] However, with the rise of the new Spanish Liberal State, there were those like José Jimeno Agius, who, in the 1870s, were calling for the liberalization of tobacco in the framework of the colonial space under metropolitan rule.[57] When the tobacco monopoly in the Philippines was finally abolished in 1881, tobacco passed into the private hands of the *Compañía General de Tabacos de Filipinas*, set up by Catalan and French bankers, and other smaller companies.[58]

Challenges Ahead

At the outset of the collaboration between Spanish and Portuguese historians, more emphasis was placed on the existence of an Iberian Atlantic model along the lines mapped out by Elliott. In the period immediately prior to the creation of the Portuguese and Spanish monopolies (1580–1640), there was certainly convergence of the Portuguese and Spanish Atlantic on an important enough scale to speak of them as components of an Iberian Atlantic. However, further research led us to focus more on how, after the Portuguese Restoration of 1640, there were many differences in the two tobacco systems.

In the Spanish case, the intention was to create an imperial monopoly, which, as has been demonstrated here, was a process closely tied to the military defence needs of the Spanish American colonies and involved both metropolitan and colonial monopolies—a process which, with the exception of the Philippines, culminated in the second half

of the eighteenth century. In the Portuguese case, a very different institutional framework emerged. The Portuguese monopoly, while created parallel to that of the Spanish, was always limited to continental Portugal and its two middle-Atlantic Portuguese archipelagos of the Azores and Madeira. Throughout its entire history, the Portuguese monopoly operated by contracting out, within a framework of 'shared mercantilism', distinct from the mercantilist controls of the Spanish monopoly. The Portuguese monopoly thus came closer to that of the French, in which tobacco came under general contract as of 1730. In effect, there was no Portuguese imperial monopoly as such, although it is possible to speak of an early Portuguese Atlantic tobacco system, in which tobacco cultivated in Bahia in the north of Brazil was traded with Lisbon and for slaves on the African coast. Another major early difference—one that cannot be emphasized enough—is that after 1644 the Brazil tobacco trade on the international market did not necessarily pass through Lisbon but rather bypassed the European market whereby tobacco became a commodity traded directly (not through Lisbon) for African slaves.

Comparative history of the Portuguese and Spanish Empires evidenced that in the former the State did regulate the tobacco trade, but by means of trade agreements between the monopoly (Portugal, the Azores, and Madeira) and other partners, opening up the trade with Brazil and the international market. In the Spanish case, by contrast, the state opted for total intervention, assuming direct administration, albeit leaving open the trade with Brazil and Virginia, whose tobacco supplied a major part of the metropolitan market. In short, an Iberian imperial tobacco model proved not viable given the different monopoly regimes and disparate supply sources of tobacco.

Further comparative research along these lines will surely clarify more the areas of divergence as well as convergence during the Iberian imperial period. In the Portuguese context, a comparative reading of the changes shaping relations in and between Portugal, Brazil, Africa, and India and the Portuguese middle-Atlantic archipelagos would further our understanding of the defining interactions in these areas. Similarly, further study on the other Spanish colonial monopolies in the Americas, such as that of New Granada, would shed more light on their intercolonial connections. It is also important to note that the Iberian tobacco monopolies occupied a space that configured trade, property, and social relations in the metropolis and the colonies in ways that would shape what was to come long after their abolition. The three nineteenth- and twentieth-century transitions in tobacco in Cuba, the Canary Islands, and the Philippines are ripe for comparative study from this angle, as are those across Spain's former American colonies. Another important aspect to be explored is the continuity of a model of pre-crop financing set out in the *situado* in the form of advancing farmers tobacco credit against their eventual crop, which might be seen as a precursor to futures trading.

The end of the Iberian tobacco monopolies was the end of an era in which tobacco had been a key protagonist for the imperial states in shaping their colonial empires, framed institutionally to organize resources and revenues to underwrite military defences and bolster the metropolitan economy. It demanded a level of organization capable of maintaining colonies, coordinating intercolonial exchange, and acting as an arbiter of friction among large administrative units under which small-scale agriculture

prevailed with not inconsiderable small-farmer agency and opposition. On all fronts, the monopolies were constantly fighting a losing battle.

The full dimension of the role played in this by what has been conceived as illicit trade and smuggling is yet to be explored, including the extent to which the colonial authorities themselves were complicit and efforts in Lisbon, Madrid, and colonial capitals invariably frustrated. It is impossible to calculate the true extent of illicit trade and smuggling, though references in reports drawn up by political, administrative, social, and religious bodies point to it being endemic wherever tobacco was grown, traded, manufactured, and consumed, and also the difficulties of putting a stop to it, no matter how many measures were introduced to that effect. How also should we see illicit trading and smuggling? While defined as such by one empire, it was not seen as that by another, or necessarily by those involved on the ground.

A key challenge going forward is the need for a global comparative history of all empires over time in which tobacco has played a central role, and the ways in which, and extent to which, developments were driven as much by the agency of people, including movements of people and/or circuits of knowledge and expertise as by imperial design. Another is to focus on the continuities as well as ruptures in cultivation, processing, manufacturing, and consumption after the end of empires and their tobacco monopolies, in the shadows of the post-imperial transnational tobacco corporations that emerged in their wake. A new globalization of tobacco from the late eighteenth century paved the way for mass mechanized production of the cigarette, which revolutionized the global tobacco industry from the late nineteenth century on, spanning old and new regions of the colonial and post-colonial world. No matter how many tobacco prohibitions in the past and smoking bans in the present day, a powerful culture of sociability had been created over the centuries around tobacco as a commodity, which overshadowed its nocive effects not only on health but on society and the environment. Understanding this fully in the case of tobacco can surely give us greater insights for a more rounded study of the history of other commodities in relation to both empire and empire's legacy in today's world.

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CHAPTER 8

FUTURES TRADING AND GERMAN AGRICULTURAL MARKETS

ALEXANDER ENGEL

The trading of commodities involves moving large and usually heavy amounts of materials: packing and unpacking, loading and unloading, storing and transporting them, which requires hard manual labour, machinery, and infrastructure. When carried out on a larger scale and over larger distances, the trading of commodities also requires considerable coordination and capital: decisions need to be made where a commodity is bought, which variety, at what price, where it is transported to, and/or how and for how long it is stored, when it is to be sold, for which price, and under which legal and practical conditions all this is done. Capital is necessary to acquire the commodity, pay for transport and storage, gather information, and so on. It is necessary to be able to carry risks and absorb potential financial losses: on the one hand, the risk of losing the commodity in transport, through fire or floods when stored, as well as the risk of the commodity decaying or getting damaged, and on the other hand, the risk of market prices decreasing between buying and selling a commodity.

The eighteenth and nineteenth centuries saw the rise of capitalist market economies and global economic exchange on an ever-larger scale, the division of labour progressing. In this process, the interrelation of both spheres—handling the commodity in its materiality, and handling the commodity as represented in markets—became more abstract, the spaces and working environments in which they took place became still more distinct, the logic under which each sphere operated became more independent from each other. Both spheres changed its form. On the logistical side, new transport infrastructures developed: new means and forms and routes of transportation and new constructions for storing and reloading commodities.

On the market side, the most noteworthy development was the emergence of a new commercial practice adapting to changes in communication, a new instrument that gave rise to a new type and additional layer of market: futures markets, which, organized

at commodity exchanges, exist in parallel and as an extension to the traditional spot markets. In spot markets, the commodity itself is traded, in tangible loads and batches, for immediate delivery. Futures markets, on the other hand, are markets in which standardized contracts for future delivery are traded: contracts that call for the future delivery not of an actual, tangible batch of the commodity but of a generic amount of a specific (reference) variety of the commodity. Usually, futures contracts are not settled by delivery of the commodity but by payments to account for the difference of the contracted price and the current market price ('trading in differences').

Futures markets proved an essential tool for commodity traders and brokers in the age of globalized and highly accelerated (telegraphic) business, and at the same time opened commodity trading for financial interests, investment, and speculation. In the late twentieth century, it even served as a blueprint to alter the workings of financial markets themselves. It fundamentally changed commodity pricing, the character of commodity prices, and the underlying temporal structure of modern global economies.

An overview of the historiography relating to futures trading can be seen as falling into three principal areas of research: the origins of the practice; the administrative and organizational history of the functional role played by commodity exchanges, and the development of cultures of risk and speculation. An illustrative case study here looks at the history of German futures markets for agricultural commodities, through the nineteenth and twentieth centuries. The chapter concludes with a consideration of the prospects for further research into this widespread commodity-trading practice.

Historiographical Overview

Academic research into the history of futures trading has mostly focused on case studies of single futures exchanges and local markets,[1] and these are accompanied by a plethora of coffee table books with *festschrift* character, usually commissioned by the exchanges themselves, and similar endeavours by journalists—books that are usually well illustrated and well researched as far as historical detail (but not necessarily historical context) is concerned.[2] Studies focused on the history of a single commodity occasionally discuss the role and implication of futures trading, yet are usually brief on that aspect and not devoted to much original research in that area.[3] There is substantial research on the legal history of futures trading in specific countries, especially the United States[4] and Germany[5], and more recently also histories of speculation (mostly concerning the United States) that involve futures markets.[6]

Most of the perspectives and significant findings in this literature revolve around three general topics: the origins of futures trading, organizational and administrative developments, and cultures of risk and speculation. In the following assemblage of some of those findings, it becomes apparent that much could be gained from a more comparative and transnational approach to the history of futures trading, as has already been employed in some of the most recent studies.[7]

Studies of the history of futures trading have provided a surprising variety of answers to the questions of where, when, and how futures trading originated. Perhaps because for most of the second half of the twentieth century, futures trading was largely confined to the United States, the bulk of pertinent publications from that era stems from American authors, and tells the story as an American, or at least Anglo-Saxon one: 'Organized futures exchanges, notably the Chicago Board of Trade (CBOT), the New York Cotton Exchange, and the Liverpool Cotton Exchange, emerged in the third quarter of the nineteenth century',[8] as Jeffrey C. Williams stated. The focus is usually on the CBOT, which was founded as a business club in 1848, had begun operating as an organized commodity exchange by the 1860s, and became the world's largest futures exchange before 1900. In his classic study of the environmental history of Chicago and the Midwest, in which he demonstrates the manifold transformations of nature into economic space, William Cronon points to two key institutions that considerably facilitated Chicago's grain trade: a system of elevators and warehouses to store grain against receipts that became themselves tradeable; and the Board of Trade's grain-grading system, which spared grain dealers the burden of inspecting a grain sample for each lot transacted. Together with the existence of an organized market, this 'constituted a revolution' in the eyes of Cronon, and, in combination with the technique of forward contracts, 'enabled Chicago's greatest innovation in the grain trade: the futures markets'.[9]

A forward contract is a basic commercial practice, an agreement on a transaction of a commodity or service for future delivery. If delivery is stipulated to take place once the good arrives from another location, this used to be called a 'to arrive contract', which—as Williams has shown—was in considerable use at least in New York and Buffalo in the late 1840s. These contracts could be sold many times over before the actual delivery became due. This practice was facilitated by forward contracts in which the parties freely agreed on a delivery date a few months into the future, independent of a commodity arriving. Those contracts became common in Chicago in the early 1850s. If a lot of forward trading of a single good is done at a single place, in a sufficiently homogeneous way, for round lots (like one thousand or five thousand bushels), a coherent market for the future delivery of the good emerges. Such 'informal futures markets', as Williamson calls them, existed in Chicago and New York in the early 1860s. In 1865, the CBOT stipulated the use of standardized contracts and rules for such business on its floor, where trade was confined to its members. This essentially resulted in 'formal futures markets' in a wider sense, even if not all common elements of 'modern futures trading' were in place, such as a clearinghouse. In the process, trading ceased to be in specific lots of grain, and instead was carried out in generic grain of a standardized quality. For this conceptual transition, Cronon argued, Chicago's system of elevator receipts was central, as a receipt did not reference the specific lot of grain put into an elevator: in storage, all lots of a given quality (as certified by the grain inspectors) were inseparably stored in a joint compartment.

Proponents of this 'American story' of the origins of futures trading occasionally include a paragraph granting that there is a wider history of early modern forward trading systems in Europe and Japan. Yet, Hieronymus concludes: 'All of that is interesting [. . .] but as a practical matter we need look no farther back than the frontier of the United

States in the mid-nineteenth century for the origin of modern commodity futures trading', implying that all modern futures trading practically followed the example of Chicago. This view is being increasingly revised.

Matao Miyamoto, Ulrike Schaede, Mark D. West, and others have detailed the evolution of a rice futures exchange in early eighteenth-century Osaka, which operated until 1939; it thus was a reference point for modern futures trading at least in Japan.[10] Rice had been a key commodity during the Tokugawa shogunate, not only for being the basic foodstuff, but also for having qualities of a currency, with public salaries and taxes paid in rice for a long time. In that sense, Schaede argues, the Osaka rice futures market can also be seen as a financial futures market. This market was rooted in the trade with warehouse receipts for rice that had emerged in the early seventeenth century, so, as occurred later in Chicago, the securitization of commodity trade was an important step towards futures trading (the same, incidentally, is observable in Europe at the time, for instance in the British pig-iron trade[11]). Next to proper warehouse receipts, also empty ones (i.e. unbacked rice bills) were issued and traded. Those rice bills had maturity dates, making them forward contracts. Forward trading, which became ever more standardized and took on the form of 'informal futures trading', concentrated outside a certain merchant's house in the late seventeenth century, with that trading place being moved to the borough of Dojima in 1688 and becoming officially authorized as an exchange in 1730 (ending an official ban of rice-bill trading that had been in effect from 1705). The transactions at the exchange referred to a set of standard qualities, maturity terms, and fixed lots (multiples of 100 koku, with one koku being about 180 litres of dry rice, thought to be the amount of rice consumed by an adult every year) and hence were futures transactions. Rather than writing out concrete futures contracts, however, trading was done 'on the books'—that is, each merchant wrote down his transactions, and at the next maturity date all books were handed to a clearing house and jointly settled, which took only a fraction of the effort necessary to settle each transaction directly between counterparties.

The technique of trading 'on the books' until a maturity date, then jointly settling transactions, was also used in the Netherlands at the same time for the trade in English company shares and became used elsewhere in Europe—for example, in German stock exchanges. In seventeenth-century Amsterdam, the trading in company shares involved the use of options, which could also be found occasionally in commodity business and in the infamous tulip speculations of the 1630s. All this is why Oscar Gelderbloom and Joost Junker claimed Amsterdam to be the 'cradle of modern futures and options trading'.[12] Certainly forward trading of commodities on a grand scale took place in early modern Europe. Especially for Amsterdam, there is ample evidence of regular forward trading from the middle of the sixteenth century through the seventeenth, eighteenth, and early nineteenth centuries.[13] Nevertheless, futures trading in commodities on organized markets in Europe is generally considered to be a product of the nineteenth century, just as in the United States.

The concurrent emergence of modern futures trading in Europe and the United States (seemingly independent of the Japanese case) has recently prompted a more

transnational story of the origin of Western futures trading. Engel, for example, suggested that an important common driver to this was the asymmetric acceleration of flows of goods and information, which resulted in 'telegraphic markets' that required new mercantile techniques. To tackle price risks and free capital from ongoing transactions (that lasted while goods were bought, transported, and sold again), merchants began relying on forwarding on such a scale that standardized futures markets evolved, which in turn proved ideal to tackle these issues.[14]

A considerable part of research into futures trading can be considered administrative and organizational history, focusing on the peculiar nature and functional role of commodity-futures exchanges. Those exchanges were mostly run by publicly authorized private associations of those who had an interest to trade there—usually a large body of local merchants, often the local chamber of commerce or board of trade. They could be operating the exchange rather autonomously, such as in the nineteenth century United States and as in Britain until the late twentieth century, or with a notable oversight from public authorities, as in the case of most German, French, and Japanese exchanges, and in the twentieth century increasingly also in the United States.

Futures exchanges have accordingly been studied with a view on their place in the evolution of modern legal systems, and the rise of government regulation and the administrative state. Jonathan Lurie, for example, declared in his study of the history of the CBOT that it 'traces the evolution of the Chicago Board of Trade from its beginnings as a sort of private club to its later function as a quasi-public regulatory agency'.[15] The Dojima rice market, on the other hand, as it became a formal institution in 1730, is a peculiar example of an exchange that was created by the authorities, but explicitly as a private body that was obliged to follow the old customs (from the days of informal trading) and otherwise govern itself; forward and future contracts were declared unenforceable before court. Verdicts are usually, as in Lurie's study on the CBOT and West's analysis of Dojima, that self-regulated private associations were quite successful in establishing internal institutions and tackling unethical behaviour of members detrimental to the exchange, to secure reliable, trustworthy, and well-functioning markets. Kenneth Lipartito asserted that the New York cotton exchange 'established standards for the contract and rules for trading. It gradually eliminated the worst abuses of speculation. In doing so, the Exchange also instilled public confidence in the futures market'.[16]

What exactly did exchanges do to maintain stable markets, except for 'formatting' the market in terms of rules and standards? A basic condition to meet was that all transactions were indeed followed through. As a futures contract usually resulted in a settlement of price differences, one side received money, and the other had to pay money. These payments were not always, in all places, legally enforceable in court. For exchanges in which trade was confined to members, the threat of being expelled from the exchange for not honouring commitments was certainly an incentive, at least for regular market participants to follow through with all transactions. Yet if the payments were so large that the person would not or could not pay it, the opposing party faced losses, which in turn could have ripple effects, and even cause a wave of insolvencies. To prevent this, most exchanges allowed buyers and sellers in the futures market to demand

a deposit (at a local bank)—a so-called margin—from the counterparty. This stipulation was, for example, already part of the CBOT rules in 1865.

From the 1880s onwards, many European exchanges went one step further, combining deposits with the principle of the clearing house, as Peter Norman has detailed.[17] As already noted for the case of the Dojima rice trade, clearing houses took over the job of settling contracts to reduce the effort from direct settlement between counterparties. In nineteenth-century Europe and North America, clearing houses were well known in the banking world, to help in the settlement of cashless payments, exchange notes, bills, and debts. In 1867, the Frankfurt stock exchange created a clearing house to determine the net number of each stock that each member had to deliver or receive at the end of the month, greatly reducing the number of stocks that had to be circulated. The example was followed by Berlin, Hamburg, Vienna, and, in 1874, London.[18] The Liverpool cotton futures market was the first Western one to adopt a clearing house in 1876; each day it took all contracts that matured on that day into consideration, determined the net position for all brokers involved, collected the money from all those who were in the red, and immediately redistributed the money amongst those who were in the black. When the New York Coffee Exchange was founded in 1881, it included a clearing house mechanism—that inspired a visiting coffee trader from Le Havre to do it one better at home. In 1882, the Le Havre futures market introduced a '*Caisse des liquidation*', a 'liquidation fund', which became copied by many European exchanges in the late 1880s. In a futures market with a liquidation fund, each transaction involves having an according deposit—either a fixed amount per contract or a fixed share of the contracts' volume; in practice it meant being sufficiently in credit with your account at the fund. All payments resulting from transactions were not owed to or received by the counterparty, but directly to or by the fund, which accordingly acted as a clearing house, through which all transactions in the market had to go. This system, known as 'complete clearing', eliminated the individual risk from counterparty default, made those markets much more attractive, and contributed to a notable increase in trading.

It also, however, had distinct structural effects. Self-regulation went hand in hand with exclusion: while, for example, the older public exchanges in Germany allowed all (male, respectable, and solvent) members of the public to take part, self-regulating exchanges confined trading to its members, requiring outsiders to approach brokers. On the one hand, this was a practical matter of enforcing rules: the exchange had jurisdiction over its members, it could threaten expulsion and only in rare cases matters had to be taken to outside courts. With non-members trading, there would be a high risk of evading payments and rules, and much higher legal costs and efforts involved. On the other hand, though, excluding non-members from trade clearly also privileged members and secured them economic advantages and power.

Laura Rischbieter, in her study of the Hamburg coffee trade, has demonstrated how the founding of the Hamburg coffee futures market shifted power, not least pricing power, away from the intermediaries in the German coffee trade towards the big Hanseatic wholesalers.[19] This was especially the case with the creation of a liquidating fund ('*Liquidationskasse*'), as in practice, soon all transactions had to run through a few

brokers connected to the fund. In a similar way, the founding of the Liverpool cotton clearing house favoured the cotton brokers organized in it, who traded directly with US sellers, to such a degree that the competing cotton merchants in the Liverpool spot market temporarily broke away to establish their own exchange, before both sides agreed on a joint solution.[20] Bruce E. Backer and Barbara Hahn have recently made the case that practices at the New York cotton market were detrimental to Southern producers and traders in the cotton business and became tackled only after it being placed under federal regulation.[21]

The guiding question underlying much of this research is to what extent self-regulation was successful in the organisation of specific futures markets. Originally, this was mostly understood in the sense of successfully creating a market that runs smoothly to the satisfaction of its participants, and it was investigated with a view to the sustainability, and even superiority, of private self-regulation versus governmental regulation. The more recent research shifted and extended the question, asking more prominently if a futures market also worked to the satisfaction of other, outside stakeholders. It has begun to point to changing practices, structural transformation, shifting power, and other economic and social consequences of futures markets becoming central institutions of modern economies.

The contemporary discussion of commodity futures trading in the nineteenth century Western world was to a large extent of a legal and moral nature, specifically with a view to the problem of speculation and to what degree speculation in futures markets bordered on—or equalled—gambling. One initial problem, closely connected to the question of the self-governance of futures markets, was the enforceability of futures contracts.

As futures contracts usually resulted in a settlement of price differences, they could be understood as wagers: as simple bets on the future development of the market price. Yet under many jurisdictions, gambling debts constitute only legally unenforceable debts of honour. In many countries, the nineteenth century saw a huge number of court cases and legal opinions on the question if a futures contract was in effect binding. Austria stipulated the legal enforceability of any exchange transaction in 1875, France in 1885. This clarification spared a lot of legal trouble but was in fact not of great importance to the general functioning of the markets: in Dojima, transactions had been made enforceable in 1773, but then again unenforceable in 1784, both without great effect. In Germany, the exchange law of 1896 and a supreme court verdict from 1900 made exchange transactions legally enforceable under certain circumstances, like being publicly registered as a participant in exchange markets—which, however, hardly anyone bothered to do, for fear of public shaming. Trust and checks inherent in the system were by and large sufficient for futures trading to function.

That futures trading, as far as it was a 'trade in differences', could be considered and hardly distinguished from betting, posed a serious problem for those organizing, conducting, and/or advocating futures trading—both in terms of the image of exchanges and traders, and as strict betting laws in a state might lead to futures trading becoming interdicted. For the US case, Jonathan Levy has detailed the lobbying and legal efforts to

conceptually separate the trade in differences from 'true' gambling, which was cemented by a Supreme Court verdict in 1905 using the concept of 'contemplated delivery': while a futures transaction might usually end in a cash settlement, it was supposed that at an exchange, each transaction is initiated with the contemplation to actually deliver the commodity; only the specific circumstances in the end determine if it happens the one or the other way.[22] A main driver behind the conceptual work and the legal decision was a phenomenon specific to the United States: the myriad of bucket shops, which mimicked commodity exchanges and allowed the man in the street to bet a few bucks on stock and commodity-price developments. Bucket shops only vanished in the 1920s, when a new oversight over futures markets began to be established, in which permission became necessary to operate.

In the German debate leading up to the exchange law of 1896, ideas of exchange speculation as gambling played a different role. Proponents of futures trading sought to actively restrict access to the market and curbed brokers from 'seducing laymen' to wager on the markets. This was driven both by traditional paternalistic ideas of keeping the less well-off from ruining themselves and by the idea that the pricing process of the exchange would be confused by other than professional traders participating in it. As the futures markets set the prices in key commodities, not least basic foodstuffs, that would be detrimental to the economy and society as a whole. Opponents of futures trading shared the last point, but insisted that futures trading by professional speculators was no better, since it distorted pricing through monopolistic and manipulative practices, or as the investigative journalist Henry D. Lloyd put it in 1883:

> These Exchanges are the creameries of the world of labor. The prices of the speculative wheat and the spectral hog of the Board fix those of the real wheat and the actual hog of the field. The negro planter of Georgia who raises his bale and a half must sell it for what the Cotton Exchange says it is worth. The man who works in the ground must take the price fixed for him by the man who works in the air.[23]

Lloyd is one of the early voices in an intensifying public debate of the merits, faults, and impacts of futures trading on economy and society, which can be observed in the 1880s and 1890s all through the Western world. It gave rise to legislative efforts in the United States, Germany, France, Belgium, Austria, and many other states to either curb or regulate this new kind of market. Research has shown that the drivers behind these legislative efforts were, on the one hand, farmers who at the time had to cope with low prices that were blamed on 'bear' speculators, and on the other hand intermediaries who disliked the concentration of power, especially pricing power in the commodity exchanges—so one might qualify the legislative battles as very concrete conflicts of interest between different economic groups. At the same time, they are indicative of societies that had to come to terms with a new, transformative trading technique and market organization, which embraced risk-taking and speculation as core principles of economic life. It was also, as Urs Stäheli and Jonathan Levy have illustrated, about societies themselves embracing risk-taking and speculation.[24]

The Case of German Futures Markets for Agricultural Goods

Stories on the origins of futures trading, whether they focus on the US exchanges of the nineteenth century or the Osaka rice market, describe the process as one within the respective national history, as a product of specific local conditions and circumstances. While this remains plausible for the case of the Dojima market, a look at the emergence of German agricultural futures markets is helpful to widen the perspective and transcend research, which is primarily centred around Anglo-Saxon sources and concepts. The emergence of modern Western futures trading is neither a national story nor a bunch of national stories, but transnational history.

According to many mid-nineteenth-century contemporaries, extensive forward transactions developed in the Hamburg grain trade in the mid-1820s, and by the end of the 1830s time bargains in cereals, vegetable oil, and spirits (produced in large scale from potatoes) were firmly established at major German transshipment points.[25] In Berlin, the commencement of grain imports via railways led to a system of forward contracting in the 1840s.[26] In Stettin/Szczecin on the Pomeranian coast, a forward market in grain seems to have already existed in 1833,[27] and forward transactions in rapeseed oil were taking place on a regular basis since at least the end of the 1830s. This is revealed in two letters by anonymous merchants, which were published in a monthly Stettin paper in 1847. They also stated that this business 'unfortunately became gambling-like (*harzardmäßig*) in the years 1840, 41, 42, 43, 45, 46'.[28] In 1848, Cologne's *General Organ for Trade and Industry* reminded its readers of its repeated coverage of 'exaggerations and excesses, which sometimes are noticeable in forwarding markets here and at other places', but also stated that 'such transactions can be grounded, and generally indeed are grounded, in solid, productive trading activities'.[29]

In the 1840s, forward trading had obviously become so widespread that continuous 'time markets' or 'informal futures markets' (to use Williams's term) had emerged. The Cologne article goes on to say that one now had 'the possibility of always being able to buy and sell for a certain time in advance'[30]—that is, those markets were very liquid. For the Berlin rye market, continuous market prices for rye on delivery in different months were published from 1850 at the latest.[31] The background and prerequisite for such developments was that delivery contracts became increasingly uniform in terms of quantity, quality, and delivery date. In the Stettin letters of 1847, this otherwise hidden development becomes tangible:

> The contracts for this delivery trade are drawn up and printed in advance in a special form by the sworn brokers in the larger cities, precisely because the business is conducted so extensively in them, so that anyone who wants to make a real transaction in the square and cannot conform to the form of the contracts must refrain from doing so. In Stettin, for example, it would be difficult to sell only 30 Wispel

> of 81 lb rye for delivery in March alone, or 30 hundredweights of rapeseed oil for March delivery, or 2000 quarts of 79 % spirits for March delivery. With little effort, however, it would be possible to sell 100 Wispel 82 lb rye per spring delivery, 100 hundredweights of rapeseed oil per September, October, or 20,000 quarts of 80 % spirit per spring delivery. Spring delivery can be accommodated, precisely because it is the form of business.[32]

A decisive step here is the introduction of the pre-printed contract, as was the case in Stettin some time before 1847, maybe already in 1840 (when the trade became 'betting-like' for the first time). In the Hamburg grain trade, delivery contracts were still handwritten around 1840, but pre-printed in the early 1850s.[33] A common feature of pre-printed forms was that they also included the rules under which the transaction would take place, or a reference to such a set of rules. In Hamburg, a uniform 'Regulation of the rules in the grain trade' was adopted on 31 October 1846[34]—something that had already been urged at the end of the 1830s.[35] Amsterdam had rules for trading in vegetable oil at least since 6 June 1828.[36] Since merchants moved and communicated between cities, these developments certainly did not take place independent of one another, and there are often similarities between the different local regulations, to the point of copy and paste—a comparison of Hamburg wheat-trading and Berlin rye-trading rules in the mid-1860s are a case in point.[37]

In the Dojima rice market and the Chicago grain market, the securitization of agricultural products—that is, their handling in the form of warehouse receipts—provided a formatting of the commodity, which then ultimately lent itself to be traded in futures markets. As the German case shows, such formatting of commodities could also come about through trading customs.

The move to pre-printed contracts and a fixed set of rules in the forward trade of agricultural products, which in Germany took place in different trading hubs in the 1840s, marks in effect a transition to futures trading. Another indication of this transition are contemporary worries of 'exaggerations and excess', of the trade becoming 'gambling-like'—in other words, of markets boiling over and becoming largely speculative. The 1847 Stettin letters deplored the emergence and alleged prevalence of empty transactions—that is, transactions that did not seem to be related to real, effective trade at all, that were solely in the service of speculation on differences. It was feared that effective trade already suffered from this, and in the future would suffer much more, 'if the common sense of the merchants does not keep the upper hand [. . .]. This addiction to get rich quickly without effort makes the supply business a contagious fever, which has already carried away a large part of the merchants'.[38]

Yet futures trading without recourse to physical products became a broadly and firmly established practice, and the structure of the markets changed accordingly. In the late 1860s, of the roughly two hundred firms involved in grain trading on the Berlin Exchange, eighty 'notoriously have nothing to do with the grain itself and only see it on paper', and although almost all of the remaining 120 companies occasionally engaged in trading physical grain, 'their main business, however, is differential transactions in grain'.[39]

Especially during the food price rises of 1846/1847 and 1853, the speculation in price differences in the 'time markets' attracted attention.[40] In the mid-1850s, the Prussian government also dealt with the issue of speculative futures transactions on several occasions, but, as Rudolph Delbrück—at that time the chief government councillor—explained to the state parliament in 1856, regulatory intervention was proving difficult:

> The government could not be in any doubt that, as is known from all sides, these transactions are in themselves reprehensible; but it had to ask itself whether it would be possible to intervene against these transactions with any success without at the same time interfering in a detrimental way with the real grain supply transactions, the promotion of which is in the general interest. It had to answer this question in the negative.[41]

Only in the 1890s, German futures market participants saw their business questioned. Following extensive discussion in the media and in academia about the merits and faults of the German exchanges in their current form, the government installed an exchange inquiry commission (*Börsen-Enquete-Kommission*) in 1892, made up of top-ranked bureaucrats, economists, lawyers, and lobbyists from agriculture, commerce, and banking. Based on extensive hearings, questionnaires, and expert opinions, the commission was supposed to thoroughly investigate every aspect concerning stock and commodity exchanges and advise legislators. In 1896, the Reichstag enacted the German Exchange Law. It left the futures markets for soft commodities like coffee, sugar, and cotton in Hamburg, Bremen, and Magdeburg basically untouched. But amongst a multitude of regulations on other aspects, the law forbade '*Börsentermingeschäfte*' in grain and flour (due to pressure from conservatives speaking on behalf of the agricultural interest), as well as in certain stocks.

In Article 48, the exchange law defined a '*Börsentermingeschäft*' as a transaction that is: for future delivery at a fixed date or after a fixed term, made according to pertinent rules set by the board of an exchange, and for which official prices are determined. It is notable that the definition does not mention the use of futures contracts, which is central to the concept of 'futures trading' in the English language. Futures contracts were indeed used to accomplish '*Börsentermingeschäfte*' in grain and flour, while those in stocks were organized 'on the books', as in the case of the Osaka rice exchange. The German terminology and worldview regarding this subject were generally broader than the English (here primarily American) one, yet the definition in German exchange law turned out be overly specific. The grain dealers of Berlin simply tweaked their practices to be circumvent the ban, first and foremost by allowing for a (purely theoretical) grace period when the contract matured, so that nominally it was not fixed-date or fixed-term anymore. And these practices became explicitly accepted as legal in the revision of the law in 1908: after the heated confrontation of the 1890s, the dust had settled, and futures trading conducted under government oversight had become an accepted practice in Germany.

Legislation had proved unable or at least not effective in breaking the system of futures trading. There was, however, another development, that showed all the potential

to do just that. In 1896, Franz Josef Pfleger, a lawyer and later a politician of the Catholic Centre Party, noted in his dissertation that 'the futures market is an insurance institution against price fluctuations'[42], but a solution only for a transitional period. He pointed to the rise of unions, cartels, syndicates, and trusts, which was about to bring an end to competition in the different industries and enable them to control and steady production and prices:

> If one of these new organizations is formed in an article, then there is no room for futures trading in this article. So it is by no means a coincidence that we do not have a futures market in iron in Germany, whereas there is a very significant iron futures trade in Glasgow; in Germany, the various iron-industrialists have united into syndicates. Similarly, the petroleum futures trading on the exchanges in Hamburg and Berlin, although it still exists legally, has effectively disappeared when the Standard Oil Company appeared.[43]

The same happened with futures trading in spirits (made from potatoes), which was the most important agricultural product next to grains and vegetable (rapeseed) oil that was traded in the German futures markets in their infancy. Around 1890, spirit futures markets (or exchange-based forward markets) were still active in Berlin, Hamburg, Breslau/Wrocław, Danzig/Gdańsk, Königsberg, Posen/Poznań, and Stettin/Szczecin. However, with the cartelization of the industry in Germany in 1899 and the general curbing of spirits consumption through taxes and the like, the trade literally dried up after 1900; the use of spirits as industrial alcohol and fuel could not compensate for that.[44]

Also, the landscape of futures markets itself became generally more concentrated. An essential criterion for the attractiveness and thus the success of a futures market was, above all, its liquidity: the more transactions were processed, the greater the probability of finding suitable transaction partners for one's own purchases or sales at any time. As futures transactions could be conducted by telegraph and then by telephone, the geographical location of the exchange became less relevant. Under these circumstances, turnover moved, at first gradually and then more and more rapidly, from less liquid markets to more liquid ones. The result of this process was what Kurt Wiedenfeld called 'central product exchanges': a few continental or global lead exchanges for a commodity.[45]

Around 1890, futures markets for vegetable oil were found in Berlin, Cologne, Breslau/Wrocław, and Stettin/Szczecin; after 1900, rapeseed futures trading concentrated entirely in Berlin. At the beginning of the 1890s, rye and wheat futures trading was attested for Berlin, Breslau/Wrocław, Danzig/Gdańsk, Stettin/Szczecin, Cologne, and Mannheim,[46] while it had already ceased at Königsberg, Posen/Poznań, Frankfurt, and Hamburg—in the case of Hamburg, when Germany went from being a net exporter of grain to a net importer in the 1870s, and the Hamburg export trade ceased.[47] As with other agricultural goods, the produce exchange of Berlin rapidly turned into Germany's undisputed central market, and as such in the crosshairs of the Prussian landed

nobility, which accused it of depressing prices and disturbing markets through speculation. Apart from the nominal, only partially effective ban of grain futures trading, the exchange law of 1896 also stipulated that agriculture representatives had to be on the oversight board. The exchange initially denied this, officially shut itself down, and carried on with unofficial trading 'underground' until 1900. As a consequence, Berlin's international importance as a leading grain market declined significantly, without the German regional exchanges being able to regain in importance compared to Berlin. As Kurt Wiedenfeld mockingly remarked in 1903: 'And the much longed for and then much praised independence of the smaller exchanges did not happen either, because here the Berlin price report was generally replaced by the Chicago price slip'.[48]

Ultimately, therefore, grain futures trading became concentrated not only within individual economies but also within the global economy. For German futures exchanges, it became increasingly difficult and futile to restart their business after the breaks in operation they had to endure in the early twentieth century. World War I brought a stop to futures trading around the world, but in Germany it was allowed to be taken up again only in 1925. With the rise of the Nazi Party to power, an end to market pricing and futures trading in agricultural produce became imminent again only eight years later. On 19 September 1933, the specific technique of futures trading in grain developed in the aftermath of the 1896 law became prohibited at the Berlin Exchange, and ten days later fixed spot and futures prices (the latter a simple function of spot price and the cost of storage until delivery date) were set. Speculative business thus became meaningless. In 1934, futures trading in animal feedstuffs was forbidden as well. The exchange in Berlin remained in existence, but only as a transaction hub for grain allocation at fixed prices. The Bremen futures market in cotton remained open until the beginning of the war in 1939, as this commodity had to be imported and the Bremen market was instrumental in that.

In the 1950s, the resurrected exchanges of Hamburg and Bremen attempted, and were allowed, to take up futures trading in sugar, coffee, and cotton again, but business had already shifted to the UK and US exchanges. The new German futures markets never caught on and were abandoned after a few years. Futures markets for agricultural produce remained pointless, as price controls remained in place in West Germany until 1962; and after that, the European Common Agricultural Policy (CAP) stabilized the agricultural markets until the 1990s. Only in 1998 did a new futures exchange for agricultural produce finally opened in Hannover, but it did not catch on and stopped operations after only a few years.

Conclusion: Lost in Translation?

It will have become apparent that modern textbook definitions of what constitutes 'futures trading'—which usually includes the use of futures contracts according to the rules of an organized exchange with a clearing system for joint settlement—is only of limited

use to a history of futures trading that tries to pinpoint relevant phenomena. The emergence of futures markets is usually dated to a period before the advent of clearing systems on those markets. Williams described a regular, sufficiently homogeneous trade in forward contract as 'informal futures market', rightly implying that some core features and purposes of futures markets are already given in such a trade.

Vice versa, a regular, standardized trade for future delivery under a set of rules at an exchange is also conceivable without the actual use of futures contracts. This is notable when approaching the problem through different languages and the corresponding conceptual frameworks of different societies. While in the English terminology, 'futures trading' is generally understood as 'futures contract trading' (which is always carried out at an exchange), in sharp contrast to 'forward contract trading' and less well-named practices like trading on the books. The German '*Terminhandel*' and Dutch '*termijnhandel*', the French '*négociation à terme*' and Spanish '*negocio a término*', in contrast, all translate as 'delivery-date trading' and can refer more broadly both to futures trading and a somewhat regular trade in forward contracts. In English sources, the now out-of-use term 'time bargains' is usually employed as the most general umbrella term, mirroring the German '*Zeitgeschäfte*'.

Transcending from 'trading' to 'market' ('*Terminmarkt*', '*termijnmarkt*', '*marché à term*', '*mercado a término*') usually points more strongly towards what one calls a 'futures market' or 'exchange' in English. In German, the prefix '*Börse*' (exchange) is often added if one wants to stress that the '*Börsenterminhandel*' is carried out on an organized market, but this term still is not as narrow as 'futures trading', as it was also used for stock exchanges in which shares were traded on the books in the course of a month, and all transactions only settled at the end: in that sense, a '*Börsenterminhandel*' in shares already existed in the eighteenth and nineteenth century, but futures trading in shares—employing futures contracts—was taken up only in the late twentieth century. The contemporary Japanese expression for the futures market in Osaka was '*chōaimai*', 'rice on books' (as opposed to '*shomai*', 'real rice', which referred to the forward market in rice receipts), which also points to the absence of tangible futures contracts in what we consider the first organized futures exchange—a *Börsenterminmarkt* it was without a doubt, though.

Differences in concepts corresponded with differences in institutional arrangements: while in the United States, stock and commodity exchanges were separate organizations, German exchanges usually combined stock and commodity trading under the same roof. The 1890s German legislative efforts towards exchange organisation in general, and futures trading in particular, aimed equally at commodity and stock markets and discussed them concurrently, and in many respects as one. Differences in the construction of exchange markets for future delivery could and can make it difficult to grasp and describe them when looking at them from another country, with another language, and other experiences and concepts.

An illustrative example can be drawn from the German legislation efforts themselves. During its hearings, a public commission tried to establish, as one of myriad aspects, if there was futures trading (*börsenmäßiger Terminhandel*) in grain in London

and Liverpool, but 'views on this diverged considerably'[49], and this was less due to ignorance of certain experts, but to different understandings. In his introductory work on commodity futures trading of 1891, Carl Fuchs also admitted that for his list of the most important futures exchanges of the present, it was 'not possible to find out everywhere whether there is only forward trading or futures trading (*Lieferhandel oder Terminhandel*)'.[50] It's ironic that the attempt of the Reichstag to curb futures trading in grain and flour in Berlin essentially failed in practice, precisely because the law was overly specific in defining the practice to be banned ('*Börsentermingeschäft*'), making it easy to sidestep it and continue with similar forms of forward-looking trading.

What consequences can be drawn for further research into the history of futures trading? The emergence and transformation of modern futures trading is neither a national story nor a bunch of national stories, but transnational history. In that, it becomes necessary to have a more encompassing look at trading commodities for future delivery in organized marketplaces, to pay more attention to the diversity of terms and concepts as well as to the diversity of practices and institutions. If an organized market checks all boxes for it to be called a 'futures market' in the fullest sense of today seems less relevant than to investigate its practical essence and implications: whether it was achieved by the specific arrangement, how integrated the market was, whether it generated future market prices for specific enough goods and time horizons, enabled speculation and/or hedging, attracted business, restructured trade, created in-groups and out-groups, or shifted power. This view does not make it a moot point to investigate the advent of margin deposits, clearing houses, and liquidation funds at specific places, and to compare historical forms to the forms of today—it only asks to interpret this more broadly and carefully.

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CHAPTER 9

COMMODITIES ACROSS THE SOCIALIST WORLD

ANNE DIETRICH

Socialist commodity flows were by no means cut off from the rest of the world. The question of whether and to what extent they were special cases within the capitalist world economy, which had been described as 'a historical system marked by a world-scale division of labor' by Terence K. Hopkins and Immanuel Wallerstein[1] or whether they could rather be assigned to an alternative non-capitalist economic order was controversially discussed during the Cold War. Wallerstein argued against the existence of two world systems with two coexisting divisions of labour postulated by Soviet scientists, because according to his logic, in the world economy of the twentieth century there was only room for one single world system, namely that of the capitalist world economy, and its structure of interdependence could only amount to a single division of labour.[2] Following this rationale, Roberto P. Korzeniewicz and William Martin analysed the global distribution of six selected commodities in a long-term study. They studied the global commodity chains (GCC) of motor vehicles, tyres, crude steel, wheat, cotton fibre, and yarn between 1970 and 1987. In accordance with the GCC framework further developed by Giovanni Arrighi and Jessica Drangel as well as Gary Gereffi and Miguel Korzeniewicz,[3] they subdivided the corresponding producing countries into core countries, semi-peripheral countries, and peripheral countries, correlating with each country's share in overall production of the six selected commodities. As a result, they classified the socialist countries Albania, Cuba, Czechoslovakia, East Germany, Hungary, Poland, Romania, the USSR, and Yugoslavia as semi-peripheral states and China and Vietnam—as well as the socialist-leaning countries Angola, Ethiopia, and Mozambique—as peripheral within the framework of world-economic zones. In general terms, one can therefore say, the socialist world was a semi-periphery region in a capitalist world system.

For the Eastern European socialist bloc, however, there were three regions when it came to planning global commodity allocation: the Council for Mutual Economic Assistance (CMEA), the Global South, and the capitalist West. In this framework,

CMEA countries were exchanging raw materials and prefabricated components with each other or buying and selling them from and to capitalist countries, at the same time importing raw materials and agricultural products from the Global South, supporting socialist-leaning countries to build up their industries. This often resulted in similar dependencies as in the Global South's trade relations with the Western industrialized nations of the Global North, though the socialist rhetoric propagated mutual benefit.[4]

Certain key features distinguished the socialist context from the capitalist one: namely the socialist economy and supply system, including the stipulations and mechanisms of the planned economy; the state ownership of land, financial institutions, enterprises, and means of production; a focus on heavy industry and a policy of fixed prices; the monopoly on foreign trade; and a chronic lack of hard currency. These common key features resulted in phenomena that could be observed in different socialist countries all around the globe, whether in the Soviet Union or China, in East Germany and Eastern Europe, and in non-European member states of the CMEA, such as Cuba and Vietnam, and other socialist countries in the Global South. These common phenomena are interrogated here first with a focus on the importance of grain and other agricultural products across the socialist world, energy flows and international economic cooperation within and beyond the CMEA, and the social life of scarce consumer goods in Eastern Europe. The focus then shifts to Cuba, and the integration of the island's main export product sugar into the economic system of the Eastern bloc.

Agrarian Supply Regimes and Socialist Cash Crops

Grain was a highly important commodity and driving force for development in the Soviet Union. The need for securing adequate quantities to feed the population was behind the enforced collectivization of farming, which ironically ended up having a serious negative impact on food supply. One of Stalin's main reasons for the process was the liquidation of the *kulaks* (rich peasants). In 1928, farmers had refused to sell grain at the state fixed price, which led to grain shortages in Soviet cities. A deficit of around eight million tons resulted in the introduction of nationwide bread rationing in the winter of 1928–9 and draconian measures to force peasants to make their grain available to the cities.[5] While in the first year of collectivization (1929) grain collections increased, crop yields dropped considerably in 1931 and 1932 due to a severe drought. Nevertheless, more grain was collected from the countryside than ever before. As Donald Filtzer has argued, Stalin 'was willing to denude the countryside of grain in order to feed the towns', which led to mass famine in rural areas.[6]

According to R. W. Davies and Stephen G. Wheatcroft, the Soviet famine of the early 1930s in fact had several causes. Collectivization and dekulakization did indeed play a role, but poor weather, the general lack of food, low harvests with rising consumption,

an increasing urban population, which was preferentially provided for, and, above all, rapid industrialization contributed decisively to the famine.[7] Manfred Hildermeier details the grave effects of the transformation of rural production structures, with forced collectivization and dekulakization leading to chaotic conditions during the sowing period, a declining stock of draught animals, and ultimately below-average crop yields. The collective farms (*kolkhozes*), which were now mainly responsible for supplying the Soviet population with grain, simply could not produce as much as the individual large- and medium-scale farmers used to, also because they lacked agricultural equipment and seeds. This led to a major supply crisis and ultimately to a devastating famine. Hildermeier emphasized that the Soviet leadership did not react appropriately to early warning signs of impending catastrophe. Despite low harvests in the primary grain production areas, they did not redirect procurement flows to improve the situation.[8] However, the forced collectivization enabled the Soviet state to gain control of the grain supply chain and subjugate the peasantry by making them pay the price for the precipitous industrialization of the country.

Stephen G. Wheatcroft, Felix Wemheuer, and Lorenz Lüthi compared the collectivization of agriculture and famine in the Soviet Union with China, where 'overambitious "Great Leap"-style industrial policies [. . .] sought to take grain from the peasantry to finance the rapid expansion of heavy industry'.[9] As a result, between 1931 and 1933, while six to eight million people died in the Soviet Union in the wake of the forced collectivization of agriculture, between 1959 and 1961, fifteen to forty-five million people died in China. As in the Soviet Union, the collectivization in China was driven by the need to feed the growing urban population; and, similar to the Soviet approach, the Chinese government established a state monopoly over grain trade, setting purchase prices below market prices. Fixed prices enabled the state to buy enough grain to feed the expanding urban workforce as long as harvests were good. Although grain yields declined between 1958 and 1960, in the first two years of Mao's Great Leap Forward, the Chinese state sourced more grain from rural areas than ever before.[10] The result was a massive famine that hit the rural population (who received no food rations from the state) particularly hard. Stalin's Soviet Union and Mao's China thus serve as prime examples of the uneven supply situation in early socialist societies and growing inequalities between rural and urban areas, as former economic elites were disempowered and new hierarchies emerged.

The urgent need for grain was a further reason for strengthening economic ties with the United States during the Brezhnev era. Large crop failures due to bad weather necessitated grain imports from the United States, and in 1972 the Soviet Union and the United States agreed on what Nixon proudly proclaimed to be the largest grain trade agreement ever concluded between two countries. While in previous decades the Soviet Union had typically exported grain, this agreement enabled them to import large amounts (twenty million tons in 1972 alone), at preferential terms. Although 1973, 1974, and 1976 were good harvest years for the Soviet Union, these imports continued to be necessary. Between 1972 and 1979, the Soviet Union imported sixteen million tons of grain annually (of which between 54 and 99 per cent came from the United States). After

the invasion of Afghanistan by Soviet troops, the Carter administration in 1980 imposed a grain embargo on the Soviet Union, which had to fill the resulting import gaps with grain from Canada and other countries. Accordingly, of the thirty-nine million tons imported between 1980 and 1988, only 25 to 33 per cent came from the United States.[11] Further crop failures in the Soviet Union in 1979–1982 necessitated food imports from Western countries on a hard currency basis.[12]

While in the late 1920s and 1930s grain was an essential commodity for feeding the urban population and to promote industrialization, grain imported from the United States in the 1970s and 1980s mainly served as animal feed to increase Soviet meat and dairy production.[13] The increasing consumption of meat, dairy products, and eggs was part of a new consumer policy in the Eastern bloc, and, as Christian Gerlach puts it, providing 'more meat to an urbanizing populace served as a sign of modest wealth'.[14] China also imported large quantities of grain, primarily wheat, from both the United States and Canada, from the beginning of the 1970s, and grain imports contributed to the growing Western debt of the Eastern bloc in the 1980s, especially during the Polish crisis.[15]

While the link between crop failures, grain shortages, uneven supply, and famine was to be repeated in socialist supply regimes in the Global South, climaxing with the 1984 Ethiopian famine, some socialist-leaning countries outside the Eastern bloc benefitted temporarily from a surplus of agrarian products they could profitably sell on global markets or barter for other commodities or services. Particular agricultural products served as cash crops and strengthened the national consciousness of decolonizing states in the 1970s.

Sven Beckert shows how in the struggle for India's and Egypt's independence, cotton, an important global commodity, was at the centre of the conflicts between the colonial power and the colonized, and continued to be of relevance for the economy of both nation states under Nehru and Nasser.[16] The end of the Portuguese dictatorship saw a new wave of decolonization in Africa in the mid-1970s. From an economic point of view, this was good timing for the newly established nation states of Lusophone Africa, as prices on global commodity markets for their main exports were skyrocketing. Even so, São Tomé and Príncipe, for example, did not succeed in making a profit from cocoa after independence. Jędrzej G. Frynas, Geoffrey Wood, and Ricardo M. S. Soares de Oliveira attributed this mainly to the radical changes in agricultural production, linked to the exodus of the Portuguese agro-managerial elite, the end of forced labour, and failed attempts at land reform and collectivization. In 1979, cocoa prices collapsed, which hit São Tomé and Príncipe's economy particularly hard, as it did not leave sufficient foreign exchange reserves for investment in industry. São Tomé and Príncipe finally benefitted from a barter agreement with the German Democratic Republic (GDR), which guaranteed cocoa exports to East Germany on the basis of fixed prices far above world market prices.[17]

The GDR signed similar agreements with Angola and Ethiopia, focusing on the import of green coffee. According to Jelmer Vos, coffee had been an important cash crop for Angolan peasants and the country itself a leading African coffee producer since the

nineteenth century.[18] This did not change after independence, though Angola suffered from the same teething problems as São Tomé and Príncipe when adjusting its agricultural sector to socialist production conditions. The GDR's involvement in the reconstruction of the Angolan coffee sector after the Portuguese exodus should not be underestimated in this context, Immanuel R. Harisch noted. The deployment of East German 'Free German Youth' (FDJ) brigades in Angola played a decisive role in this context, as it was explicitly tied to the production and export of Angolan coffee.[19]

As a result of global supply shortages, coffee became the main foreign exchange earner of socialist Ethiopia in the second half of the 1970s and was considered the 'nation's number one cash earner' and 'backbone of the economy'[20]—as has been explored by the present author. As the government was planning to sell more and more coffee to foreign markets, the Ethiopian population was even asked to reduce domestic consumption. The United States and several European and Asian countries bought large amounts of Ethiopian coffee, and after the Lomé Convention of the European Economic Community (EEC) came into force in 1976, allowing agricultural and mineral goods to enter the EEC duty free, Ethiopia was granted access to the European Development Fund for financing its coffee improvement programme. Ethiopia's total export shares to EEC countries, West Germany and Italy in particular, rose from 23.3 per cent in 1977 to 27 per cent in 1978, while the CMEA share fell from 15.2 to 8.5 per cent. The GDR, which had reached a barter trade agreement with the Marxist Derg regime in Ethiopia in June 1977, was by far the largest buyer of Ethiopian goods within the CMEA, though Ethiopian exports to the GDR decreased considerably from ETB 99.8 million in 1977 to ETB 32.5 million in 1978.[21] Consequently, the coffee barter trade with the GDR was ended in 1979. The Ethiopian coffee sector aimed to profit from global coffee prices, leading to a substantial conflict of interest between the actors involved in the trade with the GDR, and this contributed to the termination of the trade.[22]

In the 1980s, the quantities delivered from Angola then increased continuously to compensate for the lack of Ethiopian coffee, accounting for purchases of at least ten thousand tonnes of green coffee per year and about a fifth of the coffee consumed in the GDR.[23] Pavel Szobi has shown that the Czechoslovakian government had a similar interest in Angolan raw materials and agricultural goods, whereby Czechoslovakia sent machinery, entire factories, and experts for the (re)construction of Angola's infrastructure and enterprises in the late 1970s in return for its demand for iron ore, oil, coffee, and cotton.[24] This commitment of Eastern bloc countries to cooperate in increasing raw material and agricultural production in the Global South was not limited to socialist Africa. Thus, in 1980, for instance, the GDR supported Vietnam in the production of natural rubber, pepper, coconut oil, and coffee for export, thus 'laying the foundations of Vietnamese coffee power' in the province Dac Lac.[25]

With rising world market prices, coffee, cocoa, and tropical fruits were firmly in CMEA sights. From the early 1970s, representatives of foreign trade companies of individual CMEA countries met at increasingly shorter intervals to discuss the market situation, price trends, and possible business deals with exporters in the so-called non-socialist economic area. The deepening cooperation of the individual member states

was intended to optimize foreign trade with the capitalist countries in the Global North and the Global South and aimed, among other things, at monitoring price developments on the international commodity exchanges and obtaining price concessions through a joint approach to export firms in capitalist countries.[26] However, it was doomed to fail as CMEA countries competed for foreign trade with capitalist countries and socialist-leaning countries of the Third World and individual advantage in the exchange of goods. CMEA cooperation was much more constructive in coordinating other commodity flows, as will be shown in the following section.

CMEA Energy Flows and the International Socialist Division of Labour

The CMEA was created in 1949 by the Soviets in order to integrate the economies of the Eastern bloc into a supranational system of economic cooperation and coordination.[27] Although the CMEA was based in Moscow and followed Soviet requirements, the Soviet Union was never really able to convince its other member states to participate in a fair trade that benefitted all equally. Randall W. Stone argued that the failure of the Soviet Union to bargain with the Eastern European CMEA countries, the lack of incentives and monitoring their performance, and a policy of looking the other way encouraged them to manipulate accounts, suppress information, and violate international agreements.[28] Furthermore, they benefitted from cheap raw materials, as within the CMEA the Soviet Union provided most of them at preferential prices well below world market level—including natural gas, oil, iron ore, asbestos, coal, and timber—while importing low-quality industrial goods from its allies. According to Oscar Sanchez-Sibony 'the satellites were effectively subsidized by a country that was, in fact, less developed than many of them'.[29] Paradoxically, this militated against the implementation of an international socialist division of labour aimed at counteracting the unequal exchange of goods by creating equal partnership relations in international trade.

It was energy supply that actually interlinked the Eastern bloc economically, or, as Lüthi accurately put it, 'energy formed the glue that held the CMEA together'.[30] As a result, the establishment of cross-border energy infrastructures was the main task of CMEA cooperation.[31] Various historians, such as Lüthi and Falk Flade, observed a general pattern in the creation of transborder CMEA energy networks and their ongoing expansion with growing energy demand, be it the electricity grid Mir, the oil pipeline Druzhba, or the gas pipeline Soyuz. The Soviet Union focused on energy production and supply of Soviet crude oil to the Eastern bloc countries, since the adoption of the Soviet industrialization model there led to higher energy demand that could no longer be met with domestic energy reserves. The Soviet Union and Romania were the only socialist countries in Eastern Europe that had fossil-energy reserves. Most Eastern European

countries relied heavily on hard coal or soft coal mining, even though they could hardly meet their own energy needs with it. Poland, for instance, produced hard coal, which was exported on a large scale to supply East German heavy industry. As a result, the Soviet Union provided some two thirds of energy imported by Eastern European CMEA members,[32] particularly the GDR (especially its chemical industry) and Czechoslovakia, but also for the mechanization of agriculture in all Eastern European states. There was a rapid rise in crude oil imports and the construction of refineries—the first of which were in Bratislava (Czechoslovakia), Schwedt (GDR), and Płock (Poland)—from the second half of the 1950s.

A milestone in the creation of a unified energy system was the construction of the Druzhba (Russian: 'friendship') pipeline, which was completed in 1963. The pipeline, with a total length of around 5,500 kilometres, was put into operation between 1962 (Czechoslovakian section) and 1964 (Soviet section) and from then on supplied Poland, the GDR, Hungary, and Czechoslovakia with forty million tonnes of crude oil per year.[33] Since the mid-1950s CMEA member states had repeatedly discussed the coordination of energy flows and the development of the oil and gas industries, which included infrastructure and oil shipments. As facilities within the existing oil transportation network were limited and pipeline transport was much cheaper than rail transport, the CMEA commission suggested the construction of a long-distance crude oil pipeline, reaching from Al'met'evsk to Mazyr in the Soviet Union and then continuing via the northern route to Poland (Płock) and the GDR (Schwedt) and via the southern route to Czechoslovakia (Bratislava) and Hungary (Százhalombatta).[34]

Focusing on the planning and construction process of the pipeline, Flade emphasized the international socialist division of labour of the project and the dependency on imports from the West. Technical components for the pipeline were supplied from each country involved in the project, entailing quite often delivery delays and constant complaints about the quality of deliveries from other countries. The embargo policy of the West as a result of the Berlin Crisis of 1961 and the Cuban Missile Crisis of 1962 brought further problems, as pipe deliveries from the West German pipe-producing companies Mannesmann, Hoesch, and Phoenix-Rheinrohr came to a halt. The Druzhba pipeline was soon extended: a second line for the direct supply of Hungary was built between 1968 and 1973 and a third line for supplying Soviet crude oil to Yugoslavia decided in 1974. Furthermore, growing export obligations necessitated connections of the pipeline to oil fields in Western Siberia.[35]

Soviet natural gas also found its way through the Soyuz (Russian: 'union') pipeline to Eastern Europe since the 1970s. After the discovery of the Orenburg gas field in the southern Urals in the 1960s, plans evolved to construct an international gas pipeline within the CMEA. At the 27th CMEA Council Session in June 1973, Czechoslovakia, Poland, Hungary, Bulgaria, and the GDR were invited to participate in the construction works of this three-thousand-kilometre-long pipeline, which was to stretch to the western border of the Soviet Union and from there be connected to already existing Eastern European gas networks. The general agreement on the joint construction and financing of the pipeline was signed in 1974. Although the construction was a joint

project, the Soyuz pipeline, once completed, belonged to the Soviet Union exclusively. Within the framework of the Transgaz project, the Soviet Union had already gained experience with building a similar gas pipeline to Western Europe. As in the building of the Druzhba pipeline, the Soyuz construction required imports of Western technology, including machines, pipes, and other equipment.[36]

The procurement of dollar loans from Western banks to finance these imports fell within the remit of the International Investment Bank (IIB), which was established in 1970 to fund larger multilateral industrial and infrastructure projects within CMEA. With a capital stock of one billion transferable roubles, in which the GDR had the largest share after the Soviet Union, the IIB extended long- and medium-term loans in transferable roubles, national currencies or in convertible currencies. The annual interest rates amounted to only 4 to 6 per cent and were thus considerably lower than the interest rates of Western banks. As early as 1975, the IIB had granted loans for thirty-nine properties in various CMEA countries.[37] According to Lüthi, the Soyuz pipeline became the bank's main task in the 1970s and almost drove it into bankruptcy, particularly due to the poor creditworthiness of some project partners. Eventually, the pipeline went into operation in 1979, only a few months delayed.[38]

As early as the 1960s, when Eastern European energy demand increased tremendously, the Soviets tried to encourage other CMEA states to import oil and natural gas from countries in the Middle East and North Africa so as not to bear the sole burden of supplying energy to the Eastern bloc. In 1966, the Soviet State Planning Committee Gosplan even considered connecting the then to-be-extended Druzhba pipeline system with a pipeline from Iran to guarantee a steady flow of oil from the Middle East.[39] Furthermore, the Soviet Union concluded economic agreements with Iraq in 1969 for the construction of oil-production facilities and the import of Iraqi oil, and considered similar arrangements for the provision of oil and gas from Iran, Algeria, and Afghanistan. Since the cost of importing these resources from developing countries was lower than the production costs within the USSR, the Soviet planners calculated substantial savings in re-exporting imported oil and gas to Eastern Europe. However, much to the Soviets' disappointment, most Eastern European governments proved reluctant to accept their alternative energy-supply plans. While the Poles continued to rely on a steady flow of oil from the Soviet Union, at least the GDR considerably increased its oil imports from Egypt in 1969 and also declared its willingness to import Iraqi oil after 1972.[40] Although the Iraqi oil was cheap, it was loss-making for the Soviet Union, as it had to pay for the oil purchases in Western currencies and also provide Iraq with technical assistance.[41] The beginning of the war between Iran and Iraq in 1980 meant the abrupt end of oil and gas supplies from both countries to the Soviet Union.

Oil and gas were not the only energy sources that formed the basis of infrastructural cooperation in the Eastern bloc. The electricity grid Mir (Russian: 'peace') linked the national power grids of Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and the west of the Soviet Union. The decision to establish a united energy system was taken at the 1959 11th CMEA session. The advantage was that the power network did not have to be built from scratch but linked the Romanian, Bulgarian, and

southern Soviet energy system with already existing electricity networks between Czechoslovakia, East Germany, Poland, and Hungary. New transmission lines had to be put into operation only between eastern Poland and western Ukraine, and between Poland and Romania via Ukraine, in 1963 and 1964. The network was finally completed in 1967 with a transmission line linking Romania and Bulgaria. While energy production until the 1960s was mainly based on the use of lignite and hard coal deposits from Czechoslovakia, East Germany, and Poland, which were converted into electricity at the point of extraction and then transported via cross-border transmission lines, the growing demand for energy and increasing energy prices in the 1970s required a further extension of Mir, leading to the focus on an expansion of nuclear energy and eventually the joint construction of nuclear power plants and a network of high voltage transmission lines.[42] In 1979, the Soviet Union, Czechoslovakia, the GDR, Poland, Hungary, Bulgaria, and Yugoslavia signed an Agreement for Multilateral International Specialization and Cooperation in the Construction and Mutual Supply of Equipment for Nuclear Power Plants between 1981 and 1990, setting their hopes high for nuclear energy as the sole source for electricity.[43] According to Lüthi, Flade, and Mike Reichert, the Chernobyl disaster of 1986 did not cause the termination of the nuclear-energy grid project but was a significant reason for further delays of the project that had already fallen behind schedule and was to be extended for another decade.[44] The main reason for the delays was the Soviet company Atommash, the main producer for components of reactors, having delivery problems.[45]

In general, the terms of trade were in favour of richer CMEA countries, and CMEA trade was thus more advantageous for economically advanced Eastern European countries that focused on the export of manufactured goods, such as Czechoslovakia and the GDR, and rather disadvantageous for the Soviet Union and other producers of raw materials and agricultural goods. Stone, Sanchez-Sibony, and Suvi Kansikas, among others, have repeatedly pointed out that the Soviet Union in effect subsidized its allies with cheap oil and other raw materials,[46] while it pushed other CMEA countries to export surplus raw materials, improve the quality of finished goods for export, and invest in projects in the Soviet Union to cover production costs of raw material extraction.[47] In particular, the economies of the GDR and Czechoslovakia, which were highly developed in comparison with the other member states, were to support the Soviet Union and other CMEA countries in industrially building up their national economies, in accordance with the 'logic of proletarian internationalism'.[48]

Another point of debate among socialist officials with regard to raw material exports was the pricing system within the CMEA. The old price-formation mechanism of 1958 in time become unfavourable to the Soviet Union and the CMEA pricing policy was finally revised as a result of the 1973 oil crisis and skyrocketing oil prices on world markets. From 1975 onwards, prices for particular commodities would be set for one year only, replacing the old mechanism of five-year-average prices.

The Eastern European oil-supply situation changed dramatically at the end of the 1980s. The Soviet Union reduced crude oil exports to CMEA countries and sold oil on Western capitalist markets instead to support Poland with the hard currency revenue

generated. Faced with the Polish Crisis, the Soviet Union urged its allies to turn economically more to the West. Poland's economic decline had a greater impact on some CMEA partners—on the GDR in particular. The hard coal that could not be delivered by Poland now had to be bought by the GDR from Western countries for hard currency instead.[49] The increase in imports from the West in the 1980s was not limited to raw materials, however, but also increasingly affected more and more consumer goods.

Consumer Goods, Scarce Commodities, and Symbolic Values

The Western orientation of certain Eastern European countries did not start in the 1980s but reached further back. In the late 1950s and during the 1960s the governments in Hungary, Yugoslavia, and Romania turned their attention to the West in order to provide their populations with access to more consumer goods and thus secure and legitimize their power. People in the Eastern bloc were permanently confronted with the consumer wealth of the West, which seemed even closer and more tangible for the citizens of the GDR with the neighbouring Federal Republic. As a result, during the 1970s and 1980s Western imports to the whole Eastern bloc grew immensely, including not only sophisticated technology but also everyday consumer goods and even agricultural products, which contributed decisively to the debt problem of the Eastern bloc.

The establishment of a luxury goods industry in the Eastern bloc dates back even further. Jukka Gronow has presented an entirely different picture of Stalin's Russia of the 1930s that witnessed the first attempts to create a genuinely Soviet commercial culture that would rival the West. The range of luxury goods produced and marketed in the Soviet Union between 1933 and 1939 included not only luxury foods, such as caviar, champagne, liquor, and chocolate, but also consumer durables like gramophones and wristwatches.[50] In his 1957 book *The New Class*, Yugoslav dissident Milovan Đilas noted the rise of a new socialist bureaucracy in the Soviet Union and Eastern Europe that enjoyed material benefits and other privileges from their influential positions in politics and economics, including preferential access to consumer goods.[51] In Hungary, for instance, János Kádár pursued a relative liberalization of the economy and encouraged a modest form of consumerism as a means of gaining popular support after the uprising of 1956—a policy that was mocked as 'goulash communism' by Khrushchev. As a result, a new petite bourgeoisie emerged, longing for consumption and material possessions. Between 1957 and 1978, real wages doubled and consumption multiplied 2.5 times. Consumer demand focused on durable consumer goods, whose supply grew tenfold between 1957 and 1978. While consumers enjoyed modern achievements in household and leisure, such as refrigerators, washing machines, radios, televisions, and cars, the official public discourse in socialist Hungarian periodicals mocked 'fridge socialism' and argued younger citizens would prefer a car over a kid and the petite bourgeoisie in general was perverted by the values of overconsumption.[52]

Modernizing households with consumer durables was a trend in the 1960s across the socialist world, and, as Stephan Merl has pointed out, disparities in the provision of households with consumer durables could be observed between the Soviet Union and the East Central European countries. While washing machines, refrigerators, and televisions became standard in Hungarian, Czechoslovakian, and East German households, Poland and the Soviet Union were lagging behind in this respect.[53] There was a demand for domestic consumer durables, which could not be satisfied in any of these countries. Production of cars, for instance, never met the growing demand in the Eastern bloc. While between 55 and 58 per cent of Czechoslovakian and East German households had a private automobile, only 20 per cent in the Soviet Union did.[54] But even in the comparatively well-supplied GDR, East Germans had to wait about ten years for a Trabant or Wartburg due to production bottlenecks, caused less by a lack of technical know-how of engineers and developers than by a lack of state investments in the East German automobile industry. As a consequence, used cars on the East German black market were more expensive than the new cars produced by the automobile manufacturers in the GDR, and availability more important than the condition of the vehicle. Since housing and basic needs were cheap in the GDR, people with middle and higher incomes could afford to put money aside for cars and other luxuries from the black market.

Socialist consumer societies have been repeatedly described as 'shortage economies'—a term coined by the Hungarian economist János Kornai—and 'societies of scarcity' in contrast to the dazzling capitalist 'affluent society', described in detail by Jean Baudrillard and John Kenneth Galbraith.[55] While basic necessities, such as bread, milk, and other basic foodstuff, detergents, toiletries, and clothing, were domestically produced and usually permanently available and affordable as they were subsidized by the state, there was a lack of certain commodities, including coffee, chocolate, tropical fruits, jeans, home electronics, and certain cosmetic products or brands of cigarettes, beer, or liquor. These scarce products were either imported or primarily meant for export and tended to have a sphere of exclusivity and distinction, particularly when they were branded as luxuries and sold at high prices. A special case was licensed production that took place in many Eastern European countries, for instance in Hungary and Czechoslovakia, in the form of cooperation between Eastern European state enterprises and Western European private companies. It was usually based on license agreements, except in the GDR, where it was called *Gestattungsproduktion* and was directed according to the production requirements of the West German cooperation partners. In contrast to license agreements, the GDR did not pay a licence fee but paid with a share of the produced goods. This was a win-win situation for both sides, as the GDR could keep small quantities of popular and much-desired West German products for selling on domestic markets at high prices and the West German companies received cheap yet high-quality products. A prominent example, investigated by Pavel Szobi, was the production of Nivea cream, a well-known cosmetic product and export hit of the West German company Beiersdorf AG, in Czechoslovakia and the GDR.[56] Similar to the goods that had actually been imported from the West, licensed products, and cosmetics

in particular, were loaded with symbolic meaning, far beyond their use value. The hoarding of such rare commodities was quite common.

In the 1980s, technological innovations from the West found their way to Eastern European markets. Patryk Wasiak has pointed out that Poland played a pioneering role in the spread of VCRs in the Eastern bloc. In the first half of the 1980s, Polish guest workers brought the first VCRs from Western Europe, mostly from West Germany, and Asia to Poland. Initially, VCRs were offered at informal open-air markets (*giełdy*) for a sum that was roughly equivalent to two annual salaries of an average state-enterprise employee.[57] Due to the high demand, the official economy soon followed the trends on the black market. From the middle of the 1980s on, Poles could buy VCRs of the Japanese brands Sony, Sanyo, or Panasonic priced at between USD 450 and 500 at the hard-currency stores Pewex and Baltona.[58] Hard-currency chain stores were a bloc-wide phenomenon and existed not only in Poland, but also Czechoslovakia (Tuzex), Hungary (Intertourist), Bulgaria (Corecom), Romania (Comturist), the Soviet Union (Beryozka), and the GDR (Intershop).[59] They offered Western foods, drink, tobacco, cosmetics, home electronics, and sometimes jewellery and cars. As part of the governmental program '*polskie wideo*', two Polish state enterprises started to manufacture VCRs and blank videocassettes as mass products at affordable prices in 1986. However, the VCRs made in Poland were launched on the official Polish market much too late and could not keep up with their Western competitors. This example clearly shows how the sale of western competitor products favoured a devaluation of domestic products.

It is striking how Western commodities played a significant role in all Eastern European consumer societies, including the GDR. Paul Betts has argued that products from the West, usually brought to the East as gifts, were key in linking East and West over decades.[60] And Daphne Berdahl underlined that Western jeans, packages of cigarettes, coffee and cocoa, chocolate and other sweets, soap boxes, and even (empty) coke cans and shampoo bottles were not only conspicuously consumed, but were put on display.[61] For many consumers in Eastern Europe, Western clothing, and blue jeans in particular, carried a symbolic meaning of a liberal, Western lifestyle without restrictions. It is remarkable that the governments of Hungary and the GDR in the 1970s nevertheless pushed for the import and domestic manufacture of this product. Fruzsina Müller emphasized that for the Hungarian state apparatus, supplying the population with this fashionable garment was more relevant than the presumed ideological threat it posed.[62] Accordingly, jeans were only political insofar as their availability was perceived as a fulfilment of the Kádár government's promise of a modest consumerism, but, like the Polish VCRs, the Hungarian brand Trapper was much more unpopular with consumers than the imported or licensed-produced Levis or other Western brands. Even more unpopular were jeans of East German production. East German consumers preferred to buy their jeans in Hungary, had relatives send them from West Germany, or hired Vietnamese contract workers to tailor them fake jeans with Western labels.

Western jeans were far from the only goods that Eastern European consumers coveted and associated with a liberal, Western lifestyle. After the fall of the Berlin Wall in 1989, bananas became icons of liberation in the reunification process. West Germans

joked about the East German's panic buying of bananas, and some politicians even condemned them for their rampant consumerism, coining the derogative term *banana patriotism*.[63] The supply of tropical fruits was a general problem in the Eastern bloc and helps explain the economic rapprochement of CMEA countries with countries in the Global South. This rapprochement is discussed in the next section, on the basis of Cuba's integration into the CMEA, focusing on its sugar economy.

Cuban Sugar and the Eastern Bloc

The integration of non-European countries into CMEA economic structures was not initially intended.[64] China still maintained close economic relations with the CMEA in the 1950s. As a result of the Sino-Soviet split, however, cooperation with the CMEA was discontinued after 1966. Korea (1957), Vietnam (1958), and Mongolia (1958) had observer status within the CMEA from the second half of the 1950s, and the 1962 16th Extraordinary Meeting of the Council finally paved the way for non-European countries to become full members by admitting Mongolia. Cuba's admission to the CMEA in 1972 formed the basis for deepening economic cooperation between the Caribbean island and the Eastern bloc. In addition to the expansion of trade relations, this included joint construction projects and production cooperation, quite often to meet the demand of the European CMEA countries.

After the fall of the Batista regime and Fidel Castro's coming to power, Cuba moved into the orbit of the Soviet Union and the Eastern bloc. High-ranking Soviet Politburo member Anastas Mikoyan visited Cuba in February 1960 and agreed to supply Soviet oil at below world-market prices and purchase 425,000 tons of Cuban sugar at the current world-market price. In the years 1961 to 1965, the USSR then wanted to import one million tons of sugar annually at preferential prices. Given the political course the United States had taken toward Cuba, this support came at just the right time. In response to the Cuban land reform of 1959, which caused losses to many US landowners, President Eisenhower drastically reduced the import quota of Cuban sugar by 95 per cent, and the Soviet Union announced its willingness to buy the sugar boycotted by the United States. This laid the foundation for Cuba's increasing sugar trade with the Eastern bloc. After the United States broke off diplomatic relations with Cuba in 1961, completely banned the import of Cuban sugar, and declared a general trade embargo in 1962,[65] the Soviet Union and various Eastern European countries were to fill the gap left by the United States—previously Cuba's largest sugar consumer and most important trading partner.

In 1972, Cuba finally joined CMEA. The integration of the geographically distant island into the economic system of the predominantly European socialist countries posed new challenges not only for the Cuban economy but also for those of the existing member states. Since many of the Eastern European countries were classic sugar-exporting countries that were also largely able to cover their domestic consumption themselves, a reduction in their sugar production was a basic prerequisite for expanding

Cuba's sales market eastwards. Soviet CMEA experts put forward the advantages of a reduction of the domestic sugar production, arguing that, in the foreseeable future, the Soviet Union would have additional large areas of fertile soil at its disposal and funds previously used for the cost-intensive production of beet sugar could be saved. In addition, Cuban cane sugar would help European refineries achieve better capacity utilization and thus increase profitability, by extending the harvest period of a few months in the fall (beet sugar) to include half a year in the spring and summer (cane sugar), making sugar available for processing almost all year round. The surpluses achieved were used to develop the domestic fruit-canning and jam industry, but were also available for re-export.[66] Cuba's integration into the international socialist division of labour thus meant far-reaching changes within the economic structure of the whole Eastern bloc, especially with regard to the sugar industry.

The CMEA price policy, guaranteeing fixed and stable prices, encouraged Cuba to turn once again to sugar, its main export commodity. While the difference between world-market and CMEA sugar prices was still small at the beginning of the 1970s, socialist price policy developed clearly in Cuba's favour from the second half of the 1970s onwards. Between 1976 and 1980, for example, the Soviet Union paid Cuba sugar prices that were at least three times higher than those paid on the world market.[67] In the 1980s, when the world market price collapsed, the Soviet preferential price was six to ten times higher.[68]

After significant CMEA funds for the development of the Cuban sugar industry had been promised, Cuba modernized the sugar sector. A focal point of the industrialization of Cuban agriculture was the mechanization of the sugar cane harvest, which began in the second half of the 1970s.[69] It achieved its breakthrough in the first half of the 1980s, after the 'General Agreement on the Complex Development of Sugar Production' was signed at the 1981 35th CMEA meeting, whose aims were the comprehensive modernization of the sugar cane harvest, the supply of new equipment for sugar factories, and the development of production facilities for the utilization and processing of sugar cane by-products.[70] While in 1980 only 45 per cent of the sugar cane was cut mechanically, by 1985, this was already the case for two thirds of the harvest.[71] This progress was mainly due to the use of Soviet KTP-2 forage harvesters.[72] Furthermore, a restoration of the old sugar-processing facilities could finally be realized. A loan of USD 643 million was granted for the construction of new sugar mills in Cuba, with most of this amount being covered by the Soviet Union, the GDR, and Bulgaria.[73] These were the first new buildings in this sector in fifty years and led to a significant growth in the capacity of Cuban sugar production. As a result, Cuba's sugar deliveries to the CMEA countries increased steadily throughout the 1970s and 1980s. As decisive as British knowledge transfer was in the process of the modernization of the Cuban sugar industry in the nineteenth century,[74] so important were Soviet and Eastern European technology transfers for the development of this industry in the second half of the twentieth century.

As part of a diversification strategy in the sugar industry, it was suggested that the Cubans should focus not only on the production of sugar but also on its by-products.[75] This primarily targeted two niches: bagasse and torula yeast. Thus, in the second half

of the 1970s, a joint research project between the GDR and Cuba was launched at the Camilo Cienfuegos sugar factory near Santa Cruz del Norte. Experts from Cuba and the GDR conducted research here aiming to produce chipboard from the bagasse of sugar cane with the addition of uric acid and other substances in order to use it later in the East German and Cuban furniture industry.[76] By the mid-1980s, there were already ten factories for the production of paper, newsprint, cardboard, and chipboard from bagasse. In addition, eleven factories had been set up for the cultivation of torula yeast based on sugar and urea. Mixed with molasses, this fake yeast was particularly suitable for the production of a protein-rich cattle feed, which was cheaper than comparable feed made from corn and soy.[77]

Though strongly influenced by Soviet stipulations, the intra-CMEA commodity exchange with Cuba was subject to individual negotiations. As a result, each CMEA country concluded individual bilateral contracts with Cuba to meet its own needs, sometimes colliding with the demands of other member states. Cuba not only exported sugar to the other CMEA countries, but also other commodities, including nickel and growing quantities of fresh and processed citrus fruits. This suggests that non-European member countries continued to function primarily as suppliers of raw materials and agricultural products. Contrary to socialist rhetoric, the 'international socialist division of labour' within the CMEA therefore also corresponded to the traditional division of labour between industrialized countries of the Global North and developing countries of the Global South, and led to new structural dependencies and, in the long term, to a deterioration in the terms of trade. After the collapse of the Soviet Union and the Eastern European bloc, Cuba lost its most important trading partners, and plunged into severe economic crisis. In the meantime, conditions on the international sugar market had developed to Cuba's disadvantage. As a result of the protectionist measures of the developed countries of the Global North, especially the European Community, exports of peripheral countries have been reduced and global sugar prices declined. The growing competition posed by sweetener manufacturers aggravated the market situation. Horacio Crespo quite accurately summarized the condition of the international sugar market at the end of the twentieth century by stating that 'the freedom of competitive trade has turned out to be more of a proclaimed ideology than an effective practice'.[78]

Conclusion

The brief case study on Cuban sugar production presented above illustrated how socialist countries and their commodity flows were integrated in the world economy. This was also evident with regard to grain supply in the Soviet Union and China and cash crops in the Global South, as well as energy networks within and energy flows beyond the CMEA. Not all parts of the socialist world and topics dealt with by other scholars have been covered in depth. The embargo policy of the West, for example, was only briefly discussed with regard to the United States' hostility towards post-revolutionary

Cuba, when the CoCom embargo, which limited the sale of military and strategic goods from the United States, West European countries, and Japan, affected the entire Soviet bloc, as did economic sanctions imposed by the West on China.[79] China was only examined peripherally in the context of the Sino-Soviet split and the ending of economic cooperation with the Eastern bloc in 1966.[80] Labour as commodity, including labour migration within the Socialist bloc, was also not addressed, as it has been in the research literature on GDR contract workers from Mozambique, Angola, Vietnam, and other countries.[81]

Returning to Wallerstein's thesis from the beginning of the chapter, the attempt to establish a socialist economic order collided with capitalist realities. Neither for the socialist countries of the Eastern bloc nor for the socialist-leaning countries of the Global South cooperation within or with the CMEA meant isolation from the rest of the global economy. Ruptures in the capitalist world economy sometimes had their strongest effect on Eastern bloc countries. This was particularly evident in the second half of the 1970s, when the effects of the 1973 oil crisis, rising interest rates on the international capital markets, the structural transition from manufacturing to service industries, and competition from the Far East severely challenged the national economies of Eastern Europe.[82] In order to cushion the negative effects of global economic crises on the respective national economies, the goal of an 'international socialist division of labour' was intended to create better conditions for the world trade of every country involved in it by expanding their exports through the targeted development of certain production sectors. In fact, the exchange relations between the socialist countries of the Global North, and between them and the socialist-leaning states in the Global South, often took on capitalist characteristics due to the general shortage of hard currency. The profound economic interdependence between the socialist and capitalist worlds was, of course, not a new phenomenon of the late 1970s but went back further, as has been illustrated in this chapter.

Moreover, all the exchanges referred to above were linked through consumption, whether as agricultural products for directly and indirectly feeding the population, raw materials for supplying domestic industries and households with energy, or Western consumer goods and technologies demanded by the citizens and urgently needed in production. Isolation from the West was simply not possible for socialist states, since they were dependent on the generation of foreign currency in order to finance Western imports. The history of commodities across the socialist world was therefore always an entangled history of production and consumption between the socialist and capitalist spheres. As such, it provides historiography with the space for fresh perspectives on global commodities, the international division of labour, transnational trade networks, and consumer societies. There is already a huge array of research literature on socialist consumer societies, reflecting different aspects of commodities, spatiality, practices, and performances of consumption. This branch of literature would benefit from more comparative approaches and an emphasis on processes of entanglements. Furthermore, future research should focus on the particularities of socialist supply regimes and commodity flows across and beyond the socialist world from a global history perspective.

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PART III

METHODS OF PRODUCTION

CHAPTER 10

MINING FRONTIERS AND THE MAKING OF THE MODERN WORLD

LEONARDO MARQUES

Mining—the extraction of mineral resources from earth—has been the object of much scholarship that has often associated the activity with broad historical transformations. Gordon Childe, for example, put copper mining at the centre of an urban revolution in the Bronze Age, an argument that was further explored by Jack Goody.[1] Scholars of Ancient Greece have in turn pointed out how the invention of coinage by the mid-first millennium BC and the pervasive monetisation of Greek city-states, which depended on the expansion of silver mining, contributed to the emergence of new forms of abstract thought, impersonal power, and individualism.[2] The economic boom that marked the expansion of Islam a few centuries later—which also had mining and the circulation of metals as one of its key motors, as the work of scholars such as Maurice Lombard and Michael Morony has shown—has also been interpreted as an early form of modernity.[3] Song China (960–1279) similarly went through an impressive economic efflorescence by the eleventh century largely based on mining, with coal becoming the main fuel, in the form of coke, for the blast furnaces smelting iron ores. This was the first extensive use of a fossil fuel in human history. 'The scale of production at individual establishments was unprecedented in Chinese history', Robert Hartwell argued in the 1960s, 'and probably was not equalled anywhere in the world until the Industrial Revolution of the nineteenth century'.[4]

An even larger number of works has explored the connections between mining and capitalism in the early-modern era. In the first half of the twentieth century, Werner Sombart, Lewis Mumford, and John Nef described European mining as a significant agent of the development of capitalism.[5] Around that same time, Earl J. Hamilton put forward his influential thesis that the flows of New World bullion produced a price revolution in Europe followed by inflation and the accumulation of capital that would ultimately lead to industrialization.[6] In the following decades, scholars such as Fernand

Braudel, Vitorino Magalhães Godinho, Huguette and Pierre Chaunu, and Michel Morineau, continued the debate opened by Hamilton on the volume of precious metals that flowed into Europe and its significance.[7] More recently, the debate on bullion flows has been renewed by experts on Asian history such as Dennis Flynn, Arturo Giráldez, Kenneth Pomeranz, and Prasannan Parthasarathi, who have emphasized the role played by China and India in global circuits in place of the old focus on Europe.[8] In the case of China, a large part of the silver also came from Japan, which had productive mines such as Iwami Ginzan. Having such a rich internal source of bullion, according to John Darwin, also goes a long way towards understanding the economic success of Japan and its capacity to protect itself from foreign interventions in the following centuries.[9]

Taking labour, technology, and environmental change as a guiding theme, the following discussion of the historiography of mining focuses on mineral frontiers in the Iberian Americas. New Spain, New Granada, Peru, and Brazil were the main sources of the bullion that contributed to the creation of a world economy in the early-modern era. At the other end of the global flows of silver and gold were the thousands of Amerindians and Africans who spent most of their lives in the mines and rivers of colonial Latin America, working under various labour arrangements and radically reshaping the environment in places like Potosí, Zacatecas, and Minas Gerais. This is illustrated by a case study of gold mining in Brazil, followed by a discussion of the direction in which research into the history of mining appears to be heading, and a consideration of the contribution that this might make to dealing with the environmental consequences and human impacts of these extractive frontiers.

Technology, Labour, and Environment in the Historiography of Mining

A growing scholarship has been outlining the characteristics of mining in different time periods and places. Scholars of Antiquity, for example, have shown changes over time—such as the excavation of deeper mining shafts and the development of technologies like water-wheels and the Archimedean screw after the emergence of coinage.[10] However, earlier forms of mining did not disappear, a persistence that was frequently interpreted by part of the scholarship focusing on technology as a form of 'primitive' survival.[11] Fortunately, attention to the broader contexts and meanings of mining has helped scholars move beyond linear interpretations. In his overview of five thousand years of copper mining in prehistoric Europe, William O'Brien argues that the activity was conducted on different scales, so that in some cases it could involve large numbers of people and perhaps even slaves (although the archaeological record does not indicate this to have been the case). But frequently it was a part-time and seasonal activity performed by farmers, and involving various ritualistic elements—something that was also the case in more recent times in Africa, as Michael Pearson and Raymond

Dummett have respectively shown for the pre-1800 Swahili coast and the Gold Coast in the nineteenth and twentieth centuries.[12] A somewhat similar situation could be found in ancient America, as a growing number of works have been showing.[13] A rich interdisciplinary scholarship on the environmental effects of mining has also helped turn the more traditional, teleological narratives upside down. From mercury pollution in the Andes, which started even before the emergence of complex societies in the region, to the effects of lead mining and its uses in the Roman empire and beyond, scholars have shown that the effects of human activities on the rest of nature have had a very long history.[14]

The early-modern era, however, marked a significant transformation in the history of mining that has been the object of an even larger historiography. Looking at the mining boom in Central Europe (the Saxon and Bohemian Erzgebirge, the Tyrolean Alps, and the Harz mountains in central Germany) between the 1470s and the 1540s, Tina Asmussen outlines a transition from 'family businesses, small-scale technology and cooperative associations' to business models of various partners, more complex and expensive machines, and large numbers of wage labourers working in deeper and, consequently, more dangerous mines.[15] During this period, the first technical works on mining appeared, such as the famous *De re metallica* by Georgius Agricola, which eventually became one of the main historical sources for historians of early-modern mining.[16] A growing scholarship has also explored the environmental dimension of these mining activities, which largely focused on silver, but also included metals such as copper, lead, zinc, and tin.[17] A few other mining industries appeared in other European locations, such as iron in Sweden—which had an important Atlantic dimension, as the work of Chris Evans and Göran Rydén shows—and mercury in Almadén (Spain) and Idria (Slovenia).[18] Coal mining has been a particularly important subject for environmental and energy historians, especially after the transition to fossil fuels became the focus of contemporary debates on the global environmental crisis.[19] These remained important industries, but perhaps even more fundamental in global terms was the mining of precious metals, a critical component of European overseas expansion in the first place and the lifeblood of the emerging capitalist world economy of the long sixteenth century. After the mining boom in Central Europe, however, the silver frontier largely moved to the New World, in an example of the geographical expansion that characterizes what Jason Moore has conceptualized as a 'commodity frontier': specific zones for the appropriation of 'cheap' food, energy, raw materials, and labour in accumulating processes of the capitalist world economy.[20]

The history of mining in the Americas has been the object of a vibrant scholarship. In Brazil, Sérgio Buarque de Holanda made it a central theme of his work, exploring, for example, the influence of Spanish American mining on the development of colonial Brazil in *Visões do Paraíso* (1958) and in his chapters in *História Geral da Civilização Brasileira* (1960). Dreams of finding a mountain of silver comparable to Potosí were shared by a number of settlers and official authorities, who stimulated the organization of expeditions into the Brazilian hinterland in search of precious metals and stones. In works such as *Monções* (1945) and *Caminhos e Fronteiras* (1957), Holanda emphasized

the centrality of indigenous knowledge to Portuguese explorations of the interior and the eventual construction of riverine routes connecting São Paulo to the gold mining zones of Mato Grosso. The best synthesis, however, came with the publication of Charles Boxer's *The Golden Age of Brazil, 1695–1750*, which offered an overview of gold mining in Minas Gerais along with a broader discussion of its effects on the rest of the colony and beyond.[21]

A few important works on mining in Spanish America also appeared in this early period. In 1952, historical geographer Robert C. West published his seminal book on gold mining in New Granada, combining colonial documents and fieldwork to provide great detail on labour processes and the role of indigenous knowledge and technologies in the construction of colonial mining enterprises. Attentive to the pre-Columbian contribution to colonial developments, West showed how Amerindians developed various techniques to extract gold, from the simple extraction from the margins of rivers during the summer, when water levels were lower, to changing the course of streams to explore the bottom of rivers, creating water canals with bamboo to wash the gold in older gravel deposits, and excavating vertical tunnels that could reach 6 to 7 metres in places such as Buriticá and Mariquita.[22] A few other works on mining in Peru and New Spain also appeared in this early period, such as West's 1949 study of the Parral mining district and the pioneering book by Guillermo Lohmann Villena on the mercury mine of Huancavelica.[23]

In the last half century, a reduction in the scale of analysis and exhaustive research in local archives has produced many studies on all aspects of mining frontiers, significantly enhancing our knowledge of the subject. A few works have appeared on the mining of gemstones and non-precious metals during the colonial period, such as copper, diamonds, and emeralds.[24] Historians have also explored the history of mining in less central areas such as Hispaniola, Chile, and Honduras, which had some modest mining activities at different moments of the colonial era.[25] But the focus of the scholarship has been mainly on silver and gold in the four main mining areas of the colonial period: Brazil, New Granada, New Spain, and Peru. The dynamics of gold-mining frontiers in New Granada and Brazil, where African slavery was central, were explored in a number of works by Germán Colmenares, A. J. R. Russell-Wood, Angelo Alves Carrara, William F. Sharp, Ann Twinam, Claudia Leal, and Kris Lane, among many others.[26] From the making of local mining elites and the role of the state in the development of the industry to the dynamics of slave labour and the wider developments created by gold, these studies have explored all aspects of those mining frontiers. The same is true for the scholarship on silver mining in New Spain and Peru, with scholars such as Carlos Sempat Assadourian, David Brading, Peter Bakewell, Enrique Tandeter, Rossana Barragán, John Fisher, and Ann Zulawski, to name only a few, also outlining the many different aspects of this history based on extensive archival research.[27]

On the specific issue of labour, the accounts of Zacatecas and Potosí by Peter Bakewell assessed the different arrangements that could be found in silver-mining enterprises and their transformations over time.[28] The author details the balance of coerced and wage labour that could be found both in Mexico and Peru and the very small numbers

of enslaved Africans working directly in the mines—a contribution that led to broader debates on the role of coerced labour in colonial America during the 1980s.[29] While wage labour could indeed be found on a significant scale in the mining enterprises of Peru and especially New Spain, it is also clear that not only coercion, but more specifically African slavery, had a non-negligible role in ensuring the reproduction of silver mining, especially in Peru. The wider 'Peruvian economic space', to use Carlos Sempat Assadourian's term, was formed by the many activities that made the extraction and commerce of silver possible, from the production of foodstuffs and raising of mules for Potosí in the Pampas to the manufacturing of textiles and a few other goods.[30] To this we could add the building of fortifications in places like Lima, Cartagena, and Havana to protect silver flows or the logistical labour involved in the transportation of silver from the mining zones to the main ports, among many other activities. In all these cases, African slaves were widely employed along with native labourers as shown by the classic work of Frederick Bowser.[31] Enslaved Africans could also be found in a few activities in New Spain, but their numbers declined over time. While silver mines like Zacatecas and Guanajuato could not be explored using pre-existing native groups and structures as had been the case in Peru (native groups in the region were mostly mobile hunters and gatherers), large numbers of Mesoamericans migrated to northern New Spain to escape the violence and oppression unleashed by Spaniards in the Valley of Mexico, mixing with Africans and their descendants and eventually becoming part of a large mulatto labour force that worked mainly for wages. A few African slaves nonetheless continued to be employed in the production of textiles in *obrajes* (which produced the bags to carry ores from the mines) or as herdsmen in the supplying zones surrounding the mines. This story has been told in detail by John Tutino, who attempts to frame it within a more global perspective.[32] Moreover, animals, especially mules, were drafted in to work with humans.

This vast historiography of the last fifty years has also outlined the role of subaltern technologies and knowledge in the construction of mining societies in the Americas—a theme that already appeared in the classic works of Buarque de Holanda and West. The scholarship on Potosí has shown that the early decades of its history were marked by native control (especially by the *yanaconas*, Indians who were not submitted to the *encomienda*) over the entire mining process, from extraction to refining in *guayra* wind ovens. Similarly, in New Spain free and enslaved Amerindians also had the necessary knowledge for the prospecting and exploitation of silver mines, a situation that only began to change with the development of mercury amalgamation.[33] Marcy Norton has recently called for a broader interpretation of the concept of technology to include practices and processes—and not only the finished products themselves—as a strategy to understand the contribution of subaltern knowledge in the making of the early-modern world, a proposal that has been further explored in the specific context of mining by Allison Bigelow. Moving between studies of pre-Columbian mining techniques and colonial developments, and based on a close reading of primary sources, such as Oviedo's sixteenth-century descriptions of Hispaniola, Bigelow shows how the knowledge of natives and Africans directly contributed to gold and silver extraction and refining,

ultimately making its way into the mining lexicon of Atlantic empires.[34] Scholars of mining in Brazil such as Eduardo França Paiva, Andréa Lisly Gonçalves, and Flávia Maria da Mata Reis have also debated the contributions of indigenous and African peoples for the development of mining enterprises in the colony.[35]

Directly associated with the discussion of technology is the growing interest in environmental dynamics, which has produced an impressive interdisciplinary scholarship in recent years. Studnicki-Gizbert and Schecter have explored the specific relationship between mining and deforestation in New Spain in the long run, thus making a significant contribution to the broader debate on the environmental impact of Iberian colonization in the New World.[36] Saul Guerrero explains how the decline in silver production in New Spain by the 1560s had less to do with the growing predominance of poorer ores than with their composition, which demanded different refinement techniques. He estimates and compares the environmental impacts produced by amalgamation in the *patios* (which used mercury) and smelting (which used lead), arguing that the latter actually had a deeper impact and was more prominent in New Spain than previously thought by historians (accounting for 40 per cent of total silver production). Extensive lead fumes and the devastation of woodlands for producing the charcoal necessary for the refinement process were two main consequences of smelting, which could have been larger, in Guerrero's view, in the absence of amalgamation with mercury in the *patios*.[37] The predominance of mercury amalgamation, however, does not seem to lead to a much better scenario, as Nicholas Robins's powerful account of Peruvian mining shows. Skilfully estimating and mapping out mercury emissions, Robins offers a chilling account of the human and environmental impacts—deforestation, disease, and death—of mining in Huancavelica and Potosí. The lethality of mercury, in fact, was not restricted to mining workers but also affected working animals and the wider communities, by contaminating the air, water, land, and, consequently, their food.[38] Gold mining was much simpler than silver mining enterprises in the colonial era, but it also produced important environmental impacts, as shown in Warren Dean's classic book on the destruction of the Brazilian Atlantic Forest. Works focusing on the centrality of natural resources such as water for mining enterprises have also appeared, outlining the construction of structures to ensure the water supply in mining zones and the conflicts surrounding them.[39]

Industrialization in the long nineteenth century had a deep impact on mining across the world. The industrial revolution itself depended on mining, especially with the transition to coal as the main source of energy and the centrality of iron and other metals for various advanced industries and activities. According to Edward Barbier, after depending for thousands of years on the 'horizontal frontier' of agriculture, societies of the early twentieth century—especially the industrial nations of Europe, the United States, and Japan—were marked by the centrality of a new 'vertical frontier' of mineral exploitation.[40] New mining technologies came with an unprecedented demand for mineral resources. European prospectors travelled across the globe in search of new opportunities, with the circulation of knowledge and technologies becoming essential for overcoming environmental constraints.[41] The place that incorporated these new technologies most successfully, as Gavin Wright shows, was the United States,

which fundamentally expanded as the result of the mining of its own extensive deposits of minerals such as coal, iron ore, and lead.[42] The industrial core accounted for most of the production and consumption of coal, but coal mines emerged across the world. Zonguldak in Turkey, Jahria in India, Donbass in Ukraine, Witbank in South Africa, and Fushun in China, to name only a few places, all witnessed the development of coal mining based on labour strategies that ranged from wage labour to various forms of coercive regimes, at times in a single place, as the work of Donald Quataert on the Ottoman empire shows.[43]

Industrial expansion in the North Atlantic continued to depend on a number of minerals that had to come from the outside, from the guano and nitrate that were extracted from the Atacama desert to fertilize agriculture (leading to geopolitical conflicts that culminated in the War of the Pacific between Chile, Bolívia, and Peru) to the copper necessary for electrification (and that also increasingly came from Chile at the turn of the century).[44] The tin commodity frontier, as Corey Ross shows, was an essential component of the expansion of the canned foods industry, and radically transformed Bangka and Malaya in Southeast Asia, with great human and environmental impacts.[45] During World War II, the demand for aluminium in the aircraft industry of allied powers largely depended on the mining of bauxite in British Guiana, with cheap wage labour and a 'lunar' environmental legacy: 'pocked, mineralized surfaces, devoid of topsoil, flora, or fauna'.[46] The deepening of vertical frontiers, with the global circulation of technologies and the uneven flows of mineral resources has persisted all the way into the twenty-first century, a trend that was intensified by the development of open pit mining in the 1960s and the new demands of the electronic revolution. The current efforts to develop so-called green technologies to decrease the use of fossil fuels also depends on access to minerals such as lithium and cobalt, thus making mining technologies an equally central part of the future envisioned by political authorities of the contemporary world.

A large body of scholarship has explored the history of labour in mining sectors across the world, with a number of debates on whether miners formed a more radical and cohesive sector of the working class or not.[47] In spite of the 'myth of the radical miner', to use Dick Geary's expression, Timothy Mitchell suggests that coal miners had great leverage because of the characteristics of coal and its centrality in the world created by the industrial revolution, a power that would later be undermined by the growing role played by oil as a fuel from World War I.[48] In any case, it is clear that labour conditions in mines across the world went through significant transformations over the twentieth century, largely as a result of labour organization, including the mining sector. Elizabeth Dore has noted the inverse relationship between better conditions for mining labourers and environmental devastation in twentieth-century Latin America, but also argued that this relationship could be in the process of merging, with a decline in the labour conditions of the working class in the twenty-first century.[49] The growing bibliography on neo-extractivism in contemporary Latin America seems to confirm that point, thus showing that the interplay between new technologies, precarious labour conditions, and environmental devastation is a long-term pattern in the history of mining frontiers.[50]

The Gold Commodity Frontier in Brazil

Many of these issues relating to the labour, technology, and environmental impact of mining can be illustrated with the case of the gold commodity frontier in Brazil. The famous nineteenth-century gold rushes in places like California, South Africa, Australia, and New Zealand created images of a free competition over mineral resources that shaped much of the later historiography. However, this was far from the case in eighteenth-century Brazil. Access to the rights to explore goldfields and the size of the territories to be explored in Minas Gerais, for example, depended on the number of slaves one had. According to legislation passed in 1702, slaveholders with twelve or more slaves could explore a piece of land of thirty *braças* (each *braça* was the equivalent to 2.2 metres) while those with fewer slaves could receive land with two and a half *braças* for each captive they had. If more land was available after distribution, those with more slaves could receive more land based on the additional number of slaves they had.

In other words, mining was the business of slaveholders. While indigenous labourers were particularly important in the early decades of Minas Gerais, eventually the vast majority of enslaved workers were Africans. The number of African slaves disembarked in Portuguese America went from 464,000 in the second half of the seventeenth century to almost 900,000 in the first half of the eighteenth. How many of these were actually carried into Minas Gerais is still unclear, but Mauricio Goulart estimated something between 290,000 and 305,000 were carried to the region between 1698 and 1760.[51] Goiás had around 10,000 slaves in 1736, almost 40,000 by 1792, and little more than 13,000 by 1832, an oscillation that accompanied the rise and fall of gold mining in the region.[52] Mato Grosso in turn received 10,775 slaves between 1720 and 1750 and only about half that number (5,605) in the following twenty-two years. By 1800, the captaincy had 11,910 slaves living within a total population of 25,821 people (Fig. 10.1). Many of these slaves, especially those coming from the Costa da Mina region in West Africa, were purchased with the gold that was extracted by other slaves in Brazil. Estimates are that around forty-seven tons of gold were exported to Africa during the first half of the eighteenth century to be exchanged for captives.[53]

Between 1700 and 1799, this enslaved labour force extracted 856.5 tons of gold from the Portuguese colony, with Minas Gerais comprising 74 per cent of this total, followed by Goiás with 19 per cent and Mato Grosso with 7 per cent.[54] By the mid-eighteenth century, this gold accounted for almost 40 per cent of the total value of bullion extracted from the New World (Fig. 10.2). It is hard to overestimate the impact of this. The gold boom stimulated significant flows of settlers from Portugal and other parts of the colony, the foundation of a large number of cities and villages in a rapid urbanization process, and the development of various other activities, from agriculture to the manufacturing of a few specific products to supply the gold mining frontiers.[55] Such a dramatic expansion produced a number of conflicts with native groups across the colony, a pattern that

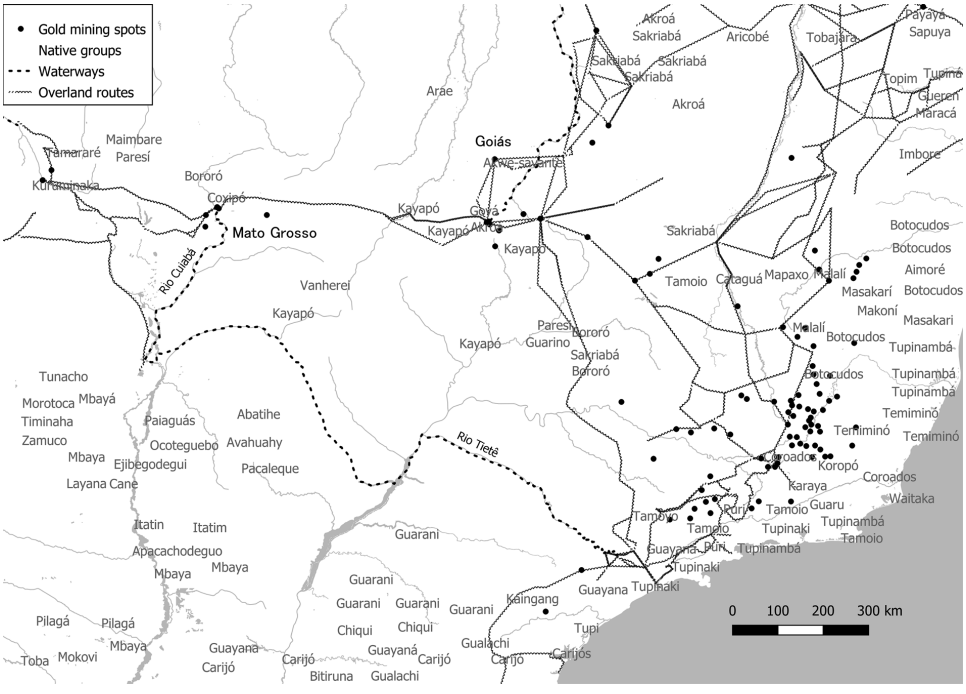


FIGURE 10.1 Mining spots, indigenous groups, and routes in Minas Gerais, Goiás, and Mato Grosso in the eighteenth century.

Source: Atlas Digital da América Lusa.

would reappear in the gold rushes of the following century in other parts of the world, as was the case in California and Australia.[56] All mining areas in Brazil had relatively large indigenous populations before the arrival of Europeans. One conservative estimate points to 97,000 Indians living in Minas Gerais, 131,000 in the Araguaia-Tocantins river basin (which included Goiás), and 75,000 in Central Mato Grosso around 1500.[57] Other scholars have estimated the presence of almost 160,000 people in Minas Gerais alone, distributed between 177 ethnic groups.[58]

We know very little about the history of these groups, but it is clear that significant transformations had already been taking place before the mining booms of the eighteenth century, with conflicts on the coast and a number of *bandeirante* (settlers based on the captaincy of São Paulo) slaving expeditions generating indigenous migrations and intensive processes of ethnogenesis during the first two centuries of settlement. In fact, the absence of references in primary sources to major conflicts with indigenous groups in the main mining areas of Minas Gerais in the early eighteenth century seems to have been a product of the human devastation produced by the slaving expeditions of the previous century in the region. Indigenous labourers were fundamental in the initial phase of gold mining in Minas Gerais, but most of them were brought by *bandeirantes* from the outside (some of whom perhaps returning to their original homeland after being captured a few decades earlier in those previous expeditions). A large number of

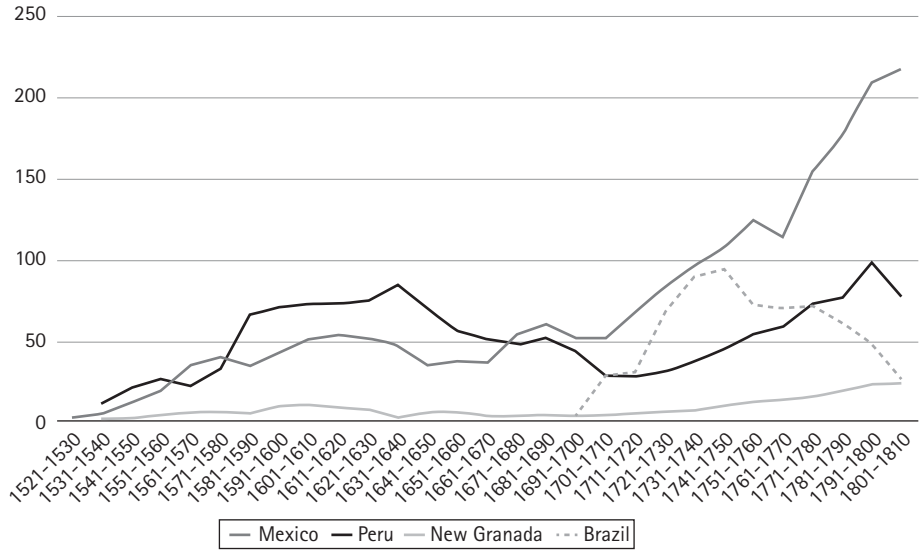


FIGURE 10.2 Estimated total gold and silver production, 1521–1810, in millions of pesos. Graph created by the author using data from John J. TePaske, *A New World of Gold and Silver*, Atlantic World (Leiden, Netherlands); v. 21 (Leiden, Netherlands; Boston: Brill, 2010), 21.

unsubdued groups nonetheless continued to make the expansion of settlers into new areas a contested process. The Botocudos, for example, were still feared by prospectors in the late nineteenth century.[59] The difficulties of the riverine routes to Mato Grosso were complicated by attacks from groups such as the horse-riding Guaicuru and, especially, the Paiaguás, who had incredible navigation skills and launched a series of attacks against expeditions coming out of Cuiabá carrying gold (occasionally trading this gold with Spaniards living on the other side of the Paraguay river). A punitive expedition with 842 men killed many Paiaguá Amerindians in 1734, but attacks continued to take place in the following decades. More peaceful Amerindians, on the other hand, like the Pareci, were enslaved by settlers to work in the goldfields of Mato Grosso[60]

The violent subordination of Amerindians during the colonial era allowed for the incorporation of their knowledge and technologies, a process that would later also be found in other gold booms such as in the incorporation of Maori knowledge in New Zealand mining or of First Nations in Klondike, Southwest Canada.[61] Native Brazilians did not develop mining traditions comparable to those found in the Peruvian Andes, Central Mexico, Colombia, and the highlands of Venezuela and Guyana, where archaeologists have uncovered a variety of gold, silver, and copper ornaments and other objects such as pots and spindle-whorls (although they did participate in the wide circuits of trade that connected a number of native groups across South America).[62] Still, their geographical and environmental knowledge was a fundamental component of the many expeditions organized by the *bandeirantes* that would ultimately lead to the gold discoveries of Minas Gerais, Mato Grosso, and Goiás at the turn of the century.

Some of the main routes leading to the mining zones had actually been developed by Amerindians centuries before the European invasion.[63] The canoes that were used in riverine routes were built using the exact same native method: 'in choosing the building material, and in the navigation system itself', Buarque de Holanda argues, 'one can say that the European influence is completely absent'.[64] Moreover, Amerindian and African technologies that had been incorporated by settlers in the Caribbean, New Granada, New Spain, and Peru certainly made their way into Brazil since mining experts were brought not only from Germany but also from the neighbouring mining zones of Spanish America to explore the possibilities offered in the Portuguese colony (and there were a few gold findings around São Paulo and in the region between Iguape and Paranaguá before the eighteenth-century gold boom).[65]

Consequently, mining techniques were usually very similar to those employed in Spanish America in previous centuries, a product of this integrated history of the continent. The main form of extraction was placer mining in rivers, their margins (the *tabuleiros*), and in deposits that were formed in higher parts of the valleys when rivers ran higher and were later exposed by geological changes (the *grupiaras*). Most placer mining was relatively simple, with practices that can still be found in Brazil and other parts of the world today. Using the *bateia* (a conical pan), slaves washed and separated the higher-density gold from the gravel with oscillating movements. This was particularly profitable in smaller and calmer rivers that had significant amounts of the yellow metal within the superficial gravel of their riverbeds, as was the case in the initial years of the Minas Gerais gold boom. Some debate has taken place on the origins of the *bateia*. Different forms of this tool can be found across the world and there are a few—albeit fragile—indications that Amerindians may have developed their own *batea* in Hispaniola (which would reinforce Bigelow's argument on the incorporation of subaltern technologies already in sixteenth-century Hispaniola), while there has been some suggestion that a version of the *bateia* used in eighteenth-century Brazil was brought from Africa.[66]

Deeper rivers, with much of the gold located below sterile layers, demanded costlier techniques, such as shifting their course and building dams and other structures to slow down the flow. On the *tabuleiros*, miners excavated large rectangular or circular holes, known as *catas*, to reach the gold gravel located under various sterile layers. In these cases, there was some investment in technologies such as the *rosário*, a hydraulic wheel to drain the water from the *cata*. The exploitation of gold in the *grupiaras* in turn depended on the use of water from other parts to remove the material, with the construction of canals and large tanks to wash the gold. The opening of *catas* and galleries in the hills to explore deposits of 'primary gold' also took place over the eighteenth century, but at much higher costs than the other methods and for this reason dependent on the very careful consideration of potential mines.[67] The centrality of water for some of these forms of mining eventually led to conflicts over the resource and the passing of legislation regulating access to it.[68] All these different mining practices coexisted, but the latter became more common in the older areas as the placer deposits in rivers became exhausted.

As the horizontal gold frontier had to move into new areas in search of unexplored deposits, those with greater means also made investments in an incipient vertical gold frontier that would be more fully developed in the following century. Gold mining in Mato Grosso and Goiás, as was also the case in Minas Gerais, was mostly placer mining, but some more expensive methods were occasionally employed here as well (although not always successfully). In a couple of paintings made during Alexandre Rodrigues Ferreira's famous scientific expedition, we can see a large number of enslaved Africans working in the riverbed of a river that had its course changed, a process that demanded a large volume of labour.[69] In Goiás a similar attempt was tried with the Maranhão River to no avail. Miners also tried to build a sluice and aqueduct to the Morro do Clemente without success. As Mary Karasch argues:

> Both projects ultimately failed . . . but they mostly involved the massive mobilization of enslaved workers, who dug great pits, toted what must have been tons of dirt, and sorted gold from gravel. When Cunha Matos saw the scale and size of the excavations and abandoned mines in the 1820s, he concluded that the massive earthworks must have been built by Cyclopes (mythical giants). But they were built by ordinary Africans, many of whom died due to accidents, hunger, disease, and heat prostration.[70]

The different technologies used in mining also led to different forms of labour organization. The wealthiest miners had managers and overseers working for them, usually family members whom they could trust. These managers could organize slaves in groups according to the different activities to be performed in the property. Other hierarchies could also be found among the slaves themselves. In New Granada, the '*capitán de cuadrilla*' was a slave responsible for supervising the other captives, distributing food, and collecting and delivering the weekly volume of extracted gold to the overseer. As Flávia Maria da Mata Reis notes, there are no explicit references to such a character in the Minas Gerais documentation, but signs of a similar hierarchical organization with a few privileged slaves abound.[71] Figure 10.3 offers a good representation of labour in a *tabuleiro*, with slaves working under the supervision of an overseer. On the right, the slaves move down with empty *carumbés* (buckets), which then get filled with gravel and are taken up so that they can then be washed in the *canoe* (a specific platform for that end). It is also possible to note the presence of a couple of enslaved women, evidencing in this case the absence of gender divisions in mining. Other images of that period—such as *Lavage du Minerai d'Or* by Rugendas—indicate some forms of gender division in the various activities performed in the goldfields.[72] In any case, gold mining in Brazil (as had been the case in Spanish America) had a larger percentage of women labouring than in the gold booms of the late nineteenth century and beyond.[73]

Less wealthy miners generally relied on the activities of their slave *faiscadores*—prospectors who frequently worked without any supervision in abandoned mines and in less explored or unknown rivers and hills. Not coincidentally, many new gold sources



FIGURE 10.3 Gold mining in Rio das Velhas.

Source: Moura, Carlos Eugênio Marcondes de. *A Travessia da Calunga Grande: Três Séculos de Imagens sobre o Negro no Brasil (1637-1899)*. São Paulo: Editora da Universidade de São Paulo, Imprensa Oficial, 2000. Modo como se extrai o ouro no Rio das Velhas e nas mais partes dos Rios, unknown author, *c.* 1780, watercolor, format 34,5 x 43,5 cm. Fundo Yan de Almeida Prado, Instituto de Estudos Brasileiros, Universidade de São Paulo.

were discovered by slaves throughout the eighteenth century. These slaves had some unique mobility and opportunities for accumulating capital since they could keep part of the gains for themselves (and some experience with the manipulation of gold may have helped them here). In New Granada, freedmen who worked as itinerant miners were called *mazamorreros*, but slaves were also allowed to mine for themselves on Sundays and other holidays. Other arrangements in Brazil included the rental of slaves for other miners (or the rental of mines to be explored by other miners), at times including the payment of wages for the rented slave. These different arrangements and the opportunities they created for some accumulation by the slaves themselves reflected on significant numbers of manumissions in the gold-mining societies of the Americas, whether one looks at Brazil or New Granada.[74] This mobility also created a number of opportunities for slaves to escape, with many of them creating maroon communities from Minas Gerais to Mato Grosso. These maroon groups were themselves an active part of the expansion of the gold commodity frontier as they found new sources of the yellow metal, exchanging it for guns and other goods. Most of these communities, however, were small and somewhat

integrated into the larger slave societies of their time, with constant exchanges with the enslaved and free populations of mining towns. Despite some occasional fears among local elites, one of the most striking features in the history of gold mining in eighteenth-century Brazil is the absence of large-scale slave rebellions. Miners, in fact, armed many of their slaves and put them to work as their personal militias. These were very stable slave societies, and this stability was largely a product of this mobility.[75]

Labour conditions in gold mining were harsh. The predominant placer mining in rivers with *bateias* depended on slaves spending most of their days with the lower half of their bodies under cold waters while the upper part was exposed to the sun. Diving to grab gravel from the bottom of rivers was also a common practice (particularly assigned to women in New Granada, according to Robert C. West, with the aggravating circumstance of potential attacks from carnivorous fishes known as *dentón*).[76] Fevers and dysentery from heat stroke along with tuberculosis caused by long periods of time spent under the water were common diseases, while the repetition of movements and positions demanded by mining produced many physical problems. Moreover, the calmer waters for washing the gold also favoured the spread of malaria and other diseases. Mining tunnels in turn could produce respiratory problems along with the collapse of structures and other accidents. In short, mortality was rampant, thus stimulating the reproduction of the transatlantic slave trade.[77]

The environmental impact of the gold-mining frontier was considerable. According to Warren Dean, at least 4,000 km² (1,544 square miles) of the Brazilian Atlantic Forest was destroyed by the mining of gold and diamonds—a number that would significantly increase if we considered the economic space of gold as a whole.[78] Burning down the forest on hills and the margins of rivers was one of the earliest steps to facilitate the searching for gold deposits and the building of mining structures. The silting of rivers with the waste produced by mining was a common feature, along with the shift of their courses and other transformations of the landscape.[79] Dean also mentions the unknown effects of mercury in the amalgamation of gold, but its use—more specifically the mercuric chloride ($HgCl_2$), known as *solimão*—was largely restricted to the mints and smelting houses (and in this sense his comparison with smelting practices in small-scale mining in the contemporary Amazon is misleading). Still, despite problems of supply, mercury and its variations were used in the official mints and smelting houses, producing vapours that had human and environmental consequences that have not been fully assessed in the Brazilian case yet.[80] Mato Grosso and Goiás never had a mature mining society comparable to Minas Gerais, but both had their own smelting houses as well. As we have seen, rivers also had their courses shifted and wider landscape changes were produced by mining in those regions. The broader economic space of gold also produced a number of environmental changes. In his description of the monsoons that connected São Paulo to Mato Grosso, Sérgio Buarque de Holanda shows that the enormous 12- to 13-metres-high trees that were used to build canoes for those trips to the mining areas became increasingly rare in the Brazilian hinterland by the late eighteenth century, forcing men to spend many months in the forests searching for these giants.[81]

By the end of the eighteenth century the volume of gold extracted in Brazil had dramatically declined, generating a vast debate on the nature of this crisis and the possible solutions for it. Demand for gold continued high as other countries besides England established the gold standard in their own economies in the following decades, with the gold frontier moving to other parts of the world such as the western United States, Australia, New Zealand, and West and South Africa, among other places, which depended on the circulation and use of new technologies such as hydraulic mining. Scholars of the nineteenth-century gold rushes have outlined a 'long transformation from an artisanal occupation to a technologically sophisticated metals industry'.[82] Still, the long-term history of gold mining in Brazil complicates this picture. The best example of a new, advanced gold-mining frontier can be found in the history of the Saint John Del Rey company, near Nova Lima, Minas Gerais, which became the largest gold mine of South America by the 1860s, with fourteen thousand slaves working in all aspects of its operations.[83] Most other attempts at the time, however, were much less successful, such as those in the Amazon, where maroon groups were mainly responsible for the first gold findings, and all large companies that came in their wake basically failed.

Gold mining continued at reduced and declining rates, especially in the form of small-scale informal mining operations that came to be known as *garimpagem*. By the second half of the twentieth century, after a significant rise in prices in the international market caused by the oil crisis of the 1970s, the gold frontier re-emerged more strongly, with growing tensions between this informal small-scale mining sector and big national and multinational companies.[84] Eager to control the access to rich mining zones, big companies tended to depict the informal mining sector as backward. But it has become increasingly clear that this is one of the most effective ways of extracting gold in the Amazon, leading to blurred frontiers between these different mining sectors.[85]

Extractive Frontiers and the Capitalist World Economy

A plurality of forms has been the hallmark of Brazilian mining in the long run, making any linear narrative of technological transformation much more difficult to be applied here. Moreover, longue durée aspects of the gold commodity frontier can still be seen at work: vast appropriation of natural resources, brutal exploitation of racialized labour, violence against indigenous peoples, and environmental degradation.

The expansion of global trade and the many financial revolutions that transformed Europe in the early-modern era were partly made possible by the labour of Amerindians and Africans in the mining frontiers of the early-modern world, which were mainly located in the Americas. In the eighteenth century, one of the flipsides of the emergence of London as one of the greatest financial capitals of the world was

the labour of enslaved Africans who had to dive in the cold waters of Minas Gerais to grab much of the gold that would ultimately end up in British banks. Moreover, the large-scale human suffering that marked the history of mining in the Americas was intertwined with intense environmental degradation. The contamination of water streams as a consequence of the use of mercury in refining started in the colonial era. Disasters such as the rupture of a dam in seventeenth-century Potosí, with a large number of deaths and widespread destruction, as described by Bartolomé Arzáns de Orsúa y Vela, or the many collapses of gold and silver mines that can be found in the historiography also took their toll. While some debate has taken place on the environmental impact of Iberian colonialism, with some scholars arguing that the Mediterranean agro-system that was established may have been beneficial for colonizers and colonized alike, the case of mining is a completely different story as some scholars have shown.[86] Depletion and landscape change have been hallmarks of these enterprises in the long run, generating a large number of problems across Latin America that continue to shape the continent to this day.

The dependence of modern economies on mineral resources and the many challenges surrounding their extraction—from the impending exhaustion of some of them to broader conflicts involving governments, companies, and local communities—has only increased since the colonial era, as a look at any contemporary electronic device quickly shows. The iPhone 6, for example, has more than thirty different minerals extracted from different parts of the world in its composition. At the other end of the contemporary act of sending an email we can find a wide range of mining processes spread across the world, involving different labour arrangements, a frequent number of conflicts and tensions, and vast environmental degradation.[87] A similar case can be made for many other aspects of the contemporary world, from the iron used in the construction of cities to the coal that provides energy for many of them. New technologies allowing for the extraction of ever larger volumes of resources—such as mountaintop removal—have also produced ecological devastation on an unprecedented scale. The Pico do Cauê in Minas Gerais, for example, was basically destroyed for the extraction of iron ore during the twentieth century; it does not exist anymore. The great Brazilian poet Carlos Drummond de Andrade, who grew up in the area, once wrote of the 'longest train in the world' that carried his history, his childhood, and his life 'pulverized in 163 railroad cars of ore and destruction'.[88] Disasters in mining enterprises continue to be part of this history as the Mariana dam disaster of 2015 (with nineteen deaths, the disappearance of an entire district, and the pollution of the Rio Doce) or the Brumadinho dam disaster of 2019 (with 270 deaths and equally devastating environmental impacts) clearly show, to remain only with examples from Minas Gerais. Scholars and activists have been documenting similar processes across the world.[89]

Future comparative and global histories of early-modern mining may bring new insights to the discussion by moving beyond the issue of bullion flows that has occupied much of the historiography. By the late eighteenth century, for example, at the same time that colonial authorities in New Spain were establishing new coercive policies that limited the autonomy of labourers, Japanese elites were coercively recruiting labourers

in the cities to work in the silver mines, especially to drain the water that constantly flooded the mines.[90] Whether this was merely a coincidence or a reflection of structural world developments remains to be explored by global historians of mining. But this example also shows how the history of mining technologies and environmental change in the early-modern era may also profit from a more global and comparative take. The lack of water drainage technologies in the Japanese silver mines led to the use of men and buckets to carry the water out of the mines—an example that seems to support Sugihara's famous comparison of capital and labour in Europe and Asia.[91]

A growing public and scholarly interest in extractive processes has appeared in contemporary discussions, not only as part of the old concern with the depletion of resources but especially because of their environmental impacts and consequences for human and extra-human life. The history of extractive frontiers—and the concept of commodity frontier is particularly important here—can contribute to this debate by showing the local human and environmental dimensions of the wider global developments that have made the modern world. In this sense, one of the greatest challenges for the future scholarship on the subject may be to integrate in more effective ways the gains of the extremely rich and detailed local studies of the last half century with the broader questions that had inspired an earlier generation of scholars and that resonate with the contemporary global crisis that shapes the world today. The extraction of non-renewable resources in a finite planet is one of the main factors in the current global environmental crisis. Outlining its development over time can contribute to the understanding of the systemic and long-term nature of our problems.

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CHAPTER 11

TOWARDS A TECHNOLOGICAL HISTORY OF COMMODITY PRODUCTION

DAVID PRETEL

Many of the best global histories have used the story of a particular commodity as a window onto broader issues, usually trade or consumption and sometimes politics, labour, or the environment.[1] Achieving a thorough understanding of global history also requires paying attention to the technological dimension of commodity production. Generally speaking, the idea is that investigating the skills and techniques required for extracting, processing, mobilizing, and manufacturing commodities may help explain the significant changes that have occurred in the global geographies of production. In many cases, tools, machines, and technical expertise enable the commodification of subsoils, forests, seas, and lands; in others, they increase the scale and efficiency of production. As Sidney Mintz observed in 1985, in his classic book *Sweetness and Power*:

> the chemical and mechanical transformations by which substances are bent to human use and become unrecognizable to those who know them in nature have marked our relationship to nature for almost as long as we have been human. Indeed, some would say that it is those very transformations that define our humanity.[2]

Yet a lot of this global history of production remains to be written. The complexity of technological interventions along commodity chains requires closer attention, in particular the importance of industrial processing in the colonial, post-colonial, and tropical worlds.

The technological dimension of commodity chains has attracted a fair deal of interest for quite a long time. Historians have produced a substantial body of research on new maritime and land transport technologies as decisive factors in lowering the costs of freight in long-distance trade, especially since the industrial revolutions. As the literature has made clear, railways and steamboats during the nineteenth century, then

trucks and airplanes during the first quarter of the twentieth century, strengthened pre-existing commodity circuits and created new ones by making them economically viable.[3] However, the general role of technology in global commodity production is more uncertain and less linear. Production technologies have been explored from a variety of angles, either as part of broader economic histories or, more often, as scattered studies of selected commodities that rarely provide general insights.[4] Much work has concentrated on how seemingly raw materials were manufactured in the modern industries of western Europe and the United States, ignoring all too often the technical artefacts and material practices of extraction, processing, refining, and manufacturing in Latin America, Africa, and Asia.[5]

Not only historians but also anthropologists and archaeologists have traditionally concentrated on the production of major and strategic global commodities, from silk to cotton, silver to copper.[6] Some recent scholarship, however, has alternatively concentrated on the production of relatively less known or minor commodities—such as manila hemp, the barbasco root, or tapioca—capturing additional global connections and flows.[7] Certain farm and field technologies (reapers, ploughs, threshing machines, and tractors), general-purpose technologies (steam engines, railways)[8], and the innovations of the Green Revolution (fertilizers, pesticides, irrigation) have unsurprisingly received more scholarly attention than others (hand-tool implements, small-scale refining, tapping techniques), including more recent agricultural biotechnologies (transgenic crops, tissue culture).[9] Over the past few years, there has been a renewed interest in mining, with scholarship providing thorough studies of technologies of mineral exploration, mine operations, and practices of refining in localized contexts and environments.[10] The study of transnational networks of experts producing commodities is also a topic that has attracted a fair amount of scholarly interest for quite a long time, with recent works providing a corrective to diffusionist interpretations.[11] Nevertheless, with a few exceptions, neither experts nor technologies of commodity production have been studied in a comparative way.[12] Whereas the majority of scholars have explored technology trade and transfer to resource frontiers, only a handful of scholars have investigated distant technological connectivities and global production interdependences among frontiers.[13] Even less common has been any systematic attention to technological exchanges or expert itineraries within the Global South.[14]

Building on this dispersed and multidisciplinary scholarship, this chapter addresses some of the ways that technological factors—innovation, technological persistence, and the rise of hybrid or creolized technologies—have had a transformative effect on the production of export commodities. To this end, general historiographic reflections are combined with a wide range of case studies spanning the past six centuries—although admittedly with a strong predilection for Latin American commodities and the industrializing nineteenth century. Three interrelated themes are examined. The first section offers a production-centred view of commodity frontiers rather than a comprehensive examination of all the technological dimensions of commodity chains, beginning with examples of commodity production at source, either onsite at agricultural fields and mines or relatively nearby in the territory of production. Particular attention

is given to sugarcane and silver—the foremost global commodities from the sixteenth through to the nineteenth centuries—which together provide a perfect illustration of industrial processing in the territories of resource extraction themselves. The second section focuses on the broad 'technological landscapes' of commodity production—the wide range of techniques, materials, and skills in use for the extraction and treatment of natural resources—to demonstrate the coexistence of old and new technologies as well as the collaboration of local and imported expertise.[15] This section discusses how the rise of plantations and mining districts led to the expansion of worldwide circuits for the exchange of tools, machines, and materials for commodity extraction and processing. It also expands on the foundational role of expert labour in adapting technologies to local conditions, resulting in creole innovations and technological fixes on the ground. In emphasizing agency, this section sheds light on the role of local knowledge and skills, including indigenous expertise, in shaping commodity cycles. The third part of the chapter turns to an analysis of technological connections and impacts across distant localities. The aim here is to appraise the uncertain role of modern industrial and chemical innovations conceived in one corner of the world—including new processing methods and artificial substitutes—on the demand for tropical commodities derived from the other corner of the world. Here the focus is largely on hard fibres and rainforest products as they illustrate the value of incorporating the study of far-flung technological connections into global commodity histories. Moreover, this section shows that changes in global technological connections not only transformed commodity production in the global countryside but often recreated exploitations and were a source of socio-political conflict. The chapter concludes by highlighting three arguments that can serve as the basis for a renewed technological history of global commodity processing.

Technologies of Commodity Production

Historians know far more about the trade and consumption of commodities than we do about their extraction and production. This is especially the case for common products imported from the Global South. The usual emphasis on the raw condition of many export commodities discounts the complexity of resource extraction and primary refining, thereby giving rise to a dichotomy between basic and manufactured products. An open question thus remains whether the common disregarding of the processing of commodities before export justifies or reinforces unequal commercial exchanges at the international level. Indeed, by geographically divorcing extraction from manufacturing, the commonly held view of commodity production as an unskilled task ignores the fundamental knowledge required to extract and appropriate economic content from ecological resources.[16] In consequence, the framing of extracted resources as raw materials disregards the commodity-driven imperatives for transforming nature into commercial

products as well as the variety of tools and techniques that make this process possible. It is true that the industrial processing of commodities in colonial and post-colonial societies sometimes emerged in resource enclaves largely disconnected from the wider national or regional economies. Yet, the more closely we examine technological life at the early stage of commodity production, the more commodity frontiers emerge as dynamic places of knowledge generation where the contributions of locals were vital.

The extent of primary processing prior to shipment has varied from commodity to commodity. It is often invisible as historical trade statistics have labelled many processed items as raw materials.[17] It has also been uneven over time and in different settings. Admittedly, a fair share of industrial treatment of goods happened far away from plantations, farms, mines, and seas. In the case of certain significant commodities, however, industrial and capital-intensive technological advances arose before the commodities were transported to their respective markets. The biological make-up of various plants and the chemical composition of various mineral ores dictated the specific types of primary milling, refining, preserving, or drying these commodities would undergo. As Daniel Headrick has shown, some minerals, such as copper and silver, required complex deep-mining methods and were, for the most part, smelted or refined in mining districts or in a relatively closed area until at least the nineteenth century.[18] Others such as bauxite, gemstones, gold, and diamonds were exported raw or after a simple operation (e.g. cleaning, sorting, cutting, and polishing), although there were cases, typically in production regions like Africa, in which these materials underwent more thorough processing.[19]

Agricultural and animal products, and in general foodstuffs, have been processed on site depending on their perishability and to ensure that they can be preserved for more extended periods, a topic extensively studied by Susanne Freidberg. During the nineteenth century, sugar cane, fibres, meat, and fish as well as some fruits, seeds, latexes, and oils, among others, were at least partially processed at source to avoid spoilage.[20] Precious metals and lumber, for their part, have since early-modern times undergone initial processing to reduce bulkiness and weight, thereby facilitating in situ storage and savings in shipping costs. By contrast, Brian Black has shown how crude oil was cheaper to stock and transport before refining.[21]

Although the historiography has identified the biophysical and environmental imperatives of commodity production, it would be wrong to solely concentrate on these material factors as they matter more in some commodities than in others. Primary processing has also been bound to contingent socio-economic factors limiting resource extraction. This, in turn, explains why the same commodity may be subject to different degrees of processing in different locations and contexts. Political decisions, institutional reforms, and imperial policies have also influenced the degree of industrialization of commodities in export economies. For instance, as William Clarence-Smith observes, industrial processing in developing countries declined during the interwar period in response to increasing imperial protectionism and autarky.[22] In some instances, the level of taxation levied on processed and semi-processed products has discouraged on-site processing.[23] The availability of energy, capital, and labour has also affected the degree

of manufacturing that occurs prior to export. For example, the coupling of resource endowments and cheap labour explains the primary processing of natural fibres as well as the drying and milling of coffee at source.[24] Another important factor is the technological capacity of the 'raw' material's place of origin, including the availability of processing machinery, skilled labour, and adequate transport and communication facilities. Regarding the latter, the scale of dependence and the impact of foreign interventions in export processing throughout modern Africa and Latin America has long been controversial.[25] While company towns and export-processing zones may have attracted capital, and favoured technology transfer, they have also been areas controlled from abroad that enjoyed tax benefits and loose labour regulations.[26]

Silver production clearly illustrates the centrality and technical complexity of commodity refining in mines and nearby areas.[27] After all, as Dennis Flynn and Arturo Giráldez have shown, the continuous production and flow of this metal was the backbone of economic globalization between the sixteenth and early nineteenth centuries, when 'Spanish' silver coins operated as the international trading currency.[28] During this period, 70–85 per cent of the world's silver was extracted and refined in Spanish America, due not only to the abundance of this region's silver deposits but also to the development of a new mercury-based refining technique first implemented in Upper Peru from the 1580s onwards.[29] Unlike gold, silver requires intense work to both extract and refine. As in the case of other metals, the bulkiness and weight of silver ores requires on-site refining as transporting the crude rock would be extremely inefficient and expensive.[30]

In the New World, and during the early-modern period, the excavation of mines and the extraction of ores were accomplished with heavy hand tools. Mines were tunnelled, and the mineral transported to the surface, by a large labour contingent. Subsequently, stones were crushed using grinders and water-powered mills that transformed the rock ores in powder. Finally, the process of silver refining was performed either by the traditional smelting process in the presence of lead or, more often, through an amalgamation technique using mercury. Many hands were necessary for grinding the rock and refining the silver with these toxic metals. Labourers—many of them indigenous people and African slaves subjected to conditions of servitude—worked in precarious and unhealthy conditions for long hours. Animals also provided much of the labour in these silver mines.[31] Additionally, silver coins were frequently produced using local techniques in Spanish American mints located in, among other places, Lima, Potosí, and Mexico City.[32]

The community of refiners (*azogueros*) in and around Potosí, together with a large contingent of free and unfree workers, effectively changed the course of the industrial-scale metallurgy of silver ores in the New World. Once a tiny hamlet, by the 1570s Potosí—a city perched 4,000 meters high in the Andes—had become a metropolis whose population would top 100,000 by the end of the century. It was a cosmopolitan centre, inhabited by a wide swathe of nationalities and renowned for its ostentatious consumption of imported goods—though it retained the air of a frontier mining town, albeit one fuelled by the riches of its silver production.[33] Potosí not only had large silver

deposits but had become an advanced production site that favoured the recombination and codification of practical metallurgical knowledge. In the words of historian Jorge Cañizares-Esguerra, 'Potosí became the center of global silver production, the scientific capital of the Empire, and the nucleus of its scientific aspirations'.[34] By 1585, this city contained more than a hundred refining *ingenios* within its limits and immediate surroundings.[35] This was a far greater single concentration of mercury-based refining know-how than would be found in New Spain for many years. Infrastructural advancement had already come to Potosí in the 1570s, when, in order to maintain a steady flow of water to the *ingenios,* refiners introduced the design and construction of a major water-supply system.

Saul Guerrero and others have discussed how the recipe for silver refining in use between the sixteenth and nineteenth centuries was distinctively Creole as it rested on local experiential knowledge circulating within the mining communities of the viceroyalties of Upper Peru and New Spain.[36] While some silver-refining techniques had been discovered and used in Europe earlier on, it was in the city of Potosi and its surroundings that the mercury-based refining method of silver sulphide ores was put into a large-scale practice.[37] Numerous improvements in tunnel excavation, mine drainage, crushing of rocks into powder that could be mixed with mercury, industrial architecture, and the minting of coins were likewise conceived in silver mining districts and manufacturing sites (*haciendas* and *ingenios*) in Spanish America. Moreover, parallel to rising silver production were improvements in the hazardous techniques of refining, storing, and transporting mercury. Obtained from mines in Almadén, Spain, and Huancavelica, Peru, mercury was a basic input for refining silver in the Hispanic New World.

The refining recipe calling for mercury was not essential, although it was undeniably suited to the silver sulphide ores of Mexico and the Andes. While silver extracting by smelting was still viable, the introduction of mercury into the refining process largely explains the profitability and enormous scale of silver production over 250 years. Such refining method was a novel technology of great economic significance but also had long-term negative effects. This is undoubtedly true for its environmental and health impacts, a question that has been discussed by, for example, Nicholas Robins and Rocío Gómez.[38] All in all, the environmental and human costs of this innovation were many because exposure to mercury had harmful effects on workers and labour animals and the large-scale use of this poisonous heavy metal contaminated soils, water, and wildlife. However, the alternative smelting techniques were likewise labour intensive and would have demanded large quantities of wood, resulting in widespread deforestation. Around the turn of the twentieth century, silver extraction using mercury was replaced by the MacArthur-Forrest process using cyanide, although the refining of silver continued to be carried out in mining districts. Since its invention in Glasgow in 1887, industrial-scale cyaniding plants have been used primarily for gold production, in large mining centres in Australia and South Africa and elsewhere around the world, as can be seen in the work of Jan Todd and Edward Beatty.[39] Large quantities of cyanide have also been used for extracting copper and zinc, with environmental impacts at mining sites that have

triggered protests and, in recent times, the prohibition of this means of extraction in some countries.

Sugar production is another example of the central role of technological advances in commodity production. Among the technological histories of tropical commodities, sugar cane stands out as the most salient. During at least the past five hundred years, sugar cane cultivation has proceeded hand in hand with the development of techniques for grinding and refining it. Sugar production involves two separate procedures: one agricultural, the other manufacturing based. Regardless of the size of the crop, the biological properties of sugar cane necessitate a certain timetable for the production process and the coordination between the two operations. The nature of the plant largely explains that substantial industrial processing takes place in or near the cultivation fields. After harvesting, sugar cane needs to be crushed and its juice refined within a short period to prevent spoilage and the diminishment of its sucrose content.

Despite these challenges, technological innovation in sugar production remained fairly limited until the late eighteenth century, with animal power as the main source of energy with which to operate mills.[40] Then, with the advent of the industrial age and steam engines, sugar cane technologies revolutionized—just years before sugar beets produced in temperate areas became a major competitor. It is important to note that, as Ulbe Bosma and Roger Knight have demonstrated, local conditions dictated the scope and scale of the mechanization of the global sugar industry, as technologies had to be adapted to plantation environments and labour regimes of producing areas.[41] Sugar cane growing (hoeing, planting, ratooning, harvesting) and industrial processing (crushing, refining) were performed sequentially within the plantation unit, which was a site of production that integrated and contained both processes. In the mid- and late nineteenth century, industrial sugar production became a truly global activity that expanded to places as far-flung as Cuba, Brazil, Java, India, and Hawaii.[42] By World War I, the industrialized sugar factory had become a global reality after an intense process of technological convergence in the manufacturing of sugar worldwide.[43]

The rise of the Cuban sugar cane industry during the mid-nineteenth century—when the island became the largest sugar producer in the world—provides a perfect illustration of the impacts of technological innovation on plantation agriculture. Successive waves of technological improvements transformed Cuban sugar mills into modern plantation factories at the cutting edge of industrial modernity. It was, in the words of Cuban historian Moreno Fraginals, a 'sugar industrial revolution'.[44] Industrialized sugar production brought steam-powered mills and large-scale capital-intensive iron machinery such as filters, defecators, boilers, condensers, clarifiers, and centrifuges into ever-larger sugar factories.[45] These new chemical and mechanical processes of sugar cane grinding and refining multiplied production and productivity. The proliferation of systems of vacuum pan evaporation in Cuba exemplifies sugar technological transformations during mid-nineteenth century, with its benefits (increased efficiency and economies of scale) and costs (higher investment and need of expert labour). With the industrialization of sugar also came new production infrastructures, from warehouses to transport technologies.[46] The early diffusion of railways in the late 1830s had already facilitated the

connection of cane fields with factories, and factories with ports, paving the way for an unprecedented scale of sugar planting.

A major feature of the technological surge of the Cuban sugar industry in the mid-nineteenth century was its costs and challenges. New technologies introduced on Cuban plantations were not only expensive but demanded a heavy use of fuel and water, which in turn had devastating environmental effects on the island's rainforest.[47] Meanwhile, in their race for wealth and social status, Cuban planters were investing heavily in cutting-edge sugar machinery—such as the massive refinery system of vacuum pan evaporation invented by the French chemist Charles Derosne—thereby plunging many producers into debt or bankruptcy. Moreover, the great bulk of agricultural tasks on sugar plantations continued to be labour intensive, requiring ever-larger numbers of hands as well as draft animals. The paradoxical and tragic coexistence of capitalist innovation and enslaved labour has stimulated intense scholarly debate over the past several decades. As Dale Tomich, among others, has suggested, technological advancement was not only the condition underpinning the expansion of the sugar industry in Cuba and Brazil but also of the rise of a 'second slavery' in the Americas during the nineteenth century.[48]

Technological Landscapes

It is possible to argue that new infrastructure and logistical capacities (including improvements in packing and storage) profoundly affected the transnational production networks—made up of workers, tools, and equipment—that emerged during the second half of the nineteenth century and followed the trails blazed by commodity trade. More broadly, it is also possible to argue that, from roughly the 1850s, the bulk of the modern machinery used for agricultural and mining production in the Global South was imported from the United States and Western Europe—although from the end of the nineteenth century, Japan was also developing the construction and export of processing machinery, such as for silk reeling in Chinese factories.[49] Indeed, when returning from industrial Europe or the United States, steamships brought manufactured products, including machinery and tools for harvesting and extraction, to mines, plantations, and rainforests. Even more broadly, it can be argued that the expansion of agricultural and mining technologies was enabled solely by the participation of a large transnational contingent of smelters, machinists, botanists, and agronomists who had built professional careers at mining districts, plantations, and agricultural stations in Latin America, Africa, and South Asia.[50] This migration of experts to commodity frontiers occurred alongside the faster and more reliable shipment of goods.

Yet, the sole concentration on transnational experts and global innovation networks offers an incomplete narrative of commodity production. Rather, the technological landscape of commodity production in the nineteenth century (and earlier) was a commingling of local and foreign artefacts, knowledge, and skills. Without denying the importance of international technology transfers, it is also true that technologies

of commodity extraction and processing were not passively imported from abroad but were highly location specific. In other words, those working at commodity frontiers, from locals to foreigners, operated under precise production conditions, both socio-economic and ecological, that required further adaptations and improvements of machines coming from elsewhere. Major technical hurdles had to be overcome on the ground, with primary sectors often resorting to local knowledge and skills that had originated in the commodity production sites themselves.

In the case of sugar production in Cuba during the mid-nineteenth century, new infrastructure no doubt had the effect of stimulating US, British, and French commercialization of technologies on the island. Machinery makers based in, among other cities, Glasgow and New York directly supplied Cuban plantations with tools, equipment, machinery, sketch plans, spare parts, and duplicates.[51] It is, however, worth pointing out that complex sugar machinery required operation and supervision by skilled machinists working on the ground who could maintain the machines, fix technical breakdowns, and change spare parts. Other experts, from chemists to railway engineers, were necessary for the standardized production and export of refined sugar.[52] Cuban sugar plantations therefore became spaces of technological experimentation and engineering innovation where locals collaborated with transnational engineers, industrialists, and machinists from Europe and the United States.[53] Similarly, local, regional, and global migrant networks developed in other sugar-producing regions in the Caribbean, Brazil, and Asia.[54]

Sugar innovation networks appear to have been vital in the transfer of crushing and refining technologies as well as in the rise of experimental cultures that adapted technologies to tropical conditions. In the early twentieth century, when a new wave of mechanical and chemical innovations for the mass production of sugar swept around the world, experts working on the ground remained a crucial part of labour force.[55] As demonstrated by recent literature, as in the work of José Ortega, Creole inventions and technological developments conceived in the plantation space seeped back into European and US industries during the nineteenth century and early twentieth centuries.[56] Thus technical experiments and improvements in sugar affected the course of industrialization in the Western heartlands. Networks for the trade and transfer of sugar technologies no doubt also grew among producers across the Global South, beyond the great industrial powers, although it is a neglected topic that merits closer attention in the future.

While transnational expertise has been instrumental in commodity-frontier expansion throughout Asia, Latin American, and Africa, it is localized expertise that has driven the development of commercial agriculture, forest extraction, and mining since early-modern times.[57] During the last decade, the historiography has made significant progress in the study of indigenous expertise, calling into question the very identity of skilled labour and the collaboration of locals and foreigners in commodity production. This can be seen in the recent work of Alma Parra and Allison Bigelow on Ibero-American mining.[58] By concentrating on local subaltern actors such as indigenous labourers and slaves, such new scholarship as that of Chris Evans, Gabriela

Soto-Laveaga, and Daniel Rood not only rewrites the history of commodity production but reconsiders the roots of knowledge and its global transmission.[59]

Historians—including Stuart McCook, John Soluri, and Sabine Clarke—have also shown that expert practices have been specific (even unique) to local economies and ecosystems. For instance, in cases of plant epidemics, the use of fungicides in commercial agricultural has varied from producing country to another and has been shaped by the responses of localized experts (plant breeders, agricultural chemists, farmers) working on the ground within the precise ecological, economic, political, and social contexts.[60] That said, the transnational migration of European and American experts was clearly a critical element in the penetration of the global countryside. Take, for instance, the frontier infrastructure and tropical stations established by foreign civil engineers and agronomists who thought of themselves as practical missionaries of civilization and modernity.[61]

Sustained attention to the technological landscapes of commodity production also underlines the centrality of local knowledge systems and modes of production. The enduring nature of traditional production technologies serves as a counterpoint to narratives fixating on innovation and industrial advancement. In general terms, and with some exceptions, innovation-focused historians have underestimated the importance of old agricultural and mining methods, knowledge, and skills at global resource frontiers and in petty commodity production.[62] In this regard, the global history of the coexistence of old and new technologies, as proposed by David Edgerton, may well be expanded to include the global study of commodity production, as the work of Francesca Bray, among others, demonstrates.[63] These latter studies clearly point to the benefits of developing new ways of approaching the technological history of commodity production. A core argument of this scholarship is that, in modern times, commodity production has been characterized not only by the introduction of industrial technologies but also by the ubiquity of local technologies of production that have relied on traditional knowledge and manual and animal labour. Researching such localized technological landscapes requires broadening historical sources and considering oral and visual material. Visual documentation (photographs, paintings, plans, technical drawings) can give us some insights into the technological life in commodity frontiers and the coordination and timing of commodity processing.[64] However, difficulties arise when moving back from writing the local histories of technology to the reconstruction of larger global processes of technological change. The challenge for historians is to preserve the contextual specifics of local processing while seeking to capture how technologies transform when in circulation.

In the case of silver production in Spanish America, pre-Hispanic smelting technologies continued to be used throughout most of the colonial period, coexisting with the more recently introduced process of mercury amalgamation.[65] Indeed, native wind furnaces and metallurgic practices continued to be used, with certain variations, in the largest mining districts, such as Potosi, until at least the late seventeenth century.[66] As archaeologists have demonstrated, small-scale production of silver using traditional

technologies represented a considerable part of the silver produced in the New World. One obvious explanation is that native silver technologies proved less costly when refining small quantities of ore. The literature also suggests that not only did small-scale pre-Hispanic smelting endure and coexist with mercury amalgamation, but small silver producers creatively modified new refining techniques through fixes that better suited their needs.[67] Indigenous people, for example, adapted modern reverberatory furnaces to produce silver on a smaller scale. Meanwhile, as D. A. Brading shows, much of the labour in the Spanish American silver economy was carried out by mules, which assisted with the pumping of water, transportation, and hoisting and crushing of ore.[68]

Similarly, traditional methods of producing sugar were never completely replaced by mechanized mills during the nineteenth century. In Cuba—as in other producing regions such as Java, Brazil, West Indies, and Hawaii—traditional technologies coexisted with modern ones, and small-scale sugar production was common.[69] Some producers eschewed innovation and remained reluctant to invest too heavily in new machinery—partly due to the difficulty in carrying out repairs or obtaining spare parts. Concomitant to the abolition of slavery in Cuba and Brazil in the 1880s, the sugar industry entered a new phase during the last two decades of the nineteenth and early twentieth centuries with the transition to a so-called central factory system for the centrifugal production of sugar. The introduction of capital-intensive, continuous-process innovation went hand in hand with a new corporate organization, which, in turn, increased the size of industrial sugar complexes. Despite these radical technical transformations, smallholders' sugar production and more sustainable and diversified farming continued at the margins of central sugar factories. Moreover, as Jonathan Curry-Machado has shown in his study of a region in the centre of Cuba in the late nineteenth century, new infrastructure such as roads and railways also had the effect of connecting small-scale sugar producers and farmers at the margins of sugar plantations to wider regional and national trade networks.[70]

Research on commodities other than silver and sugar also reveals the role of local and non–capital-intensive technologies in resource extraction and processing. Take, for instance, the production of rice around the world or the rainforest extraction of hardwoods and gums.[71] In both these endeavours, labour-intensive methods of cultivation, tapping, and refining have been the norm, thereby perpetuating subsistence economies among peasants and forest workers. In hard fibres production (jute, henequen, hemp), traditional methods of cultivation and harvesting were likewise used during the nineteenth century alongside increasingly capital-intensive industrial refining that enabled large-scale forms of commodity production.[72] Something similar occurred with the persistence of complex hydraulic technologies, such as water pumps aqueducts, canals, reservoirs, wheels, and cisterns in agrarian landscapes.[73] Drainage technologies raised productivity and enabled the expansion of rice fields into deltas, mangroves, and flood plains around the world.[74] Such advances in intensive irrigation and drainage technologies were commonplace in agriculture centuries if not millennia before the rise of modern civil engineering.[75]

Technological Connections

Historians have typically shown that large-scale and reliable infrastructures—particularly steamships, railways, and telegraphs—revolutionized commodity production and exchange during the modern industrial age. Innovations in transport resulted in an increasing regional specialization in certain commodities, as illustrated by monoculture plantation economies and mining company towns. Civil engineering enclaves, in particular, emerged in colonized territories where export development had been carved by technological systems. Several historians—including Sandip Hazareesingh, Jim Tomlinson, and Tariq Omar Ali—have furthermore pointed out that the transport and communication revolution was accompanied by a readjustment of logistics around the world. New infrastructures were set up to mobilize commodities, from hydraulic cranes to harbours, from multistoreyed warehouses to oil pipelines. Take, for instance, the major harbour extensions and improvements introduced in the Scottish port cities of Dundee and Glasgow during the second half of the nineteenth century—largely in response to increasing imports of cotton and jute from India, where port development was likewise occurring in cities like Bombay.[76] Stuart McCook, for his part, has shown that modern transports enabled promotion of a neo-Columbian exchange between Europe and the Americas in the second half of the nineteenth century—an exchange that had direct impacts on the biological penetration of commodity frontiers.[77]

Beyond this well-known narrative of the transport revolution, commodity history can additionally shed light on a less studied but important type of technological connection among distant regions. Global history is replete with examples of how technological changes in one part of the planet have indirectly (and even accidentally) transformed commodity production thousands of kilometres away. Technological change has triggered production synchronicities and frictions along commodity chains that became particularly salient with the rise of industrial capitalism. It is remarkable how new chemical procedures, machines, and experts defined the global trajectories of countless substances over the nineteenth and twentieth centuries.[78] For instance, in the years of the second industrialization, the expansion of organic and industrial chemistry played a fundamental—if often uncertain and unintended—role in the rise and decline of goods such as dyes, sugar, rubbers, fibres, and fertilizers. Chemical innovations affecting commodity production were driven not only by the invention of new processing techniques but by the discovery or invention of artificial substitutes in industrial laboratories.[79]

The emergence of the European and American chemical industries is a central part of the histories of the so-called second industrial revolution. This period and these industries together epitomize global economic connections. Less appreciated is the technological interdependence that existed between these industries and the commodity frontiers of the tropics and subtropics. The rise of trade in tropical products during the second half of the nineteenth century sparked a frenzied race among chemical experts to develop artificial substitutes. The invention of aniline dyes in the late 1850s gave rise to a new techno-industrial trajectory that would pose a growing threat to the use of natural

colorants such as logwood and indigo, historically produced in large quantities in the Caribbean and India, respectively.[80] Thereafter, new artificial dyes would be isolated or synthesized in industrial research contexts, many in Germany or Britain, thanks to the development of organic chemistry.[81]

The technological transformations brought about by synthetic dyes would continue with innovations in fertilizers, plastics, explosives, fibres, and medicines. The success of this new techno-economic paradigm was reflected in an explosion in the number of patents for chemical inventions registered in Europe and the United States, increasingly by large companies housing trained experts working in industrial laboratories. In the late nineteenth and first half of the twentieth centuries, synthetic polymers replaced many natural polymers such as henequen, rubber, amber, or silk. Meanwhile, new agrochemicals increased the yields of cash crops, notwithstanding their toxic effects on the environment and people. For instance, Gregory Cushman shows how natural manures such as Peruvian guano were swapped out for inorganic and artificial fertilizers.[82] Chemical pesticides and fungicides would likewise become essential innovations in twentieth-century commercial tropical agriculture for the control of pests and the reduction of pathogens—although these spraying technologies were largely inaccessible to small farmers and ecologically unsustainable.[83] World War I and World War II, especially, sparked ingenuity in the production of chemical substitutes, given restrictions in the flow of strategic commodities from plantations, rainforests, and mines. The rise of the petrochemical industry during the interwar period and especially after World War II accelerated both the swapping of one raw material for another and the development of artificial substitutes.[84] All these innovations emerged concomitant to major institutional developments including the establishment of stronger intellectual property rights, the rise of direct foreign investment in commodity production, and the expansion of agricultural and medical research at tropical laboratories.[85]

Tropical rainforests in particular felt the transformations that arose with the successive waves of industrialization and technological transformations of the nineteenth century.[86] Although partially mitigated by the occasional use of by-products as a source of fuel (e.g. the bagasse left following the extraction of juice from sugar cane), vast plantations decimated forested lands and required large quantities of firewood to run the steam engines and machinery required to process their cash crops. The extraction of natural dyewoods and precious hardwoods for global markets had already become widespread in early-modern times, but this extraction reached unprecedented levels following the technological innovations that arose in European and American industries during the second half of the nineteenth century.[87] Tropical woods and tree-related products, such as dyes obtained from logwood, had long been valuable for local economies and even global markets. However, a number of chemical and mechanical innovations triggered a sharp rise in demand for tree latexes, barks, gums, extracts, and oils (quinine, rubber, balata, gutta-percha, chicle, guayule, camphor). The products obtained from harvesting tropical trees were increasingly used as 'raw' materials for a wide range of industrial, consumer, and construction products, from cosmetics to golf balls.

Between the mid-nineteenth century and World War II, the localized chemical and environmental knowledge of local communities in extracting these forest products was frequently scaled up and made relevant for international markets. Traditional tapping, logging, felling, and chipping techniques were frequently used for extracting and processing tropical trees as well as animals and rivers used as means of transport. Despite some improvements—such as the introduction of mechanical saws, which over time were powered by electricity—local techniques, methods, and expertise remained crucial. Over the course of the twentieth century, the invention of chemical substitutes gradually ended industry's reliance on many forest products but not all, as, for example, wood itself continues to be a crucial commodity.[88] This case of forest products epitomizes the perversity of technological imperatives as the very industrial forces that made tropical forest products essential then often proceeded to make them unnecessary.[89]

Another important proposition here is that technological change transformed tropical forest in landscapes of conflict.[90] The commodification of forest and technological connections with global industries radically changed the socioeconomic basis of indigenous societies and their material landscapes, creating new political ecologies. Even when technological interactions throughout forest frontiers were peaceful and resulted in hybridization, new industrialized technologies became sources of marginalization and coercion. The devastating effects of invasive industrial technologies included the dislocation of indigenous livelihoods and social relations. The negative impact also included the exploitation or extinction of local knowledge systems and the destruction of native ecosystems.

The case of the exploitation of camphor trees is especially telling. The development of a camphor-based chemical industry in Britain and the United States (for celluloid, plastics, fibres, and explosives) between the 1860s and 1914 relied on a supply from the rainforests of the north-eastern region of Taiwan (then Formosa), home to Tayal indigenous communities. The rise of the celluloid industry also resulted in disputes between imperial states and warfare in the camphor zones of Taiwan—the so called Camphor War.[91] The global rush to natural camphor ended when artificial camphor and other camphor substitutes were invented—along with less invasive techniques of forest extraction and the acclimatization of camphor trees elsewhere.[92] As historian Ian Inkster notes, the case of camphor exploitation shows that global technological connections between tropical forests and chemical industries during the years of the second industrial revolution were often undermined 'by the very chemistry that had created them in the first place'.[93]

Similarly, the rapid expansion of the world's telegraph networks in the second half of the nineteenth century was only possible thanks to a tree product. From the late 1840s, submarine telegraph cables were insulated with gutta-percha, a latex extracted from rainforests in colonial Southeast Asia using labour-intensive and traditional tapping techniques that had remained relatively unchanged.[94] The demand for telegraphic and telephone cables was so high that the forests from which the gutta-percha was extracted were nearly decimated by the turn of the twentieth century. As Daniel Headrick observes, botanical improvements and the invention of cheaper and more readily available synthetic substitutes solved the supply crisis of this crucial tropical commodity.[95] Interestingly, these very transoceanic

cables insulated with a tropical commodity not only increased the transmission speed of information but reduced uncertainty in long-distance trade—in turn boosting the integration and performance of global commodity markets.

Another fascinating case of global chemical connectivity, though less well known, is the history of the rise and fall of tropical chicle as the primary ingredient in chewing gum between the 1870s and World War II.[96] For decades, the American chewing gum industry obtained chicle from sapodilla trees, abundant in the rainforest of the Yucatán peninsula and other parts of coastal Central America, and relied on the skills, tools, and sensorial chemical knowledge of local workers and indigenous Maya communities to perform the latex tapping and primary refining. The initial refining carried out by local peasants in the rainforests of the Yucatán ultimately enabled chewing gum to be manufactured in American factories and ensured the quality of a product that would be subsequently tested by the research laboratories of chicle companies in the United States.

As in the case of other gums and rubbers, the fate of the local chicle economy was ultimately decided by the discovery of chemical substitutes. By the 1950s, the transition from a natural gum base to a base derived from synthetic materials had become a reality. Once again, the boom in petrochemicals enabled the development of substitutes that provided lower costs and greater consistency than had the original natural product.[97] Despite apparently common patterns, technological change had different effects in each forest commodity and resulted in extremely diverse and contrasting histories. In any event, in the long run, technological changes in the globalized industries have often impacted the frontiers of extraction, which have been on the losing end of global production connections. This bold proposition does not necessarily involve a technological determinism as neither the effects of technological change nor the evolution of technological trajectories is inevitable.

Rubber offers the most compelling story of the contingent power of technological connections and distant innovations on the production of tropical commodities—one that contrasts with the trajectories and interdependences that the case of chicle, camphor, and gutta-percha illustrate.[98] The basis of the rubber boom in the tropical world over the late nineteenth and early twentieth centuries was the invention of a technique for the processing of the latex obtained from *Hevea brasiliensis* trees. Patented by American Charles Goodyear in 1844, the sulphur-based vulcanization process increased both the hardness and elasticity of natural rubber at different temperatures, thereby preventing it from melting or breaking. Goodyear's invention paved the way for the rubber boom that began in the Brazilian Amazon in the 1870s. Demand for rubber skyrocketed in the early twentieth century, when its processing became crucial for the production of, among other things, pneumatic tyres for automobiles. The other technological basis for the rise of tropical rubber, although rarely recognized, was the traditional knowledge of indigenous rubber-makers in Mesoamerica and the Amazon, with later improvements—such as new tapping techniques—developed by Southeast Asian labourers during the late nineteenth century. The process consisted of tapping wild trees to harvest their rubbery latex and then performing primary processing in rainforest camps.

Botanical research and experimentation during the 1870s and 1880s allowed growing *Hevea brasiliensis* trees on large-scale plantations. From that point, and especially after 1910, low-cost rubber production mostly spread through Southeast Asia in the face of the problems in developing plantations elsewhere, such in Brazil where the leaf blight fungus and other diseases were a significant inconvenience.[99] Intensive experimentation and several technical advances followed in the first two decades of the twentieth century, including improvements in tapping methods, artificial pollination, seed selection, plantation layout, tree planting, and, to a lesser degree, the maritime transportation of liquid rubber on a small scale for certain specialized products.[100]

During the 1930s, Buna rubber obtained from coal in Nazi Germany and mostly the production of petroleum-based rubber during and after World War II ended industrial dependence on natural rubber.[101] Yet, despite the arrival of new synthetic materials, natural rubber harvested from plantations continues to be used to this day in large quantities by numerous industries and remains indispensable for many purposes and products, from gloves to condoms. The coexistence of natural and artificial rubber reveals that while innovation has had an undeniable impact on commodity cycles, it has been far from imperative or deterministic as synthetic substitutes are often not able to replicate natural products exactly. By no means has the relationship between chemical innovations and commodity cycles been linear or homogeneous throughout history. Unlike other tree products, in the case of natural rubber, chemical innovations did not close the cycle of production of this commodity.

The production synchronicities that emerged in the henequen-wheat complex between the 1870s and World War I provides an even starker illustration of global technological connections.[102] The reaper-binding machine, invented in the United States in 1872, had the direct effect of increasing demand for henequen fibre from large-scale Mexican haciendas. Crucially, the adoption of the binder—a mechanical twine-knotting harvester—by grain farmers in the vast fields of the Midwestern United States (and elsewhere, such as the Canadian plains) was concomitant with the development of mechanized decortication on the dry plains of the northern Yucatán peninsula. Indeed, this case highlights surprising connections between henequen and wheat production. Not only were distant and exogenous technological shocks on henequen production linked to innovations in wheat production thousands of kilometres away, but in both cases on-site innovations in harvesting and primary processing were significantly impacted by the environmental conditions of production at commodity frontiers.

The defibration machines invented in the Yucatán enabled the mass production of large quantities of binder twine and rope for the US market at a reduced price and with ideal resistance, length, and weight. Unlike other natural fibres—such as jute, which was used for sacking rather than for twine or rope of any quality—henequen was increasingly cultivated and harvested on large estates. Whether smallholders produced henequen more efficiently and at a lower cost remains an open question. As with sugar cane refining, the primary processing of henequen was done, prior to export, on the haciendas' machinery houses near the plantation fields. After harvesting, agave leaves

dry out and perish within a day, requiring on-site primary processing at the estate factory or a nearby location.

The on-site processing of henequen entailed not only the use of automatic rasping machines that separated the fibre from the cortex of the agave leaves, but also the introduction of steam engines, industrial boilers, stocking presses, endless conveyors, and mechanical cleaners. Although the decortication machine was a Yucatecan invention, the technological equipment and tools used on henequen plantations were for the most part supplied by British and American manufacturers.[103] As in the case of sugar cane plantations, henequen haciendas were factories in the field that integrated some industrial processing on site. Although cultivation in the agave field was segregated from the industrial process, these two independent operations required coordination. This segregation between planting and processing was not geographical, but both operations occurred in the north of the Yucatán, in a large area surrounding the city of Mérida.

Decortication machines ran on steam power, which in turn relied on great quantities of water raised from the subsoil by traditional waterwheels moved by animal traction or mechanical engines.[104] Innovations in henequen processing induced the expansion of a local machine industry, located in the city of Merida and the surrounding area, that specialized in technical maintenance, repairs, and the replacement of spare parts for engines, decortication machinery, and portable Decauville tracks. Later, in the 1920s, some local manufacturers would produce cordage-making technologies.[105] Following the boom of henequen, infrastructure was introduced in the area to enable the export of henequen fibre—including railways, ports, and telegraph lines, along with warehouses in which to store the baled fibres. Most of the final manufacturing of cordage and twine made from henequen was done in the United States using automatic spinning machines.

In the case of henequen, distant technological innovations—first mechanical improvements in harvesting and later chemical substitutes—served as the primary forces that opened and closed the commodity cycle, impacting for decades the socio-economic and labour structures of the Yucatán. By the turn of the twentieth century, new technologies for harvesting and mechanized fibre production transformed henequen into the leading agricultural commodity of Mexico, while the Yucatán became the top producer of hard fibres in the international market. It is important to underline that the triumph of agaves over other hard fibres—such as Manila hemp—was due in large part to Yucatán's technological inventions and local improvements in henequen industrial processing. After a certain decline during the interwar period due to increasing competition from rival natural hard fibres, the henequen industry faced stiff competition from new synthetic fibres, triggering a profound crisis in this Mexican industry after World War II.

Concluding Remarks

Clearly global commodity histories can benefit from sustained attention to the technologies of commodity production. Similarly, the role of animal labour in the

extraction and refining of commodities has hardly been problematized and would deserve more research.[106] The main argument here is that the technologies of extraction and processing have not only made commodification possible but have shaped commodity cycles since early-modern times. Perusing such histories of the tools, machines, and methods of commodity production—as well as the ingenuity and skills of those devising and using them—is central not just to understanding the global history of agriculture and mining, to name two key sectors, but to overcoming current biases and assumptions regarding the raw or basic nature of the items imported from the Global South.

Although this chapter has only discussed a few seminal case studies, it is clear that the technological lens offers valuable insights on the materiality of resource production and the ambivalent impacts of technological innovation—which not only functioned as a lever for the extraction of wealth from nature, but could also be an agent of environmental destruction and often have a disastrous impact on the sovereignty of local communities. However, while the case studies presented here demonstrate how technological change can play a significant role in driving the cycles of natural resource extraction and determining the location of primary processing, it should be stressed that this does not occur in a deterministic way and does not necessarily apply to all commodities.

Nevertheless, three important lessons can be highlighted. First, this chapter brings attention to technological life at commodity frontiers and their surrounding regions. A key argument is that a focus on technologies and experts of commodity production leads to a revision of the straightforward assumption that the extraction of raw materials is necessarily geographically separate from industrial processing. As exemplified by silver and sugar, large-scale industrial processing or semi-processing of export commodities has taken place in the Global South from early-modern times through to the present. This deserves further and more systematic research, as the technological history of processing provides a unique lens through which to approach unresolved debates over imperial economic policies, resource-based industrialization, and import substitution. Writing the technological history of production has the challenge to reconcile biophysical, geographical, and ecological explanations with economic, political, and social factors explaining the varying degrees of export processing throughout time and place.

Second, the chapter shows how commodity history can illuminate global technological connections and production interdependences—although the case studies considered here are divergent and point in different directions. Among others, the global histories of camphor, gutta-percha, and chicle demonstrate that the same technological forces that initially triggered commodification paradoxically (and often accidentally) slowed, and in some cases even wholly ended, their production. This was not the case with all tree products, as can be seen with the current high volume of production of natural rubber and palm oil.[107] On the other hand, unexpected technological synchronicities enabled both henequen and wheat production on a massive scale. In this example, not only did technological innovation in one part of the world drive

extraction in another, but technological innovations occurred simultaneously in both frontiers and promoted the emergence of entangled commodity circuits.

A third lesson is that the enduring importance of traditional techniques and local knowledge for global commodity production has too often been overshadowed by the grand narrative of technological innovation and transnational expert knowledge.[108] Indeed, if historians initially drew attention to the transformative effects of innovation and transfer of modern industrial technologies, there has recently been an upsurge of interest in how old and new technologies have coexisted. By moving our lens to local extraction and processing, a different production landscape comes into focus, one with new actors, artefacts, and spaces. Even during the industrial revolutions of the long nineteenth century, global commodity production continued to rely to a significant degree on local methods and practices as well as animal-drawn technologies.

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CHAPTER 12

PLANTATIONS AND COMMODITIES

Indigo in Colonial India

GHULAM A. NADRI

A plantation is generally defined as a large landholding administered by an individual, a family, or corporation where agricultural production takes place with the help of slave, indentured, or hired labour. Plantation agriculture has been a characteristic feature of the modern world economy since the sixteenth century, and it still defines many of the world's economies today. Although large-scale plantation agriculture using slave labour was present in some ancient societies of Mediterranean Europe, it was western Europe's colonial expansion across the Atlantic that gave rise to the plantation system as a prominent form of agricultural production.[1] Several factors contributed to this: first, European colonialists wished to exploit the natural resources of the colonies to produce sugar, indigo, coffee, tobacco, and other commodity crops for markets in Europe and across the world; second, large tracts of land in the colonies became available for plantation after disease and death had wiped out the local population; third, Europe's slave trade with Africa supplied these colonies with enslaved Africans to work on labour-intensive plantations; and finally, the climate and weather conditions in the New World colonies were suitable for cultivation of several local and Old World tropical and semi-tropical commodities, including sugar, cocoa, indigo, coffee, and rubber. In the literature, European settlement in the New World is regarded as a 'commercial outpost' (or a plantation) intended to extract minerals and produce crops for which there was an insatiable demand in the metropolises.[2] The plantation system that emerged in the New World colonies, and subsequently in other parts of the world, took different forms and produced different commodities for different markets. Some plantations followed monocropping, others produced a mix of crops. Some produced crops that had to be processed before they could be traded as commodities (sugar cane and indigo, for example), and which therefore required capital for machine and labour. Others produced

crops that were marketed and consumed after minor processing (such as rice and coffee) or used in manufacturing other commodities (such as cotton and cocoa).

Three main objectives are (1) to explore the literature on the plantation system and plantation economy, examining how scholars have approached these institutions, particularly in relation to commodity history, and how the scholarship has evolved since the mid-twentieth century; (2) to explore the literature on plantation agriculture in India and how recent studies of the agrarian economy of early modern, colonial, and post-colonial India have contributed to broadening the meaning and application of 'plantation' as an analytical framework; and (3) to examine how indigo production in colonial India fits into the plantation typologies that scholars have identified. Indigo has a long history of production in India. However, its cultivation as a plantation crop first emerged in some European colonies in the New World in the seventeenth and eighteenth centuries (along with sugar and other commodities), and in India and the Dutch East Indies in the late-eighteenth and nineteenth centuries. As is discussed below, certain features of the indigo plantation system in colonial India were similar to the American plantation system, but there were some striking differences as well. A mix of planter—and peasant-led production in colonial India represents a specific form of plantation system, in which indigo was produced for European planters primarily by peasants on land that they owned or held on lease from planters. This was not a unique system in India because there were similar peasant-based plantations in other economies in the New World and in Asia. For example, indigo production in colonial Java under the cultivation system, and to some extent in colonial Guatemala, was carried out by peasants.[3]

The Plantation System: Approaches and Perspectives

Economic historians have studied plantations as a system of agricultural production, especially in the context of its development in the New World from the sixteenth century onwards and in other tropical regions around the world.[4] The slave-based plantation system is generally understood as a European institution, which was put to work in the New World colonies on an unprecedented scale so that metropolises could derive net economic benefits from their colonies.[5] However, it should be noted that plantations as a type of agricultural production have existed in almost all agrarian economies around the world throughout history. Ulbe Bosma has pointed out that the existence of plantations was not limited to Europe or the New World and that it pervaded many Asian economies prior to the arrival of Europeans in the sixteenth and seventeenth centuries.[6] Nevertheless, 'plantation' as an analytical framework or category has been applied since the mid-twentieth century mainly to the agricultural production systems of the New World and, more recently, in South and Southeast Asia and Africa.

Scholars have discussed and debated the fundamental characteristics of the plantation system as a category different from other modes of agricultural production and have underscored its various attributes. Although in general no size limits have been assigned to what might constitute a plantation, some have classified them into 'small plantations' (10–100 hectares) and 'large plantations' (more than 100 hectares).[7] Nevertheless, early scholarship generally looked at plantations as an economic institution, a mode of large-scale production of cash crops for the international market, distinguishing it from traditional small-scale peasant farming, and emphasizing the key role of external capital and markets where the products were consumed.[8] For some scholars, the production of commodities for external markets was the main feature of this system. Ida Greaves, for instance, underscored the international character of the plantation system, arguing that external markets and finance played a vital role: 'wherever it is found it derives from external stimulus and enterprise; it has always depended on external markets; and it is still largely involved in external finance'.[9] Lloyd Best describes this as an 'externally-propelled economy' in which the production of commodities and relations of production were determined by the economic and political forces in the metropolis.[10] However, while external factors were important in the New World plantations of the colonial and early post-colonial periods or in colonial India and the Dutch East Indies, many studies have shown that there were plantations throughout the world that were established by local entrepreneurs and local initiatives, even if the products were exported to foreign markets.[11]

Some have emphasized geographic location and have argued that plantation economies could develop only in tropical and subtropical regions where tropical commodities could grow on a large scale. Writers such as Edgar Thompson or Frederic Prior define plantations as land-intensive agricultural production and argue that this was possible only in frontier areas or areas of open resources.[12] Although this is certainly the case in the New World plantation system, it requires a definition in terms of scale of the enterprise and production of tropical commodities. However, plantations have also characterized European and many other non-tropical economies.

Most plantation studies have emphasized the production of a single commodity as a characteristic feature of the system.[13] At different points in time, individual plantations produced a single major commodity crop, such as sugar, indigo, cotton, coffee, cocoa, tea, rubber, or rice, depending on global demand and other political, economic, and ecological considerations. Sometimes, an entire plantation island or economy has been identified with one major commodity that it produced on a large scale, even though other crops were also produced. British Jamaica, for example, was known as a sugar colony; and Mauritius was considered a monocrop plantation economy where large-scale sugar plantations emerged in the early nineteenth century.[14] Nevertheless, some locations were more agriculturally diverse, with peasants as the primary producers. Such is the case of colonial South Asia and the Dutch East Indies, where land was allocated to a mix of export and other cash or subsistence crops. For example, in central Java officials referred to the small local plantations as 'spice merchants' gardens', because of the wide variety of crops produced. However, commercial agriculture under

the plantation system generally led to expansion in production of an export commodity and created conditions in which peasants were coerced to produce that single crop, even though other crops might have been more profitable for them.

Many scholars have focused on the internal dynamics of the plantation system, such as production relations and control structures. The overwhelming evidences of coercive labour relations between plantation owners (usually, but by no means exclusively, a colonial metropolitan or foreign entity) and unskilled, low-productivity, and low-wage labour have led many to consider plantations as a form of capitalist agriculture.[15] Gunnar Myrdal considers that the 'the spread of plantation agriculture must be viewed as a spread of industrialized agriculture'.[16] Edgar Thompson, similarly, underscores the capitalist-industrial character of the plantation system; and Trevor Burnard and John Garrigus have called it 'the plantation machine', an industrial-style production system in which large number of workers were deployed in a factory-like agricultural complex and were subject to strict discipline, coordination, and coercion.[17] Such characterizations are primarily based on the analysis of the global division of labour (plantations producing primary commodities and raw materials for the metropolis to consume or manufacture into finished products), linkages to and dependence on a global market, and large-scale cultivation of an export commodity (monoculture). Critics of this view, such as César Ayala and Trevor Sudama, have pointed out that although these were some common characteristics of the plantation system, it does not recognize the distinctions that also existed between plantations and overlooks differences in production relations from one plantation economy to another.[18]

Some scholars have explored the social, political, and cultural dynamics of the plantation system.[19] Exploration of these dynamics, especially labour relations, has generated a good deal of literature not only on Caribbean economies but also elsewhere, like colonial South Asia and Indonesia (Java), where indigo, coffee, tea, and rubber plantations became a prominent feature of the economy in the nineteenth century. This has broadened the scope of analysis and enabled scholars to examine plantations not only as an economic system but also as a settlement institution and a social or cultural institution. Eric Wolf, Edgar Thompson, Charles Wagley, Lloyd Best, and others have explored how social, cultural, and political forces underpinned the plantation system. They have argued that this exemplified a socio-economic complex, whose main features included a hierarchical class structure, social and political domination of the plantation owners, coercive and exploitative labour relations, and an almost total dependence on the metropolis and external markets and finance.[20]

This plantation economy model has provided an analytical framework for the study of the long-term economic development or underdevelopment in post-colonial nation states where plantation agriculture was a major economic activity. The proponents and partisans of this model, such as Best and Jay Mandle, have argued that this was a 'hinterland economy' or a 'hinterland of exploitation' and that its characteristics include it being an exclusive sphere of influence of the metropolis, with a total dependence on metropolis-controlled finance and technology, including transportation services, production of raw materials, and metropolitan preference for plantation products.[21] This

has proven to be a useful framework and it has helped some scholars explain the continued economic underdevelopment of some countries from the colonial to the post-colonial period as an outcome of their dependence on metropolises and other foreign sources of capital and markets.[22]

However, not all plantations typified 'hinterlands of exploitation' or shared all of the above characteristics. Many estates were financed locally. In colonial and post-colonial South Asia, for example, many local entrepreneurs owned indigo, rubber, and tea plantations.[23] Large-scale agricultural production for European and other foreign markets in colonial Guatemala and pre-colonial and colonial India was primarily in the hands of local peasants and merchants. In Brazil, coffee plantations continued the earlier model of slave-worked plantations but were developed following independence, and as such cannot be said to have been dependent upon an external metropole. Some recent studies of the Latin American economies have underscored the role and agency of the local in the commodity production even if it was for foreign markets and under the aegis of the metropolitan or foreign capital.[24] But local markets and sources of finance, institutional and organizational structures, and social capital played a vital role in the plantation systems around the world, and these dynamics have not yet been fully explored.

There are those who have characterized the plantation system as an 'extractive institution'—a concept used by Daron Acemoglu, Simon Johnson, and James Robinson. They define this as institutions that 'concentrate power in the hands of a small elite and create a high risk of expropriation for the majority of the population' or 'where the majority of the population faces a high risk of expropriation by the government, the ruling elite or other agents'.[25] Bosma argues that sugar plantations in South and Southeast Asia in the nineteenth and twentieth centuries morphed into large conglomerates or syndicates with unprecedented control over labour, exclusion of many others from the industry, and deprivation of labourers and merchants of their fair share in the profits.[26] To an extent, this was a common trend in many post-slavery capitalist plantations around the world, including colonial South Asia. However, it is important to point out that this growing concentration of power and profits did not go unchallenged. The resistance came in two forms. First, peasants and labourers adopted different strategies, including trade unions, to resist the domination of the plantation owners and demand and secure fair wages and benefits. Second, local small-scale producers, in colonial India, Indonesia, and elsewhere, competed with the plantation syndicates and were successful in carving out a fair share of the market for their own products. In colonial India and the Dutch East Indies, 'plantation' agriculture coexisted with peasant plantations; and, as Bosma has pointed out, peasant-produced sugar amounted to about half of colonial India's total sugar output at the end of the twentieth century.

While a single model cannot expect to encapsulate the wide variety of economic, social, and political dynamics of the plantation system across all economies and regions, plantation systems as an analytical framework have proven remarkably resilient and continuously evolving to incorporate different features and characteristics of plantations across the world. Plantation agriculture existed and flourished in various geographies and in disparate socio-cultural, political, and economic conditions, and its

attributes have been changing and evolving. The literature makes it clear that the plantation system existed in many agrarian economies around the world and that the manifestation of its characteristic features and the economic and political outcomes varied from one region to another.

The Indian experience of plantation is representative of this diversity. India has a long history of commercialized agriculture. Since the sixteenth century, it produced sugar, cotton, indigo, opium, rice, and many other commodities for international markets. In the nineteenth century, growing European demand for industrial raw materials, such as cotton, indigo, and rubber, and consumer products, like tea and opium (the latter mainly for China), contributed to the emergence of plantations on an unprecedented scale.

The literature on agricultural production in colonial India reveals three important but interconnected aspects. First, although the term 'plantation' generally appears in the literature and is understood as a model that was transplanted from Europe's American colonies into India following British colonial takeover in the late-eighteenth century, it is seldom used as an analytical framework to study the dynamics of agricultural production and trade. This is mainly because peasant-owned large- and small-scale agriculture continued to be the dominant mode of production in colonial India. There is a recognition in the literature that a plantation is different from a peasant farm, but there is hardly any further discussion of what that entailed and how this fits into the larger narrative of the plantation system.[27] The scholarship on colonial Indian agriculture does not fully engage with the literature on the plantation economy of the Atlantic world.

The second aspect, and also the main reason for this disengagement, is that the imperatives of British colonialism—commercialization of agriculture, and subordination and exploitation of peasants and producers—have framed much of the narrative of colonial India's agricultural economy. The literature has focused on two main aspects of this: the growth and expansion, or lack thereof, of agricultural production through the stimulus of European demand and private capital; and the dynamics of production relations under both peasant farming and plantation agriculture.[28] The dynamics of agricultural production in colonial India and the institutional, commercial, and financial determinants of growth or decline of agriculture are fairly well explored. Scholars have examined the aspects of property rights in land, planter-peasant or capital-labour relations, exploitation of peasants and rural labour, and peasant/labour movements and resistance.[29]

Third, the rise of sugar, indigo, tea, and rubber plantations in colonial India has attracted scholars' attention in the last few decades. Studies of specific plantation commodity crops, especially tea and sugar, have largely focused on the aspects of labour, the role of capital and management, and the degree of control over and coercion of labour.[30] In these studies, we also find some discussion of the defining features of the plantation system. As in the Atlantic world, the attributes of the plantation in colonial India greatly varied and no definition has been offered that can capture all the variants. In the literature, plantation is understood as a colonial capitalist enterprise, whose main objective was to produce crops for export primarily to European and American markets. Moreover, this enterprise was funded by foreign capital, and production processes

were carried out by local or immigrant labour working under a coercive management structure.[31] Some studies, such as that by Bosma, have distinguished 'plantation' sugar, where growing cane was managed and controlled by the same entity that processed it, from 'peasant' sugar, where peasants had the choice to grow cane when and where they wished, mill their own cane, or sell it to other millers.[32]

However, these are not exclusive attributes of the plantation because peasant agriculture also employed hired labour, produced crops for foreign markets, and was financed by foreign capital. The term may also be applied to those peasant farms where wage labour carried out agricultural tasks and where European capital played a vital role and cash crops were produced primarily for foreign markets. Indigo cultivation in colonial India, which was largely a free peasant enterprise, shared many features of plantation agriculture. This complicates our understanding of the plantation as a mode of agricultural production distinct from peasant farming.

Indigo Production in Colonial India

Much has been written on indigo, but the literature does not treat this as a plantation crop in the same way as tea, sugar, or rubber. Most studies of indigo production have looked at it as a peasant enterprise and focused on the issues of colonial subordination, coercion, exploitation of indigo-growing peasants, and their resistance and participation in the anticolonial national movement in the early decades of the twentieth century.[33] Although some recent studies of indigo in colonial India have used the term 'plantation', they do not frame the narrative as a plantation agriculture.[34] However, it can be argued that, on examining the ways in which this commodity was grown in India in the nineteenth century, it in fact should be seen as a variant of plantation agriculture.

Indigo production in India has a long history. It was produced on a large scale in the regions of Bayana (near Agra) and Sarkhej (near Ahmadabad, Gujarat) as well as on the Coromandel Coast in the sixteenth and seventeenth centuries for local and global markets. It was then a small-scale peasant enterprise in which peasants and local merchants and their capital played a vital role. Between 1580 and 1650, much of the indigo produced in Mughal India was exported to Europe by the Portuguese, the English East India Company (EIC), and Dutch East India Company (*Verenigde Oost-indische Compagnie*, VOC), as well as to the markets in Persia and other parts of West Asia. Europe was the largest market for Indian indigo during this period. With the revival of indigo imports from Europe's American colonies, Indian indigo lost out and consequently its production substantially declined.[35] Some indigo continued to be produced for local consumption and occasional exports to Europe and Persia. The industry revived at the end of the eighteenth century when large-scale production began in the Bengal Presidency. What was different this time was not simply the large scale on which it was produced but the large investment of foreign private capital in the industry, the colonial state's proactive role in promoting its production, and the degree of coercion

and violence involved in the industry as well as the estranged production relations between peasants as primary producers and European planters and manufacturers.[36]

In the nineteenth century, indigo plantation was a significant part of the agrarian economy of Bengal, Bihar, and some parts of the United Province (the Awadh region). The emergence and expansion of indigo plantation in India was an outcome of three major developments. First, the EIC's conquest of Bengal in 1757, its assumption of the right to collect revenue from the conquered areas in 1765, and its restructuring of the agrarian economy of the region created favourable conditions for the production of commodity crops, including indigo, on a large scale. Second, with the loss of its American colonies in the 1770s, including South Carolina—a major producer and supplier of indigo—the newly acquired colony in India was deemed to be an alternative source of indigo supplies to Great Britain. Third, the rapidly growing demand for indigo in the textile industries at home, Britain's dependence on the supplies of French- and Spanish-American indigo (from Saint-Domingue and Guatemala, respectively) in the aftermath of the loss of its American colonies, and the nationalist-mercantilist reaction against Britain's indigo purchases from rival European nations (France and Spain) motivated the British to promote indigo production in India. The British anticipated that imports from Bengal would make any purchase of indigo from foreign nations and their colonies unnecessary. In 1790, the Privy Council in London considered promoting indigo production in Bengal 'as a national object likely in time to afford such supply of indigo to Great Britain as to render any importation of that article from foreign countries unnecessary'.[37] For all these reasons, indigo became a befitting commodity whose production the EIC would promote in Bengal from the late-eighteenth century.

The EIC provided the initial stimulus by advancing money to prospective indigo planters for a future delivery of indigo to the company. By 1790, however, the EIC gave up its monopoly and, from then onwards, private merchants and planters were allowed to export indigo to Europe on their own account. European planter-manufacturers obtained lease or ownership of land and erected manufactories (processing units). In 1793, a British indigo planter, Mr Becher, erected several factories with a total of 120 vats and dug 300 wells for indigo production in Awadh.[38] It soon became a major commodity produced in Bengal and its production expanded so much that it stood unrivalled by any other country or region in output and quality.[39] The average annual indigo exports from Bengal to Britain rose from about 150,000 pounds during 1782–1786 to more than 3 million pounds during 1801–1810 and to 8 million pounds during the 1840s. The average annual value of indigo exported from Calcutta grew from about 4 million rupees between 1796 and 1805 to more than 21 million rupees between 1836 and 1845, and it exceeded 38 million rupees from 1886 to 1895.[40] How was this unprecedented expansion of indigo production in colonial India possible?

Unlike in the New World, where European settlers occupied vast tracts of land and established plantations primarily with the help of enslaved African and indentured European labour, indigo planters in India had to adapt to a system of agricultural production already in place, which was predominantly in the hands of free peasants. Bengal became a promising place for large-scale indigo plantation for two main reasons. First,

the EIC had conquered and had taken over the administrative and fiscal control of the region. The colonial state proactively promoted indigo plantation because the British in Bengal and at home in England anticipated fiscal and commercial benefits accruing from this. Second, several major and many minor rivers irrigated its extensive landmass and the deposition of alluvium by annual inundation rendered the land fertile and highly suitable for indigo plantation.[41] Peasants, who formerly used their land for paddy cultivation or for growing other food crops, were generally less inclined to grow indigo—a plant that was new to them and was also precarious and susceptible to early inundation and other unfavourable weather conditions. Growing rice and other food grains remained their priority. It was reported in 1831 that peasants in Bengal considered indigo a secondary product and never gave their best land to it unless circumstances prevented them from sowing it with grain.[42] Peasants had to be persuaded and given some incentives to grow indigo for European and Indian planter-manufacturers.

The planter-manufacturers gave monetary advances to peasants and enticed them to undertake indigo cultivation. Upon receiving an advance payment (from two to six rupees per *bigha*), peasants undertook to cultivate indigo and deliver the crop to the lender on terms and at prices stipulated in the written contract. This was known as the *raiyyati* system. In some cases, the planter-manufacturers had the right to determine where to sow indigo, supervise production processes, and instruct peasants to carry out tasks in ways that would ensure the best results. In Bihar, peasants were sure to receive up to three rupees per *bigha* in case of crop failure due to natural calamity. A penalty of twelve rupees, however, was imposed on peasants for each *bigha* that was short of the agreement.[43] These provisions did not apply to peasants in Bengal, where the terms of contract were different.

Alternatively, the planters could obtain land on lease from local landlords (*zamindars*) on payment of rent to the latter and grow indigo with the help of hired labourers.[44] This was known as the *nij* system in which growing the crop and processing it to produce indigo were done by the same entity (i.e. planter-manufacturers). Many planters in the Agra and Awadh regions had recourse to this system. In a collection of anonymized letters published in 1831, many indigo planters stated that they held thousands of acres of land for indigo cultivation under their direct supervision.[45] This comes closest to what is conventionally understood as a 'plantation'. However, due to overseeing and management costs and unsuitability of land under planters' proprietorship for indigo cultivation, this turned out to be costlier than the former system and most planters preferred the former mode—that is, peasants growing the crop for them under contract.[46] The cost of indigo plants from a *bigha* under *nij* cultivation in Bengal was four rupees in 1830, whereas the planters could obtain the same amount of plant for two rupees from peasants producing it under *raiyyati* cultivation. Similarly, the cost of peasant-grown indigo crops in Bihar was nearly 25 percent less than the crops grown under *nij* cultivation.[47]

There was yet another system under which the planters took villages on lease (*theeka*) on payment of a nominal rent to the local landlord or the government. Small lots of three to seven acres of land were then allotted to the local farmers, who had to grow indigo on the best and most productive part of the holding. The planters provided the

seed and the peasants supplied the harvested plant to the factory.[48] This was the most preferred system of the indigo plantation in Bihar in the late nineteenth and early twentieth centuries.[49] However, in the late nineteenth century, many indigo planters in Bihar carried out an extensive *nij* cultivation. They hired local peasants and labourers to grow indigo on land that they leased from the local landlords. In some parts of Bihar, planter-led cultivation was predominant. In 1904, it was reported that the factories in the Samastipur division cultivated 30,760 *bighas* of indigo under the *nij* system, which amounted to 94 percent, and only 6 percent of land was cultivated by peasants.[50]

Throughout the nineteenth century, the *raiyyati* system remained the dominant mode of growing indigo and peasants received cash advances, cultivated the plant under obligation, and delivered it to the lender (i.e. planter-manufacturer). Thus, the actual cultivation of indigo in two of the three modes described above was carried out by peasants whose individual landholdings did not exceed a few *bighas*. Even though the peasants owned the land, they grew indigo because they were coerced to do so by the planters from whom they had received cash advances. The latter manipulated the contract system in a way that brought the peasants under perpetual obligation to grow indigo for them. The testimony of EIC officials in Bengal, Christian missionary activists, and local peasants before the Indigo Commission shows that indigo cultivation was not remunerative for peasants in Bengal.[51] Despite this, they still grew a whole lot of it because they were coerced by the planter-manufacturers.

Scholars have debated the nature of the peasant-planter relationship in colonial India. Some have understood it as a complete subordination of peasants to European capital and capitalistic relationships, while others have challenged this view, emphasizing the relative autonomy and interdependence of these economic actors.[52] Some have also underscored the role of the colonial state and its frameworks of law and administration, which were more accessible to indigo planters than to the peasants.[53] The indigo contract system and its evidently coercive character mark a departure from the existing agrarian relations of production that were generally based on informal agreements and reciprocity between peasants and merchants. Growing indigo under the contract system was unremunerative for peasants, and the planters manipulated the contract and used it to control and coerce the former to grow indigo for them.[54] Once the peasants entered into an agreement and signed the contract, they remained in perpetual indebtedness.

Initially, the peasants received cash advances from planters because with that money, they could meet their household expenses, pay taxes, or invest in the next cycle of production. As long as they grew indigo on land not under rice cultivation, peasants supported it because it supplemented their income. But as production expanded and spread over land formerly occupied by rice or other food grains, peasants grew discontented and unwilling to accept cash advances. On the other hand, an increasing number of European indigo planter-manufacturers in Bengal competed with each other to secure peasants to grow indigo, whose export became a means of remitting payments and profits to Europe. The indigo enterprise was largely funded by European capital through the agency houses that emerged in Calcutta in the early nineteenth century, including the richest and the largest of those houses, John Palmers and Co.[55]

Control over peasants was key to ensuring regular supplies of indigo plant as well as to minimize the costs of production. They knew that they were competing in Europe with Spanish- and French-American indigo and that unless they produced indigo at low costs, they could not undersell their rivals. Consequently, they had recourse to the notorious advance contract system that seemingly kept the peasants under perpetual control and forced them to grow indigo. In the early nineteenth century, fierce competition and coercion, including violent affrays, intensified so much that their position, for many contemporary observers, looked hardly different from that of slaves.[56] Lord Macaulay, for example, remarked in a memorandum that many peasants were 'reduced to a state not far removed from partial slavery'.[57] In 1832, the Court of Directors observed that 'the greatest of evils of which the *ryots* complain is the almost utter impracticability of being able to free themselves, should they once have the misfortune to receive indigo advances, either by their own free will or compulsion'.[58] In the 1880s, similarly, F. E. C. Linde wrote that 'it is not rare to meet with instances in which whole generations are given over, bound hand and foot, to a factory, the grandson still vainly striving to adjust the accounts which his miserable sire opened in an unhappy moment'.[59]

This was not, however, the case everywhere and at all times. The degree of planters' control over peasants varied from one region to another. In Bihar, Benares, Agra, and Awadh, a different production regime prevailed in which the terms of production were somewhat evenly balanced and not totally unremunerative to peasants.[60] The competition was not so intense, the terms of contract were not rigid, and, above all, the planter-manufacturers shared the risks with the peasants. The system of indigo production in Bihar, according to Colin Fisher, was based less on coercion than on persuasion and peasants receiving advances were entitled to compensation if the crop failed.[61] Other studies, however, have shown that the indigo growers in Bihar were in no better condition than their counterparts in Bengal. They were coerced to grow indigo, and many were physically assaulted and dispossessed of their land for not doing so and had to migrate to other areas.[62]

Of course, peasants also resisted such control and coercion. Resistance occurred in many forms. Some peasants accepted monetary advances from a manufacturer and then absconded; some did not allocate the best land to indigo as stipulated in the contract; some sold their crop to others who offered a better price; and some even took advances from more than one manufacturer for the same crop.[63] At times, the peasants petitioned the government and local magistrates to intervene and stop the abuse and violence they suffered from indigo planters.[64] When petitions and litigations were ineffective, they had recourse to direct action. In 1832, the peasants attacked the indigo manufactory at Barasat and in 1859–1860, they revolted against the planter-manufacturers in Lower Bengal.[65] The 'blue mutiny', as it was called, forced a number of European planters to relocate in Bihar, where the peasants would grow indigo under duress and suffer hardships for the next sixty or so years. Peasants in Bihar also resisted the oppression by the planters and they, like their counterparts in Bengal, petitioned the government and, at times (e.g. in 1867–1868), revolted against the planters.[66]

Thus, despite being a peasant-led agriculture, Indian indigo cultivation shared many of the features generally attributed to plantation agriculture. The features that Mandle and others have identified in their study of the American plantation economy—such as production of cash crops, market responsiveness, foreign capital, profit orientation, and heavy participation in international trade—also characterized indigo cultivation in colonial India.[67] Indigo in nineteenth-century India was primarily produced for European, American, and other foreign markets. More than 95 percent of the total produce was exported to those markets. According to one estimate, only 4 percent of the total production in Bengal was consumed locally and the remainder was exported.[68] It depended so much on European markets that when the indigo market collapsed in Britain in 1826 and in the early 1830s, many indigo planters lost their fortunes and almost all major agency houses in Bengal, which financed the industry, went bankrupt.[69] Similarly, the colonial context and the planters' relentless endeavour to control the peasants—features of the American plantation system—also characterized the indigo plantation in colonial India. The planters exerted control and influence over indigo cultivation individually and collectively through organizations such as the Bihar Indigo Planters Association, which was formed in 1877. They maintained cordial relations with local officials and landlords (*zamindars*), who they leveraged to further their entrepreneurial interests.

A major difference, however, was the predominance of peasant-led indigo cultivation. Yet, it is also important to note that not all indigo-growing peasants were small-scale producers with small landholdings. Many peasants, who were examined by the Indigo Commission in Bengal, were substantial farmers with proprietary rights over land ranging from 30 to 107 *bighas*.[70] The manufacturing units ('concerns' or *neel kothis* as they were called), which the planter-manufacturers owned, processed the crop grown on thousands of *bighas* of land mostly under peasant proprietorship. Even though the average size of individual landholdings was small, the total land that indigo occupied in each indigo concern was large. In 1867, for example, thirty manufactories in the Champaran district in Bihar had altogether 37,183 *bighas* of land under indigo, which rose to 95,970 *bighas* in the mid-1890s.[71] Hugh Martin-Leake, a biologist for the Bihar Indigo Planters Association from 1901 to 1904, noted that 574,000 hectares of land were under indigo cultivation in India in 1897.[72] Even though the peasants owned a large part of this and cultivated indigo, it was tied to the planters, from whom they received advance payments and to whom they delivered the crop as per the terms of the contract. Thus, the indigo cultivation carried out by peasants under the *raiyyati* and *theeka* arrangements could be identified as plantation agriculture.

Conclusions

What we see in colonial India is the emergence of two types of plantation. Indigo cultivation under the *nij* system, in which the planters were also growers of indigo, represents

the one that conforms to the conventional definition of the plantation. The peasant-led indigo cultivation under the *raiyyati* and *theeka* systems represents the other type of plantation, which shared many of the features of the American plantation system but retained some pre-existing local features. This was not unique to India. Sugar plantation in late colonial Java was also based on peasant-led cane production; as was also the case in Cuba from the late-nineteenth century, as a result of centralisation of sugar processing, and its separation from cane growing.[73] If we define plantation as an 'extractive institution', the Indian experience certainly comes close to this. The coercion and violence against indigo growers—both peasants and those working on the planters' land—and the overall dependence of the industry on foreign, mainly British, capital and markets reveal the extractive character of the indigo plantation system.

It would seem that the plantation system as an analytical model is remarkably flexible and can be applied to a variety of commodity productions based on different forms of free and unfree labour and labour relations. The example of the dynamics of indigo production and relations in colonial India demonstrates that it is necessary to look beyond a straightforward dichotomy between plantation and smallholder-peasant agriculture. Systems of coercion, and engagement with global commodity chains, can be found in both, and as a result the distinction between the two becomes blurred in practice. This is echoed in the work of Gareth Austin on the cocoa sector of the Gold Coast, in which he compared smallholder and estate farming, suggesting 'modes of cultivation' as being a more useful categorisation than 'modes of production'.[74] Rather than taking a predefined economic structural model and seeking to apply it to real-life cases, it becomes more appropriate to deconstruct the actual relations that are to be found in the field, where a variety of different institutional forms might coexist and interact.

This expanded notion of what 'plantation' entails, and what it can include, may perhaps offer a more integrated way through which to understand the processes by which a range of cultivated crops became commodities produced for trade within a globalizing economy. For example, peasant-led jute and poppy cultivation possibly displays similar production regimes to that of indigo, likewise, sugar cane and cotton, whose cultivation in colonial India was also carried out by peasants with the help of foreign capital and for external markets. Seen in this way, 'plantation' ceases to be simply one mode by which agricultural commodities are produced under certain circumstances, becoming instead a dynamic set of processes as integral to understanding commodity history as are value chains or trade networks.

Notes

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9. Greaves, ' "Plantation" in World Economy', 76.
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12. Edgar T. Thompson, *Plantation Societies, Race Relations, and the South: The Regimentation of Populations* (Durham, NC: Duke University Press, 1975), 39; Pryor, 'Plantation Economy as an Economic System', 290. See also Tiffen and Mortimore, *Theory and Practice in Plantation Agriculture*, 8–12.
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CHAPTER 13

PRIMARY COMMODITIES AND INDUSTRIAL CONSUMERS

The Case of Palm Oil

JONATHAN E. ROBINS

Anna Tsing has described commodities as things 'torn from their life-worlds to become objects of exchange' in human societies.[1] The matsutake mushrooms Tsing examined pass from foragers to traders to consumers with little industrial intervention, aside from the brokerage and transport services that move them from forest to table. The freshness and 'natural' state of the mushroom are key to its desirability among consumers. Many of the commodities entering long-distance trading networks in the past were finished products like these mushrooms, ready to consume, whether they were consumed more or less in the state they were extracted from nature or were the results of manufacturing processes like woven cotton or silk.

A significant—though unquantifiable—share of commodity exchange in the pre-modern era did involve primary products, destined for use in industry. Precious stones, metals, raw fibres, live animals, and many other things extracted from nature were carried great distances from sites of production to the workshops where they were made into new things for consumer markets.[2] But by the turn of the nineteenth century, trade in primary products surged as hundreds of plant, animal, and mineral commodities flooded into industrial centres in Europe and North America. In terms of both value and volume, primary commodities dominated world trade from the early nineteenth century through the middle of the twentieth century.[3]

The shift toward primary commodity trade reflected a growing spatial division of labour across the globe.[4] Capitalist industries in Europe and North America increasingly relied on raw materials produced in Africa, the Americas, and Asia, extracted under a variety of labour regimes and political circumstances.[5] Imperial conquests brought new regions and their natural resources under the direct control of industrial powers, while new technologies made it more feasible to produce and ship primary commodities over

vast distances. Technological change also created entirely new industries and new commodity trades to serve them.[6]

The physical properties of commodities explained, to some extent, how they were used in industry. An attentiveness to the material properties of commodities dates to some of the earliest works in the field. Sidney Mintz's work on sugar, for example, emphasized the chemical aspects of the commodity in both its production and consumption.[7] Historians drawing on a growing body of work in commodity history and environmental history, as well as science, technology, and society (STS) studies, and related fields have stressed how nature and non-human factors shape history. Together, these approaches add nuance to Marx's assertion that 'the value of commodities is the very opposite of the coarse materiality of their substance, not an atom of matter enters into its composition'.

Coarse materiality was the foundation on which values were constructed, though it never determined industrial uses or the forms of production for a commodity. Plantations, large mines, and other capital-intensive enterprises emerged in specific historical contexts in response to the material and human environment. Small-scale producers could be efficient and fought off competition from large-scale producers in a number of cases. Producers often benefitted when a commodity was scarce, readily processed and storable, or served multiple industries in a 'commodity web'. The recent growth in 'flexible' or 'flex' crops that serve fuel, feed, and food industries offers an example of how technological transformation and industrial diversification can change the fortunes of primary producers. But in many cases, technology brought commodity producers into severe competition as manufacturers tapped alternative resources.

Palm oil, a fatty material extracted from the fruit of the African oil palm tree lends itself to a case study on the subject. Palm oil's commodity career moved from a limited luxury trade into staple-commodity status in the nineteenth century. Palm oil's physical properties led to new roles in industry, but its main significance was as a cheap substitute for other commodities. Producers responded by producing lower-quality oil, eventually inspiring manufacturers and others to invest in plantations that could cheaply make high-quality oil for use in food industries. Cheap palm oil survived competition from petroleum and other substitutes, riding legislative- and consumer-driven turns to biofuels and 'green' products to become the world's preeminent oil crop.

The Historiography of Industrial Commodities

Through the early-modern era, many key commodities passed from producer to consumer with little processing or manufacturing in between. For agricultural products like spices, tea and coffee, or sugar, the industrial activity required to extract, process, or preserve the material happened at or near the site of production, rather than

in downstream industries. Other commodities, like textiles, entered trade as finished products of industry. As Kevin O'Rourke and Jeffrey Williamson have argued, none of these commodities offer strong evidence for systematic global economic integration before the nineteenth century.[8] Many commodities were luxury products, and commodity prices remained fragmented across geographical space and political boundaries.

As Anya King has shown in her study of musk and other exotic scents used in medieval perfumery, the value of some commodities was derived precisely from this distance and disintegration between sites of production and consumption. Unfamiliar place names attached to commodities added to their exotic appeal and affirmed their luxurious qualities for consumers.[9]

Mystique or provenance remain important selling points of luxury goods even today, but by the eighteenth century many former luxuries were in the process of becoming staple commodities. Driven by what Sven Beckert has dubbed 'war capitalism', financial (and later, industrial) interests in Europe encouraged invasions that brought new lands, labourers, and resources into commodity circuits.[10] Plantations were among the most notable features of this expansion, producing coffee, sugar, and tobacco in ever-greater quantities in the Americas and Asia. Even a foraged product like beaver fur could become an industrial commodity in this economic system, extracted from nature on a staggering scale to meet the demands of manufacturers in Europe.[11]

Scholars have rightly highlighted the cultural and ecological impacts of commodity exchanges, stressing that globalization cannot be reduced to market integration. Brightly dyed and printed cottons imported from India revolutionized fashion in western Europe, for example, sparking industrial competition and government interventions that had far-reaching implications for cotton-growers, cotton-weavers, and rival fibre industries across the globe long before a truly global market for cotton was established.[12] Something as mundane as potash helped subsidize land-clearing settlement in North America from the eighteenth century, and potash joined other food, fibre, and timber commodities in sustaining a level of expansion in European manufacturing that Europe's own ecologies could not meet.[13] Prices for these commodities might not show global convergence before the nineteenth century, but the huge quantities involved had transformative effects in both producing and consuming regions.

The shift from luxury to staple often rendered primary commodities invisible to the end-consumer: not simply removed from the relations of production but transformed into new things. Seventeenth-century Europeans smearing palm oil on their chapped hands might not have known anything about Africa and the oil palm, but they could materially engage with the commodity and recognize its foreign origins. Europeans washing with palm-oil soap a century later had no idea—indeed, could not tell unless they were skilled chemists—whether the product they were using contained palm oil, tallow, whale oil, or a number of other oils and fats.

Yet primary commodities were not necessarily featureless and interchangeable, as contemporary definitions of 'commodity' imply. Within any given commodity, quality grades, geographic origin, and other features remained important in shaping industrial and consumer demand. It mattered a great deal to spinners, weavers, and the

wearers of cotton shirts whether cotton fibre was long- or short-stapled, or pure white, yellow, or brown in colour, for example. Grading systems often entrenched regional distinctions across sites of commodity production, and empowered merchants and other middlemen who controlled classification.[14] Even a thoroughly modern staple like petroleum is traded in more than 150 grades identified by geographic origin, with different chemical compositions, rather than forming a single integrated 'oil market'.[15]

Historians of commodities have long been attentive to the material aspects of their subjects. The story of sugar, in Sidney Mintz's telling, followed a materialist logic: the plant was a champion producer of sucrose but only grew in certain places. Its production could be scaled indefinitely as long as one had access to sufficient land and labour.[16] The need to quickly crush sugar cane after harvest to avoid spoilage dictated large workforces, often enslaved, and large facilities to process sugar.[17] The finished form of sugar—though it changed over time with new processing technologies—was relatively easy to store and transport, making it feasible to connect distant sites of production and consumption. William Cronon similarly argued that the material aspects of wheat were crucial in explaining industrial change. Individual farmers loaded dry wheat kernels into sacks, for transport by land, canal, and ocean, and each sack ground into flour could, in theory, be traced back to a farmer. The introduction of the grain elevator in the mid-nineteenth century upended this system, allowing middlemen to store and transfer wheat grown by hundreds or thousands of producers in bulk. Graded into lots and sold by the ton, the grain elevator facilitated the development of a complex futures market for wheat. For wheat growers, the system seemed inevitable and inescapable, no matter how much they protested the price-setting power of elevator companies and futures traders.[18]

These approaches rightly show the importance of material facts in shaping commodity history, but they risk luring readers into a crude determinism. Deterministic appeals were in fact important to corporations and governments trying to justify particular forms of production like plantation systems in the past. Apologists for slavery argued that slavery and the plantation system were key to the affordable price of industrial staples like sugar and cotton; the perishable nature of products like bananas and palm oil served to justify plantation methods in later periods.[19] Yet small-scale producers did in fact grow cotton, sugar, bananas, and oil palm. Even rubber, a novel commodity with no subsistence value or local market demand, was successfully produced by smallholders using simpler methods than the sophisticated systems advocated by government and industry experts.[20] Material factors influenced but did not determine how commodities were produced.

Indeed, some commodities have material features that were amenable to small-scale production. Deposits of tin, gold, diamonds, and other minerals could be panned out of alluvial deposits by individuals as easily—and at times, more cheaply—than machines could do the work, despite the impressive scale of capital-intensive mining methods.[21] Though consuming industries did complain about quality at times—and occasionally invested in primary production themselves—most did not care whether the minerals they worked with were scooped from the ground with baskets or steam-shovels. The

same was true for agricultural products like copra and groundnuts. Both could be grown, harvested, and processed into stable, long-lasting forms by producers working at any scale.[22] These oilseeds, along with cocoa, coffee, and a number of other products could be held by producers for long periods, giving them some power to protest economic or political policies or to influence prices—though the history of crop 'hold-ups' has few success stories.[23]

Taking the materiality of commodity production seriously opens up new ways to examine topics like labour, social conditions, culture, and other factors in commodity history. On Congolese oil palm concessions, for example, the need to harvest tall oil palms created specific labour demands, and workers' distaste for the task of tree climbing inspired resistance and cultural adaptations that frustrated commodity production.[24] Similarly, Henry Ford's 'Fordlandia' rubber estate in Brazil was plagued by rubber blight, and the siting of the project and the visions of its managers created conflicts with labourers and local communities that doomed the scheme.[25] The success of tyre manufacturers like Firestone and Michelin in managing profitable rubber plantations in Africa and Asia[26] might circle back to crude biological determinism—blight did not follow the rubber tree to Africa or Asia—but their profitability had much to do with political and labour conditions.[27]

While Mintz noted the biological underpinnings of sweetness in shaping human relations with sugar cane, he astutely balanced the material and cultural, avoiding the biological-determinist bent seen in later commodity books aimed at a popular audience.[28] Demand for sugar was not the inevitable result of human responses to natural stimuli but emerged from cultural and political systems that made large-scale sugar consumption desirable and possible. As Arjun Appadurai stressed in an important collection titled *The Social Life of Things*, the uses and values of commodities are human inventions: nature does not dictate how or why any particular material becomes a commodity.[29]

But nature is not merely a stage on which human history plays out. Timothy Lecain uses the example of copper to show how the human and the material each act on the other. For mining engineers, the definition of copper ore (or any other ore) is historically contingent: ore is a deposit with minerals that can be economically recovered. The line between valueless rock and ore is drawn by humanity's ability and willingness to exploit the minerals contained in the earth, not by the innate qualities of the rock.[30] Lecain stresses that changing technology, like changing tastes, can remake human relationships with material things. Those things, in turn, remake our human world. Both gold and copper can conduct electricity, but the relative abundance of the latter and the cultural values attached to the former meant that copper became the material of the electric age. Growing demand for copper led to new refining techniques, which in turn made new mining techniques feasible, leading to open-pit mines exploiting low-grade copper ores. The mountain-eating industries that helped remake human societies with electricity and telecommunications inadvertently liberated other minerals, however, setting new natural processes in motion that poisoned swathes of land and water and forced more human responses.[31]

Environmental historians have long seen the importance of showing nature as an active force in history, rather than an object to be acted upon, and commodity history has increasingly focused on environmental themes, in addition to its traditional emphases on labour, industry, and consumer cultures. Influences from other disciplines, most notably Bruno Latour's actor-network theory in science and technology studies and the popularization of the geological Anthropocene in the natural sciences, have led some historians to call for 'more-than-human', 'post-human', or 'neo-materialist' methods.[32] Michael Egan's work on mercury, for example, demonstrates the mobility of mercury as it 'escaped' human industries, following novel pathways through the natural environment.[33] These more-than-human approaches also have great resonance for historians examining animal industries.[34] Cattle, sheep, whales, pigs, and other animals consumed in industry reacted dynamically to human behaviour and anthropogenic changes in the environment, creating opportunities to explore the roles of animals in shaping human industries.

These environmental or 'more-than-human' perspectives have been especially important for historians explaining the parallel evolution of commodities and the industries they serve. Cotton is perhaps the best-studied example of a plant whose genetic evolution was consciously manipulated to respond to industrial demands. The main 'Old World' and 'New World' cotton varieties were independently domesticated thousands of years ago, as farmers intervened in the cotton plant's evolution to favour variants with long, soft fibres that could be spun into yarn.[35] As English manufacturers began to mechanize cotton manufacture in the eighteenth century, they initially relied on linen warp threads or mixtures of cotton and linen, constrained by the short, relatively weak fibres of Old World cottons. Edmund Russell argued that cotton plants evolved alongside machinery as industries tapped stronger, longer-stapled New World varieties. Spinners demanded stronger cotton, and when breeders responded, their new commodities allowed for faster machines.[36]

But this was not a simple cycle of mutual improvement. Angela Lakwete stressed that the early saw gins, which removed cotton from the seeds of the common New World variety, *G. hirsutum*, badly mangled the fibre. Manufacturers bought this cotton because it was cheap and abundant, not because it was materially better than roller-ginned Indian cotton.[37] As gins improved, *G. hirsutum* remained cheap because breeders developed higher-yielding varieties that were cultivated by enslaved labour on newly cleared lands, expanding both the scale and productivity of the American cotton frontier.[38]

Yet cotton producers, like their counterparts in other industries, were never passive objects of economic pressure or government influence. In France's West African colonies, for example, local hand-spinners found that newly introduced cottons were better than local varieties, and they redirected fibre from exports to local industries. In parts of India, farmers insisted that indigenous cotton varieties were more resilient than New World types, stubbornly resisting colonial efforts to 'improve' a key cash crop.[39] More recently, the cotton plant's propensity for cross-breeding has allowed Indian farmers and others to 'pirate' traits from genetically modified cotton, bypassing corporate monopolies and leading to myriad uncontrolled experiments in

cash-crop production.[40] At times, industrial markets had to adapt to the choices made by producers. Coffee consumers and processing industries were not always enthusiastic about *Robusta* coffees, for instance, but they still bought *Robusta* beans when disease pushed *Arabica* varieties out of key producing areas.[41]

Commodities connected societies, industries, and ecosystems across long distances, often leading to radical transformations at one or both ends of an exchange. Historians wrote about these global processes well before the popularization of 'globalization' as a concept in the 1990s.[42] While critics like Frederick Cooper have made trenchant attacks on the use of 'globalization' as a theoretical or methodological framework,[43] the ubiquity of the term makes it an inescapable concept for historians examining commodities in global circulation. Like the 'follow-the-thing' approach in anthropology,[44] global commodity history attempts to integrate sites of production, processing, and consumption into an analytical whole. The approach can be an important corrective to earlier work focused on commodity production, which tended to credit industrial consumers with great power but gave them scant analysis.[45] Recent work focuses on 'commodity webs' as part of a globalization process, showing the concrete linkages across places and industries in a more expansive way than linear 'commodity chain' approaches.[46]

As Sterling Evans found in his study of the North American grain belt and its unlikely links with the Yucatan, following a 'thing'—wheat—led to another thing, henequen fibre. A new technology, the mechanical binder, linked these locations through henequen binding twine, which allowed wheat farmers to package their harvest in an economical, labour-saving manner. New machines, capital flows, labour migrations, and the arrival of competing fibres all figure into the story. Evan's account shows the precarity of these connections and the power disparities across the commodity web. When American farmers adopted the combine harvester, which did not require twine, the Yucatan side of the 'web' collapsed while the wheat industry remained profitable.[47]

The entangled relationship between jute growers in Bengal and manufacturers in Dundee offers another example of a global commodity web in action. Jute growers developed a highly unequal relationship with spinning and weaving firms in Dundee, with regional merchants serving as crucial middlemen and mediators between global capital and peasant communities. The fortunes of both ends of this web hinged on world demand for woven sacks to carry commodities of every sort. Within the British imperial system, the mobility of capital allowed jute manufacturing to relocate to Bengal, taking advantage of the same cheap labour that made jute agriculture feasible. While inventions like linoleum flooring and jute carpet backing diversified the downstream side of the jute industry, it was doomed in the long run by the development of bulk shipping, which eliminated the need for jute sacks.[48]

Global commodity history often looks at strong (if unequal) binary relationships: Dundee and Bengal, Lancashire and the cotton South, and so on. Stuart McCook's study of coffee and coffee rust disease stressed the important of *horizontal* linkages as well as the vertical linkages seen in most commodity histories.[49] Primary producers were often connected to other producers through transfers of plants, animals, diseases, and new technologies, and by the movement of people—including labourers as well as the scientists

and others who tried to change the way commodity production occurred. Aside from disease, the most important horizontal connection for most producers was the common market they competed in. Producers of industrial staples often found themselves in 'commodity hell' as they sold undifferentiated commodities alongside rivals from across the world. Manufacturers reaped the benefits, and often forced producers—by way of merchants or government agents—to adopt arbitrary standards for quality.[50]

Taking the globe as one's stage encourages historians to explore linkages across other commodity and non-commodity processes. Gregory Cushman's history of guano in the Pacific world follows economic, political, and environmental flows out of guano islands and into fertilizer industries, coconut plantations, soap factories, commercial fishing, and industrial feedlots.[51] All these things shaped the evolution of the guano industry, but the story is ultimately about the Pacific Ocean rather than a commodity. Katerina Teaiwa's *Consuming Ocean Island,* another guano history, shows one solution to the prospect of an endlessly expanding (or arbitrarily truncated) commodity history. Teaiwa calls for a 'telescopic' approach rooted in one place. She follows phosphate 'from its tiniest unit as a molecule. . . to its much larger form as an entire island, and all the chemical [and industrial] processes in between'. 'Telescoping' allows Teaiwa to explore the material and economic impact of phosphate within a global industry while maintaining a focus on how Banaba Island and the people who lived and worked there were transformed by the phosphate industry.[52] The approach works against the tendency in some popular histories to close the books with an authoritative study of one thing that 'changed the world', instead inviting comparative work on other places embedded in the same webs.

Technology is an unavoidable topic in global commodity histories, often serving as a *deus ex machina* that closes the story (think of jute sacks and bulk shipping, henequen and the combine, or guano and synthetic fertilizers). Technological change opened and closed possibilities for commodity producers across the globe through new infrastructure, processing techniques, and finished products. Technology also created substitutes and alternatives that forced disparate places and things into direct competition.

Some technological changes appeared seamless, even invisible to consumers. No one can taste the difference between sucrose extracted from sugar cane and sucrose extracted from beets, for example. Translating this material fact into a real industry required a century of investment in plant breeding and refining technology, however. State action was key in creating conditions that incentivized the development of the sugar beet, and also in securing land and reserves of cheap labour to harvest it in commodity frontiers across Prussia and the United States.[53] While both cane and beet sugar converged in a chemically identical product, the two things were produced under profoundly different ecologies and political economies. Because of this, the cane-sugar industry remained competitive. New breeds of sugar cane and processing machines increased yields and drove down costs.[54]

Competition from new substitutes could result in swift collapse for the losing industry, however. This was particularly true when the established commodity was the product of living plants or animals, and the substitute a synthetic derived from coal or petroleum.[55] African camwood and Turkish madder markets were wiped out by

synthetic dyes in the late nineteenth century. Demand for natural lamp fuels (including fuels made from whales, pine trees, and cottonseed) collapsed with the diffusion of kerosene, gas, and electricity. Asian producers of shellac and gutta percha found themselves relegated to minor niches in industry by synthetic substitutes—though in the case of gutta-percha, the growing scarcity of the raw material was the very thing that inspired the hunt for substitutes.[56] Yet competition could also stimulate innovation. After the discovery of synthetic dyes in the late nineteenth century, Indian indigo planters turned to Western science as well as Indian agronomic knowledge for help, boosting yields and holding down costs until the industry's ultimate demise during World War II.[57]

Synthetics did not always mean the end of natural commodities. Cotton growers successfully competed with rayon and polyester throughout the twentieth century. In the United States, cotton farmers mechanized and, with the help of tariffs and subsidies, kept the price of cotton low enough that it remained a viable alternative to synthetics. Meanwhile, peasant producers in West Africa boosted yields with new agronomic tools, benefiting from consumer tastes for the soft, supple fabrics made from hand-picked long-staple cotton.[58] Natural rubber remained competitive with synthetic rubber after the 1940s, and natural rubber proved better than synthetic rubber in important ways, remaining strong and flexible in finished products like aircraft tyres and condoms. These outcomes were not overdetermined by the material nature of commodities or how they are made but instead reflected dynamic human responses to the possibilities and limits of particular commodities and the contexts that produced them.

These cases buttress David Pretel's argument that 'the interplay between technological change and commodity production has been specific to material and historical conditions'.[59] New technologies were not always better, cheaper, or wanted.[60] The cigarette was not an inherently superior thing than the cigar or vice versa; both evolved out of different cultural practices, agricultural and industrial changes, and state interventions. The divergence between labour-intensive, locally owned cigar workshops and highly automated cigarette factories owned by globe-spanning corporations had significant impacts on tobacco growers, capitalists and workers in manufacturing centres, end consumers, and even on the tobacco plant itself, in terms of its cultivation and initial processing.[61]

Commodity histories push back against simplistic narratives of economic, environmental, or technological determinism, stressing the importance of politics and power in the success or failure of an industry. One example was the US government's decision to ban cocaine, which smashed a thriving pharmaceutical cocaine industry in Colombia in the 1940s.[62] But as Paul Gootenberg emphasizes in his history of Colombia's cocaine trade, producers had power too, turning to a fast-growing illicit market for recreational drugs. Resistance to state and market pressures—or, in this case, dynamic responses to new market opportunities—by peasant producers has long been a key theme in the history of agricultural commodities. When peasant producers could fall back on subsistence crops or produce alternative commodities, they could resist pressure from governments or industrial interests.[63]

Some commodities lent themselves to diversification, giving producers more flexibility in the market. Cotton and flax were both historically cultivated for their fibres, but growing

demand for oils and animal feed in the second half of the nineteenth century created new markets for the oil- and protein-rich seeds of these plants. Some late-nineteenth-century flax farmers did not bother harvesting the fibre, given the trouble needed to process it and the value of the oilseed in new paint and chemical industries.[64] The more a natural product could be reduced to basic chemicals like fatty acids, sugars, protein, or cellulose before being used in industry, the greater number of industries it could serve, easing the boom-and-bust cycles often found in primary production.[65] Even a relatively exotic commodity like star anise was, in the 1990s, drawn into an entirely new industry as a source of shikimic acid for use in pharmaceuticals—though scarcity has inspired research into synthetic alternatives that might wreck this lucrative market.[66]

Saturnino Borras Jr. and co-authors have popularized the term 'flex crop' to describe plants that serve multiple and interchangeable commodity markets.[67] While they are wrong to assert the novelty of this phenomenon and risk conflating 'joint products' with the multiple uses of a single commodity form (e.g. soybeans as sources of food, meal, and oil, vs. the multiple uses of soybean oil in food, fuel, paint, and other chemicals), the 'flex crop' concept calls attention to the ways in which changing technology and consumer tastes can absorb overproduction, raise prices, and encourage further expansion in commodity production.[68] In the late twentieth century, soy and maize both experienced massive booms in production because they could meet so many different industrial demands. Global markets, new technologies, and government policies all profoundly shaped the prospects of 'flex crops' like these.[69]

Commodity 'flexing' and substitution were constrained by profitability, regulation, and cultural norms, however.[70] The introduction of the first industrial 'substitute foods' in the late nineteenth century provoked a ferocious backlash and regulatory response. Many consumers argued that substitution was nothing but adulteration, with margarine masquerading as butter or *vanaspati* as *ghee*.[71] Substitution was never costless for industry, either. Hydrogenation, which pushed the limits of fat substitution to new heights in the early twentieth century, proved expensive and imperfect. Hydrogenation turned the more common and cheaper liquid fats into solids, but it introduced unpleasant scents to some fats. As scientists later discovered, it also produced trans-fats that had serious health impacts when consumed in food. Partially hydrogenated soybean oil drove palm oil out of key markets in the 1960s and 1970s, until trans-fat regulations in the 1990s and 2000s forced manufacturers back to palm oil. Palm oil was the only natural fat that could be economically used as a direct replacement for partially hydrogenated fats.[72]

Case Study: Palm Oil's Industrial Careers, 1500–2020

Palm oil has a long history as an industrial commodity, one that encompasses the themes explored in this chapter: the evolution of luxuries into staples, the importance of

materiality and technology, the possibilities of substitution and 'flex crops', the impact of globalization and spatial interconnections, and even a 'more-than-human' perspective that takes palm oil and the oil palm tree seriously as historical subjects.

Palm oil served as a subsistence foodstuff in western Africa for thousands of years. It was not a luxury commodity found in ancient Egyptian tombs as many authors erroneously suggest, but it was widely traded across long distances to supply western Africa's urban centres with food, lamp oil, cosmetics, and medicine by the sixteenth century.[73] By that point, European ships began carrying palm oil from port to port in Africa as part of a growing regional trade, in addition to using it to feed captives in the transatlantic slave trade. Yet palm oil did not become an important foodstuff anywhere outside Africa except Bahia, where oil palms took root in Afro-Brazilian agricultural practices.[74] Instead, palm oil began its commodity journey as a luxury medicine. Europeans appropriated African ideas about the medicinal qualities of palm oil in skin care and carried back small quantities directly from Africa, and in the holds of returning slave ships. Early sources never portrayed palm oil as a particularly exotic product, but its healing qualities were widely praised and texts offered advice about buying fresh, bright-orange, violet-smelling oil and warning of counterfeits.[75]

In the nineteenth century, this luxury market was overshadowed by a new industrial use for palm oil in soap. Initially, the qualities that made palm oil appealing as medicine shaped this usage: costly medicinal soaps claimed to moisturize and soothe the skin. Meanwhile, other manufacturers began using small amounts of palm oil to colour their tallow-based 'yellow soaps'. Palm oil was too costly to use as a staple ingredient, and in the eighteenth century, Britain taxed imports heavily, classifying palm oil as a drug.[76] Britain's decision to abolish the transatlantic slave trade in 1807 forced law-abiding British traders and their African business partners to find 'legitimate' products, and palm oil was among a few commodities that could be procured in large quantities. Prices for palm oil and import duties on it in Britain dropped by half in the 1820s, encouraging wider use in soaps.

By the time Parliament abolished the duty on palm oil entirely in 1845, palm oil had become a staple raw material, mostly on account of its price and material similarities to tallow. Palm oil directly competed with tallow in soap and found a new niche in railway grease. Tinplate works replacing tallow with palm oil found that the latter had greater resistance to heat and more tolerable smell. In the 1840s, candlemakers applied new chemical technologies to palm oil, extracting solid fatty acids that could be used in new types of candles. Leftover fatty acids wound up in soap or lubricants. Residual glycerine extracted from palm oil—first dumped as a waste product—was soon worth more than the fatty acids, owing to its value in skin treatments, medicines, explosives, and other uses.[77]

Manufacturers expanded palm oil's commodity web by investing in chemical technologies that opened up new categories of goods that could be made from palm oil, but they could only weakly influence primary production. The supply side remained in the hand of Africans, mostly household producers. Oil palms were not simply wild trees that could be tapped to exhaustion; productive groves grew alongside agricultural

settlements and were harvested where communities had both ample labour and access to markets.[78] Exports from Africa did grow over time, especially during price shocks like the Crimean War (which knocked Russian tallow out of the market), but the rate of increase was modest until the late 1890s when colonial conquests, steamships, and railways forcibly incorporated hundreds of thousands of new producers into imperial economic systems.

One of the most important innovations in production was the 'hard oil' method adopted around 1850. Using natural fermentation to soften fruit, men eliminated the need for women's labour in cooking and pounding fruit. The result was a thoroughly inedible product, produced solely for the export market. The change was a response to growing demand for palm oil, but it reflected palm oil's role in the market: it was a cheap substitute, not a prized ingredient. Soapmakers did not care how smelly or inedible the raw material was, as long as it cost less than tallow or whale oil.[79] Low prices gave producers weak incentives to make more or better palm oil, but conversely palm oil's role in most industries was solely due to that price.

Hard oil was in some ways a new commodity, and it was joined by the palm kernel after 1850. Kernels were joint products with palm oil and exports surpassed palm oil in places with strong domestic demand for edible oil, or long dry seasons that limited oil production.[80] Palm kernels became part of a complex commodity web that partially overlapped with palm oil. Crushed under hydraulic pressure in European mills, palm kernels gave up their oil for use in soap, candles, as well as margarine and other food products. The protein-rich 'meal' or 'cake' left behind after crushing provided valuable fodder for cows, whose milk was churned into butter. The leftover skim milk could then be mixed with kernel oil to make margarine, competing with the cow's primary product. The kernel market was not simply a by-product of palm oil production but was shaped by butter, margarine, meat, and a wide range of other oilseeds that could also be crushed for oil and meal.

Both palm and palm kernel oils were substitute commodities, subject to substitution themselves. Major developments in rival industries could have significant long-term impacts in a distant place. Petroleum cut into palm oil's markets in lubrication and lighting from the 1870s, sending all the natural fats into fierce competition with each other and petroleum.[81] But petroleum did not make good soap at all, and palm oil's role in tinplating persisted even after substitute chemicals were introduced in the 1860s. Palm oil is still used in cold-rolling tinplate and other metal sheets, nearly two centuries after its first application in that industry.

By 1900, food industries emerged as the biggest potential market for palm oil, but most of what Africa exported was inedible hard oil. To make edible oil, palm fruit had to be promptly cooked, but this work—on top of the significant labour required to climb tall oil palms for harvesting—meant that many producers stuck with hard oil. Lever Bros. tried to solve the first problem with machinery without tackling the second, working Congo's 'palmeries' as if they were plantations. Labour costs were high, and plantation experiments elsewhere in Africa ran into stiff resistance from landowners.[82] The first successful oil-palm plantations instead appeared in Southeast Asia, where

introduced African oil palms, European capital, and migrant (often coerced) Asian labour together remade forest landscapes into palm monoculture.[83]

These plantations made edible palm oil more cheaply than African smallholders, and their oil was uniform enough in quality to be bulked and shipped in huge tanks. Manufacturers could place orders for future delivery from distant plantations, confident that each tanker ship carried the same stuff as the last.[84] The age of merchants and manufacturers sampling puncheons and haggling over gradations in colour, smell, and impurities was finished. While firms continued to sell specialized grades of palm oil for tinplating and other industries into the 1960s, by the 1980s there was only one way palm oil could be sold on commodity markets: as 'CPO' (crude palm oil), meeting a strict standard for free fatty acids and other impurities. Small producers could not extract oil from palm fruit as economically as large plantation mills could, and they could only access the market for uniform, high-quality CPO by cooperating with a plantation.

This shift in the commodity character of palm oil was accompanied by incremental changes in technologies for refining and transforming palm oil and other fats in industry. Refined, bleached, and deodorized (RBD) palm oil became a 'blank canvas' for industry.[85] Fractions of palm oil and other chemicals extracted from it served all sorts of uses in baking, frying, and emulsifying industrial foods. In many cases, firms quietly substituted palm oil for other fats without bothering to inform customers.[86] Palm and palm kernel oils also found new markets in detergents and other oleochemicals, fending off competition from petroleum-based competitors—especially when governments began mandating biodegradable detergents and other chemicals in the 1960s.[87] By the 1990s, manufacturers saw real marketing value in touting 'plant-based' and 'petroleum-free' products as consumer concerns about the environmental impact of consumption and industry increased.[88]

The most important oleochemical frontier for palm oil was fuel. Colonial businesses used palm oil to fire boilers and power diesel motors in the early twentieth century, but palm oil burns inefficiently and can damage machinery. A Belgian scientist patented a method for converting palm oil into a more fluid, cleaner-burning chemical, palm oil methyl ester (POME, not to be confused with palm oil mill effluent, a waste product from palm-oil production now used to generate biogas), in 1937. But POME was initially a dead-end use for palm oil. Even the lowest-quality palm oil was worth more as raw material for soap than the equivalent amount of petroleum that POME replaced.[89] A booming market for POME would not develop until the 2000s, and this had nothing at all to do with industrial demand: it was entirely driven by state action. The European Union adopted ambitious biofuel mandates, and large palm-oil refiners quickly 'flexed' their output to meet this new demand.

The proliferation of palm oil in industrial products gradually eroded its invisibility to end consumers. Beginning in the 1990s, NGOs (nongovernmental organizations) linked palm oil 'hidden' in supermarket products to deforestation and land grabs in the tropics.[90] More pressure came from within commodity-producing regions in Southeast Asia, as cities choked under haze produced by fires on land cleared for plantations. The fires created a 'crisis of visibility' for the palm oil industry.[91] Commodity producers

responded by embracing voluntary certification schemes, the largest of which is the Roundtable for Sustainable Palm Oil (RSPO). RSPO labelling differentiates 'sustainable' palm oil from the featureless, placeless CPO and RBD oil traded on the world market.[92]

The RSPO and other sustainability-certifying groups effectively create new commodity forms—or rather, a fictive commodity attached to a material one. The raw commodity is still consumed and transformed by industry, but the fictive commodity (such as 'orangutan-friendly palm oil') reaches the end consumer through logos stamped on packaging. On some products, consumers can scan a code on a packet and find location of production, or read anecdotes about the people who made the palm oil. Whether this will undo the work of commodity fetishism, of revealing and recreating the social relations in which commodities are produced, remains to be seen. One critic calls sustainable-certified palm oil 'a magic solution' that obscures the social, economic, and political realities of the palm oil supply chain with a label.[93]

Conclusion

Commodity history may adopt various approaches when an industry is the key consumer. Writing such histories calls our attention to the material attributes of products, as well as the human and natural conditions under which they are made. Materiality is critical but not determinant; its impact changes with cultural evolution and new technologies (and in the case of plant and animal commodities, changes in the organism itself). Flows of labour, capital, and political power shaped where and how specific commodity industries developed. Multi-sited, multi-industry 'commodity-web' frameworks offer one way of grappling with these complexities, but they risk exploding 'commodity history' as an organizing principle by taking on too many topics. A comprehensive study of the products competing with palm oil, for example, would necessarily become a study of fat-producing industries generally—a worthy goal, but one with little room for nuances of place, labour, capital, technology, and the cultural contexts that commodity historians excel in charting.

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PART IV

PEOPLE AND LAND

CHAPTER 14

MIGRATION, SLAVERY, AND COMMODIFICATION

MICHAEL ZEUSKE

Migration has played an integral part in global history.[1] Geographical mobility, whether freely entered into or the result of coercion, has always been an important element of human society and the global spread of commodity frontiers. Indeed, it would probably be impossible to study the history of any commodity without some consideration of the human movements that this involved. Migrations of workers, merchants, or technical specialists enabled the development of plantation economies and extractive regimes, as well as exchanges and trade in general, but there is another sense in which migration and commodities are interlinked: the process by which human bodies themselves became a form of capital—commodified as slaves; traded; and in the process enabling the exploitation of plant, animal, metallic, mineral, and medical commodities that as a captive workforce they were employed in producing.

The concept of migration was initially primarily used by state authorities in their counting of emigrants and immigrants, as they attempted to maintain control over their populations. From this, social science demographers and historical sociologists made use of the term. Although with some earlier precedents, historians—in particular those applying a more global perspective—have since the 1990s been paying close attention to this. Particularly important was Dirk Hoerder's study of world migrations over the last millennium,[2] but the range of historical migration studies is now quite impressive.[3] Bridging the gap between social sciences and historical research, this growing literature covers a wide range of migrations: slavery and the slave trade, as well as other 'unfree' forms of labour and forced migration, such as indentureship and convicts; concepts such as the 'African diaspora' and the 'African Atlantic' that arose from the slave trade, along with the human commodification in the production of tropical commodities; and the voluntary migrations related to economic, structural, political, and religious differences and the global division of labour.

Until at least the sixteenth century, most migration consisted of nomadism—the historical movement of large groups. This saw the migrations in the early history of

mankind, the migration of peoples with their livestock from Central Asia to Eastern Europe and India, the migrations to and across the Americas, and that of the Polynesians and the migrations in Africa and other large territories. Militarized expansions also played a part: the Hun expansion of the fourth to sixth centuries AD, leading to the accelerated migration of peoples, in many cases through displacement; the Mongol expansion of the thirteenth and fourteenth centuries; and later European expansions. From this perspective, all human history, since its early beginnings until the present day, is the history of migrations—taking place for reasons of subsistence, inequality, land occupation, or climatic changes and events or as a result of political causes such as escape from violence, oppression, or armed conflicts.

Many migrations have not been voluntary. From the earliest times, alongside 'free' movement there has been a trade in those who were compelled against their will. Christian Langer, for example, has shown the relationship between forced labour and deportations as far back as Ancient Egypt.[4] Since at least the Neolithic period, animal husbandry (in particular of horses) facilitated military migrations and massive raids on other settlements, resulting in enslavement.[5] Not only were those captured forced into domestic or military service, but they quickly came to demonstrate an early form of commodification, as 'gifts' exchanged between rulers and elites.[6]

Probably the most important of forced commodified migrations that played a significant part in defining the modern world, integrally connected to a number of commodities, was the 'African diaspora', involving the coerced movement of large numbers of enslaved Africans to other parts of the world and the most significant movement of people into the Americas. Up to 1820, while some two to three million migrants arrived from Europe, between six and eight million came from Africa. It was not until 1840 that this became supplanted by other migrations in scale—Europeans into the Americas and Asians to both the Americas and Australia.

While the African slave trade was integrally connected with commodity production in the tropics (sugar, tobacco, cocoa, coffee, cotton) and slave-food commodity production (jerked meat, dried salt cod, cassava, maize, beans, rice, eddo), this forced migration itself saw human bodies becoming commodified. Enslaved men and women, as well as children, were 'talking commodities', and their human capital was arguably the fundamental capital of Atlantic history from 1450 to 1900,[7] and an early driver of globalization. Commodified humans provided a gigantic capital stock and were the basis of formal financial and commercial institutions (including state credit), as well as colonial territorialization by European powers.[8] However, although much of the literature has focused on transatlantic slavery, this was but the more visible aspect of a phenomenon that was in fact much more widespread. Andrés Reséndez, for example, has shown how the Spanish built an 'empire of slavery' in the Americas, partially founded on the enslavement of indigenous peoples, particularly in frontier zones,[9] while Mattias van Rossum et al. have recently highlighted the importance of many slavery regimes in the Indian Ocean World.[10]

The focus here is on the enslaved forms of migration in which humans themselves were commodified. Slavery can be defined as the exploitation and control by other

people (individuals, institutions, or corporations) of human bodies, their productivity (work, energy, services), time, and mobility. Slaves have been used as body capital for power, labour, value, wealth, and productivity, as well as for status, health (including as objects for medicinal knowledge), and currency or value—sometimes linked quite specifically to either parts of the enslaved body, or its whole. They have also been used for their reproductive value, as, among others, Jennifer Morgan has explored.[11] That the procurement of those to be enslaved was carried out mostly by marginal elites, or as mutual 'gifts' between elites, resulted in slavery becoming an institution, as Joseph Miller traces for slavery throughout global history.[12] However, despite its historical ubiquity—or perhaps because of this—slavery should not be seen as a 'mode of production' in itself. Rather, there have been slaveries in multiple epochs and situations—including houses, estates, mines, ships, harbours, and military fortresses. Slavery has occurred in many different regions, under quite distinct slavery regimes, while slave trading and slave production in slaving zones have been part of various political systems—imperial, monarchical, and republican—and also 'without state', practised by small-scale societies, or religions such as Catholicism, Protestantism, or Islam.[13]

Damian Pargas has argued that slavery was a globalizing phenomenon, along with the slave traders and their personnel, in a way similar to the role played by sailors.[14] The connection to developing global communications and mobilities stems from the sixteenth century, with the expanding circumnavigation of the earth through Iberian ships (Magellan/El Cano 1519–1522) and the founding of Manila in 1571 leading to a truly global connection of slaveries and slave trades. Prior to this, the most globalized slaveries and slave-trade systems were those of the *islamicate*—territories under Muslim control, or strongly influenced by them, from Spain to Sumatra and the Southern Philippines. Sylviane Diouf has shown how enslaved Muslims since around 1400 influenced the developing European globalization—not only in Europe but also in the Americas.[15] However, 'global' biographies of enslaved people were unknown until the eighteenth century, despite literature that has established the notion of a global life history from around 1570.[16] Possibly the most globalized biography of a slave—at least covering the whole Atlantic hemisphere of Africa, Europe, and the Americas—is that of Nicholas Said.[17]

Ehud Toledano has shown how all slaveries were also 'systems of belonging' and formed the basis for new hierarchies, as well as asymmetric dependencies.[18] In this sense, they were very important for the preservation of stability, on the one hand, and, on the other, new forced migrations and expansions: slave soldiers, states with enslaved soldiers, crews of slave ships, captains, and slave traders as entrepreneurs and cosmopolites 'from below'. Not to forget slave women as mothers of enslaved people but also of mighty elites. This suggests that all slaveries were also systems of dependencies—albeit following very violent acts, actions, forced mobility, and processes against individuals and groups. All such systems were in the first instance local but also ultimately regional, continental, imperial, hemispheric, and transhemispheric, as in the case of the Mongols, extending from East and South-East Asia to Eastern Europe, or the fifteenth-century Islamic commercial networks—from Spain to Aceh and the Southern

Philippines, passing through Central Asia and Northern India, with connections to the Malay Peninsula, Northern and Eastern Africa, and Europe.

Nevertheless, none of these was fully 'global', in the spatial sense of spanning the whole globe, prior to the nineteenth century. It was not until the establishment of a world economy between 1800 and 1960 that there would be a global work system, with colonies involving many local slaveries (house slaveries, women and child slaveries, and collective slaveries, often under the control of local elites) and slave trading systems (sometimes using other names and traditions), regional slavery between elites, and global migrations into forced labour systems and 'second slaveries'. Until then, they were at most national-imperial work systems.

Chronological-Spatial Plateaus of Slavery

Slavery can perhaps best be understood as having gone through a number of 'chronological-spatial plateaus' in relation to migration and commodities. There were in fact multiple slaveries, and together these provide an alternative way at looking at world history through a commodities lens.

Hypothetically, these plateaus began between 20000 and 10000–8000 BCE. Although extending over larger spaces, they always grow from local roots in some form, and with quite specific cultural definitions or legal forms (e.g. forms of bondage and serfdom in Europe). They were, however, even from their very local beginnings, 'global' in the sense that slaves existed, even if without a worldwide institution of slavery per se or as stateless prisoners in groups. They may not have been a part of a global system as such, but with their mobility, or the interruption of their mobility in being fixed as enslaved, they were part of the broader perspective of migration. Prehistoric slavery can be seen, for example, in the work of Catherine Cameron,[19] and since then six 'plateaus' of slavery can be identified. It is important to understand that these are not stages or formations but rather manifestations of slavery that started successively, none of which has ever stopped, with the partial exception of the Third Plateau of Atlantic slavery, which was formally abolished in the West by the late nineteenth century.[20]

The First Plateau consists chiefly of enslaved women and children—or rather, victims of slaving activities within or between communities. This includes self-enslavement of women and children, as well as poor people, in return for food, sustenance, and security. This is slavery without formal institution, dating from at least 20000 BCE, and extending to the present day. Often this has been a part of nomadism or slow migrations. In this case, commodification is on a very individual level, and barely formalized—at most as an exchange or release, for example, of conflict prisoners/captives, women, girls, and children in general. This might be to leaders of other communities, playing an important function in demographic community, domination, and stabilization.

Men—especially young captive men—were often herders for livestock, and as such were treated as warriors. Even if there was some form of contract (as happened from very early in China), after the signing of such a contract these people totally disappear as legal persons. They would have their own forms of mobility and commodification, often involving other asymmetric social dependencies, like adoption, forced marriage or female house servitude, children's bondage, buying and lending of girls, boys, and women. Possibly the oldest form was that of sacrificial slavery, with the enslaved people forming a part of rituals involving the use of living human bodies.

The Second Plateau is that of 'house' or kin slaveries, existing on a small scale within personal networks of kinship, affinity, guilds of skilled people (such as hunters, warriors, ritual specialists, or healers), and clientage.[21] Here 'slaving' (even when there may have been little conceptualization of it as such) is a dimension of mobility between groups. In the majority of cases, this would have been involuntary. However, at times it may have been voluntary—for example, self-enslavement as part of a feast culture, clientage, or enslaved members of raid groups. As Alfredo González-Ruibal shows, the enslaved came into a house group, which, in the broadest sense of the word, would comprise huts, houseboats, tents, temples, and palaces.[22] This plateau forms something of a Pandora's box, containing all slaveries and slave trades as forced migrations up to the present day. It also includes slaveries without big migrations—as forms of 'close slaveries' or small-scale slave regimes, such as debt slavery, collective slavery, raid slaveries, child slaveries, slavery of certain castes, and sex slavery. It seems to date from at least the Bronze Age;[23] and combines probably the most widespread and quantitively overwhelming forms of slavery, including some of the biggest slavery regimes in world history: Roman; Arab-Islamic Caliphates and their successor empires, including the Ottoman and Persian, and their zones of influence in India, North and East Africa, and the Malayan World; the Byzantine Empire; the Frankish-Carolingian Empire and its successors; the barbaric and Slavic monarchies, which often emerged as militaristic slave-hunting societies, including the Huns, Avars, Bulgars, Saxons, Cumans, Khazars, Vikings/Normans, and Hungarians; the empires in China and its area of influence; the Mongolian empire and its successors. Often these formed a part of migrations and expansions.[24] In this plateau, commodification played a very important role, alongside 'gifts' between elites as well as for generals and soldiers, possibly as war booty. Slaves were exchanged for silver, alcohol, metals, weapons, fabrics, furs, horses, cattle, technologies, knowledge (such as books and maps), art, currencies, and even food such as fish, meat, salt, or oil.

The Third Plateau is primarily constituted by the so-called Atlantic slavery, running from around 1400 until 1900 in the expanding 'West'—spanning the Americas and West Africa, as well as parts of East Africa and (at least until the eighteenth century) the islands of the Indian Ocean. Moses Finley defined five 'hegemonic' slaveries,[25] and of these three are contained within this plateau: southern US slavery and those of Brazil and the Caribbean (the other two were the slave societies of Greek and Roman antiquity). The most important of Atlantic slaveries was that of the Iberian Atlantic, followed by the North-West European Atlantic. However, all these 'Atlantics' were, at the same

time, an 'African Atlantic', as Paul Lovejoy and others have argued.[26] Within this plateau, different types of other slaveries (belonging to the First and Second Plateaus) continued to exist: various types of local slavery regimes under their own elites, slaveholders and traders (without the African local slavery regimes, the Atlantic slavery would have been impossible), slaving zones, and local slavery regimes in growing contact with the globalizing commercial networks associated with European colonialism. One of the best examples of research into slavery and its interdependencies with colonial expansion is that of the diverse slaveries in North America, including northern Mexico and the Caribbean, explored in *Linking the Histories of Slavery*, edited by James Brooks and Bonnie Martin.[27]

The Atlantic slaveries of the Third Plateau can be summarized into three distinct periods, in terms of the interrelation between migration, slaveries, and commodities. The first, or African-Iberian Atlantic, runs from around 1400 to 1640—with connections to the Indian Ocean from 1488, and from around 1570 to the Pacific Ocean, with emporia established around the globe (including, for example, Luanda and Manila). This saw the foundation of Atlantic forced migration for the production of tropical commodities throughout the colonial territories of the Americas (although centred upon the Caribbean), the prerequisite for which was the violent conversion of African captives into 'talking commodities' as enslaved people.

The 'Second Atlantic' ran from around 1640 to 1820. This had two main dimensions: a Protestant African-Northwest European Atlantic and a Catholic African-Iberian Southern Atlantic. There were many connections between the two, especially in the Caribbean and West Africa—although in some cases also in East Africa and the western Indian Ocean, as well as between East Asia and Mexico/Spanish America. Approximately eight million enslaved people were taken from Africa to the Americas during this period, in conjunction with production complexes that were increasingly global in their orientation. These included the extraction of minerals, especially American silver (although also gold, which was important in Africa, platinum, and precious stones),[28] iron, and copper; and European and American industrial goods, including those related to shipping (sails, metal parts, instruments, barrels, masts) as well as tools, weapons, and earthenware. These were dwarfed, however, by the commodity trade that was directly related to slavery. This included the value of the slaves as commodities in themselves, which (drawing on the research into the slave trade by David Eltis, Frank Lewis, David Richardson, Nicholas Draper, Catherine Hall, Keith McClelland, and others)[29] can be estimated as being in the region of two billion silver pesos over this period. But it also includes the extensive range of commodities produced by them: not least the plant products cultivated and processed using slave labour, and then commodified by colonial and ex-colonial elites—sugar, cacao, tobacco, indigo, coffee, cotton. There were also those commodities produced for and by the enslaved: food crops, drink, working and guard animals (cattle, horses, mules, dogs), food animals (chickens, goats, cattle, sheep), clothing, tools, ships, and the various infrastructural needs—such as harbours, barracks, and the transport and communication infrastructures between them. There was the leather and timber for boxes and barrels

needed for transportation of the commodities, as well as textiles and fabrics—wool, linen, cotton, and the cloths produced from these.

The 'Third African-Iberian hidden Atlantic' of the nineteenth century was formed from some very large, almost global, 'second slaveries' and 'slavery modernities',[30] involving slave-based capitalisms.[31] These were part of European expansion, colonialism, creolization, new types of mass migrations, and Western 'war capitalism',[32] alongside the capital-multiplying space of the 'hidden Atlantic' (as in Cuba/Spain and Brazil/Portugal).[33] This period saw more than two million displaced people thrown into the illegal contraband trade, with forced migration from West and East Africa.

As a whole, these 'Atlantics' formed the Third Plateau of slave history—a history of intense forced migration over long distances. It is the only one of the plateaus of slavery that was built upon an entire commercial transport system (not only maritime, but also land-based).[34] The enslaved migrants (if they survived the journey, which of course many did not) often subsequently engaged in active resistance, flight, settling, transculturation, and the formation of new diasporic migrations (often themselves in connection with the slave trade).[35] The historiographical problem this presents is that there are hardly any self-representations by slaves while in slavery.[36] Yet this is also the only plateau that found a formal end in state-proclaimed abolitions and emancipations, as a result of which to this day there is no country where ownership of human bodies is legal—however much informal slaveries may persist.[37]

The Fourth Plateau began around 1800, and thus overlaps with the Third—mainly through the 'second slaveries', 'hidden Atlantic', and the beginnings of world economy with connections to East Africa—and is the most complicated of the Plateaus.[38] It began in the period of Western abolitionism—first from England, the United States, and France (1808 to 1840), in tandem with developing racist discourses, and then the 'new' slaveries from 1840 to 1960.[39] It saw the 'West' become genuinely global in scope (with the expansion into India, the Indian Ocean and Africa). In the process, abolitionist rhetoric and policies to openly countenance slaveries turned to other forms through which slavery could persist albeit disguised. Slave emancipation did not end forced labour, which continued in some parts under the pretext of preserving local customs and traditions, as in China, South-East Asia, India, Persia, and other Islamic countries.[40]

This was paralleled first by large-scale forced worker migrations within and from the Indian Ocean, China, and other Eastern hemisphere territories, such as the Dutch Indies, to the Western hemisphere and Australia.[41] It included mixed forms of indentureship, free labour, and bond-slaveries, based on national-imperial 'war capitalism',[42] as well as the formal or informal 'second slaveries'. In effect, this plateau is akin to a 'global second slavery', in effect 'no end after the end'.[43] It involved informalization following the abolition of former 'big' legal slaveries into smaller complexes of slaveries by another name—yet involving the same extremely hard work under the same production structures (plantations and others, in colonies or on colonial frontiers), often with even stronger asymmetric dependencies and the same low status for the nominally ex-slaves. This began with the practices under Toussaint Louverture in Saint-Domingue/Haiti around 1800 and colonial policies under British anti-slave trade pressure from around

1815, with the so-called emancipated slaves.[44] These officially 'liberated' but in reality informal state slaves had to work following their emancipation from slave vessels for seven more years under conditions that were often indistinguishable from slavery.[45]

Akin to colonial slavery and involving the same hard labour (generally unskilled and physical, involving the hardest of routine jobs, and work on large projects like canals or railways), this was indirect commodification. Individuals could not be bought and sold in the marketplace, as were enslaved people before formal abolition, but, with the help of the state, they were sold by contract, or exchanged between elites, or colonial projects and armies. Something similar also happened with the so-called contract or indentured workers ('coolies'),[46] whose contracts were also sold, sometimes with an advance payment being made by the buyer to the families of those so employed.[47]

The Fifth and Sixth Plateaus comprise slaveries of women and children, collective colonial and state slaveries, and slaveries in prisons and camps (German concentration camps, Japanese prisoner camps, the Russian gulags, US jails, Chinese and North Korean camps), and the so-called modern slaveries from around 1970 on.[48] These are not discussed here, but, particularly since the 2003 Iraq war and the refugee crisis of the twenty-first century, it has been shown that slaveries continue to form part of migrations as human trafficking linked to informal commodification. Today's slaveries exist though without formal legal ownership in the sense of civil codes, as in 'Roman' law, customary law, or traditional Anglo-American case law.

Two examples illustrate how these different plateaus worked in historical reality, one from the sixteenth century and the other from around 1800. Atlantic slavery emerged in the sixteenth century, first in Africa, the Caribbean, and on some points of the South American coast. The Iberians and Genoese encountered First and Second Plateau slavery, mostly through capture, raids, killing, and enslavement of prisoners, or house slavery of the *caciques* and elites, on the islands and coasts around the Caribbean, and themselves carried out massive raids and transported slaves. They brought the first Black enslaved people and began smuggling enslaved *cativos* from the West African islands. From 1520 onwards, they also engaged in direct trade between Africa and the Caribbean,[49] when the Spanish crown forbade the enslavement of *indios* from the New World across the Atlantic to Europe—something that Columbus had already started—and introduced collective forms of strong asymmetrical dependency on site (*repartimiento* and *encomienda*). Despite the ban on this Atlantic dimension of Indian slavery, massive slave raids continued in the Caribbean. Although the *conquistadores* and first settlers were generally acting within the First and Second Plateaus, they tried to turn the enslaved into Atlantic commodities, just as the Portuguese turned *cativos* from Africa into Atlantic capital of human bodies, quasi-settlers, and talking commodities. However, this succeeded only partially and regionally in the Caribbean, as well as on frontiers and war zones in the expanding American colonies,[50] and was not yet permanently within the Third Plateau of Atlantic slavery.

A striking example of such slavery, together with forced migration, is that of an indigenous woman from the Tocobaga people in today's Florida (near Tampa). The woman, whom the Spaniards named Madalena, was captured in 1539 during a raid by

the Hernando de Soto expedition to Florida in 1539–1542. This was clearly captivity and raid slavery of the Second Plateau. De Soto sent Madalena to the household of his wife Inés de Bobadilla in Havana—another dimension of the Second plateau (informal domestic slavery). De Soto was killed on the Mississippi around 1542, and his widow took Madalena to Seville, where she continued to be an informal house slave within the emerging Third Plateau of Atlantic slavery.[51] Inés de Bobadilla died in Seville in 1546, and Madalena returned to Havana, and as a translator she helped the Dominican monk Luis Cáncer (a close confidant of Bartolomé de las Casas) in the preparation of an expedition to today's Tampa Bay, where the Dominicans were trying to establish a mission. After serious conflicts with Tocobaga warriors, who killed Cáncer, Madalena disappeared from written sources in 1549. As Scott Cave has commented on her life history: 'Madalena is never formally called a slave, but her kidnapping, transhipment, and labour constituted slavery, in fact if not in name'.[52] The same applies throughout global history to the connection between raid/war captivity and slavery, which has so far mostly been debated in connection with expanding empires and frontiers, as well as militaristic frontier societies against expanding empires.[53]

The second example concerns the close observer and analyst Alexander von Humboldt (1769–1859), who visited Venezuela between 1799 and 1800, and Cuba in 1800/1801 and 1804.[54] Before travelling to the tropics from Europe, Humboldt had experienced Prussian serfdom and was familiar with the debates around the Third Plateau of Atlantic slavery—in the first instance with the British arguments about the slave trade. In Venezuela, he described the dynamic beginnings of 'second slavery' on the north coast of South America—an important dimension of the Third and Fourth Plateaus, which, as mentioned above, is based on capital accumulation in plantation areas from human bodies out of the slave trade as well as mass production and trade/smuggling of commodified human bodies and products/commodities for and by the enslaved. In Cumaná, Humboldt observed the smuggling of slaves in the Caribbean periphery between the islands of different colonial powers,[55] and the establishment of new cocoa plantations as part of the Third Plateau. In Caracas and in the adjacent large plantation zones of the Aragua and Tuy valleys (sugar, coffee, cocoa, indigo, cotton, tobacco; also, cattle, horses, donkeys, and mules on cattle ranches, or *hatos*), he analyzed what was then the most modern 'second slavery' in the Spanish Empire.[56] On his travels south through the Orinoco plains (*llanos*), he took note of the slavery of *llaneros* (mostly people of colour with Indian mothers) and Black enslaved foremen in the *hatos*.[57] This can be considered a very old form of slavery as part of the Second Plateau (captured warriors in livestock farming), existing within the Third Plateau. On his boat trip down the Orinoco south to the Río Casiquiare, Humboldt saw the most varied forms of slavery among the indigenous peoples (First and Second Plateaus, most of them raid slaveries, especially of Caribs, who also supplied the Dutch and French in Suriname and Cayenne). And finally, Humboldt repeatedly refers to a kind of religious slavery in the Christian missions, which used slavery and the slave trade, as well as those enslaved 'without slavery'—in other words, forms of the First and Second Plateaus on the frontiers of the Third Plateau. Similar to the *bandeirantes* and *entradas* in Brazil, the monks had developed raid tactics

with larger groups of men from colonial societies (often also indigenous people of the mission, *mulatos*, *zambos,* and free blacks as well as special enslaved people) with which they raided areas of not yet subjugated peoples and tribes (*entradas*). There, women and children in particular were enslaved in order to add them to the indigenous peoples of the mission stations and territories, with the excuse of bringing them to Christianity.

Cases Studies from Cuba

The Spanish colony of Cuba had by the nineteenth century developed the most dynamic of second slaveries in its central western part. This undoubtedly formed part of the Third Plateau of Atlantic slavery and also of the global Fourth Plateau, and through forced migrations, also contained elements of the First and Second Plateaus within this. Mayas, Apaches, and Chichimecs from the northern regions of New Spain were abducted as raid slaves to Cuba.[58] From many other areas of the Caribbean (Saint-Domingue after 1791, Santo Domingo, Florida, and Louisiana, as well as South American *tierra firme*), slave owners fled to Cuba with enslaved people or tried to force their former enslaved in Cuba back into the Third Plateau.[59] Between 1840 and 1874, around 150,000 Chinese and 2,000 Yucatecan Mayas, Indians from Honduras and Costa Rica, and Black workers from Liberia were transported to Cuba.[60] As war and raid captives between slaves and indentured people (or bond-slaves), they effectively came from other plateaus into the Third and later Fourth Plateaus.

Slaves were frequently treated not just as commodities for sale but as a form of currency that furthered transactions between the three continents. This can be seen in the example of Jacob Faber, an American slave trader from Baltimore who was taking up residence in Cuba having worked as a *factor*, or trade agent, for the *factoría* (commercial centre for the Atlantic slave trade) on the Pongo River in today's Guinea, north of Conacry. In 1815, Faber embarked on the slave ship *Junta de Sevilla* with six *muleques* (adolescent slaves) and a *negrita* (probably a young woman), to travel from Africa to Havana. To cover the cost of transportation, he paid 100 *pesos* per enslaved child to the consigner of the ship—another North American, Dr Samuel Galé, from Charleston. The trick with these semi-legal transports was that men like Faber did not run the risk of buying and losing ships, organizing the expedition, or buying food and other necessary supplies. Faber himself wrote about his human 'currency': 'Serah to prime girl/Fárra to prime boy/Sabu to prime boy/Yattá to prime boy/Yorrá to prime boy/Sabudie to prime boy/Culipa to prime boy. . . in all seven'. He had chosen especially sought after and valuable child slaves and did not see fit to baptize them or give them 'Christian' names. He had taken the children as highly wanted commodities and capital to finance the cost of hotel and subsistence expenses in Havana, and to exchange some of the children for other commodities or silver pesos. At the same time, travelling with slaves served as status capital, demonstrating his power, connections, and wealth.[61] Faber's story is one example of how enslaved people were treated as a currency for commercial

operations in both West Africa and the Atlantic World. The term '*pieza de Indias*' (or *peça* in Portuguese) was used as an accounting unit throughout the Iberian empires until around 1820. As Fernando Ortiz describes, a full *pieza* referred to a healthy man between 15 and 30 years old of at least a certain height, or a healthy, tall young woman. Older women (aged over 25 years old), along with adolescents and children, were valued as half or two-thirds of a *pieza*.[62]

The particular challenge for historians is that there are very few historical sources in which the enslaved themselves 'talk', and even fewer examples of their self-representation. As Guno Jones has written, in looking at Dutch Transatlantic and Indian Ocean slavery: 'Impactful, horrific stories of many millions have disappeared into black holes of epistemological nothingness, and there is no way to retrieve them'.[63] Nevertheless, there are some examples of the 'talking' of the enslaved, which can be found in studies that have sought to uncover such hidden voices, as in the collection edited by Kathryn McKnight and Leo Garofalo, which seeks to make audible black narratives from the early modern Ibero-Atlantic world.[64] Even then, since a voice has to be written down in order to be usable as an identifiable source, and as few slaves would have had such an opportunity, mostly what can be found are what Paul Lovejoy has labelled 'freedom narratives'[65], written either after the manumission of the respective individual or following formal abolition of slavery.

Important to historians in this respect are legal sources: police and prosecutor archives, court cases, and the records of the *síndicos* and fiscals, who were state-appointed and funded lawyers responsible for negotiating on behalf of the enslaved, slave owners, and overseers.[66] Slaves and former slaves (or those facing the danger of re-enslavement of themselves or their children) looked for sympathetic people in the system to whom they spoke and who wrote down their words. Although the problem remains that such voices have been mediated, nevertheless the impression is given of such enslaved people talking through the writer. This can be seen in recent studies, such as that of Victor Goldgel-Carballo drawing on the consular testimony of a man kidnapped into slavery in Cuba.[67]

Two specific sources from Cuba provide examples in which the enslaved 'talk' to us by writing themselves. Although neither of these two sources had been subject to forced migration or the Atlantic slave trade, since both were born in Cuba as Creole house slaves, nevertheless they were 'talking commodities', facing the risk of being sold on by their respective owners. One of these, Juan Francisco Manzano, is very well known. Manzano, while still a slave in Cuba, wrote and recited poetry that the slave owners (and possibly his co-enslaved) liked to hear. His freedom was eventually purchased by a group of slave owners and writers, and he wrote his autobiography.[68] The other, by contrast, is much less known—a young slave in Havana, Margarito Blanco, who, with the written permission of his master, looked for work on the streets or in the harbour. What we know of him comes from his recorded testimony before the Military Commission in 1839: that he was twenty-five years old, a Creole slave, married, living in the Jesús María neighbourhood (near to the walls and harbour of Havana), and held two jobs, as a cook and a harbour worker. He had asked the authorities for permission to hold a

nightly dance event with drums by the city walls.[69] Not only did Margarito speak as a 'talking commodity', he also left some texts written in his own hand on pieces of paper.[70] From other sources it seems that Margarito was a senior member of a mutualistic society (*asociación clandestina*)[71], a religious group known in Cuba as *abakuá* or *ñáñigos*,[72] in which he held the rank of *ocongo* or *mocongo*—considered to be the highest leader and warrior, responsible for making the sacred drum sound (which is considered the voice of the leopard). As well as functioning as 'labor contractors who used their position to provide favors and jobs to society members, but also to exploit them', the heads of the secret society were often required to sign contracts for their members in the ports.[73]

Partly for this reason, such slaves and former slaves learned to read and write. But there were those who arrived as slaves from Africa, already proficient in Latin alphabetical script. This was the case with the Efik people from the Cross River region between today's Nigeria and Cameroon, as well as the *ambakistas* or *ambacas* from the Kongo and Angola regions.[74] As very active slavers and merchants, in Africa they interacted with the mainly English-speaking slave traders and captains of European, Cuban, and North American slave ships.[75] As in all enslavement societies and slavery regimes, slave traders also lived dangerously—some of them were themselves enslaved and forced across the Atlantic as 'talking commodities'.[76]

Conclusion

Each of the slavery plateaus described and the case studies provided demonstrate distinctive forms of commodification, related to a wide range of commodities—including the slaves themselves as 'talking commodities'.[77] This became clearly evidenced in Atlantic slavery from 1700 onwards in the Third Plateau, and more clearly still from the Fourth Plateau onwards, with the development of the capitalist '*Weltwirtschaft*' (global economy) and corresponding local slavery regimes of resources, production, and commerce.

Once the formal slave trade and slavery for Westerners were no longer allowed, there was a turn to the so-called coolie migration of contract or indentured labour. This has its own historiography, which is not dealt with here but, in the context of those such as Hugh Tinker who refer to this as the 'new system of slavery', calls for more comparative global research.[78] Contract labour was encouraged by the destruction of rural livelihoods in their places of origin, whether through local slavery regimes or the already existing colonialism, indirect or direct (such as in India), through wars or revolutions (as in China), active military colonial expansion (for example, on the western frontier of the United States, Australia, Southeast Asia, and the Pacific islands).[79]

Indentureship saw aggressive use of contracts in the legal expansion of abolition discourse (and the already old tradition of written contracts in China); human shipments bound for the Americas over longer distances than at the time of the transatlantic slave trade and often on the same ships used in the former slave trade;[80] and work on

plantations and major infrastructure projects in the country of arrival for a specified time—in the case of Cuba for eight years, similar to the so-called *emancipados* or liberated slaves. Contracts could be sold and extended for the slightest offense, and penal sanctions could be imposed for breach of contract.[81]

After the abolition of slavery and with the US incursion into former Spanish colonies, there were also marked patterns of mass 'free' (recruited) labour migration across the Caribbean to work on post-slavery plantation areas and build roads, railways, and the Panama Canal.[82] Globally, whether Chinese sent to Cuba, Angolans to Sao Tomé, or South Asians to Sri Lanka, this was a very constricting form of 'free' labour if not slavery in disguise.

Migration, slavery and slaving, and other forms of 'unfree' or 'semi-free' labour have, thus, been major issues in global history linked to commodification, creating the basis for asymmetrical dependencies, in communities, societies, and empire formation, and for the enrichment of persons, groups, and institutions, or getting central political positions for former marginalized elites. In the case of slavery, as this chapter has shown, different historical plateaus, which began with temporal and spatial specificity, have overlapped, and interacted, and—with the exception of the formal abolitions of the Third Plateau—have not ended to this day. The best-known and best-studied plateau is arguably that of Atlantic slavery, which resulted in empire building and colonial settlement, on the basis of commodity production by and in some instances for the enslaved, in the process turning slaves themselves into 'talking commodities'.[83]

Deepening and broadening the plateau approach to encompass all forms of coerced labour may well contribute to a more nuanced understanding of the different ways in which commodified humans have been so fundamental globally, especially if avenues are explored to give them more of a voice. Without slavery, diverse slavery regimes, slave trade, and above all without enslaved people, many commodities would not have existed, and as people they deserve further research and debate. At the present stage of the debate around slavery, commodification, and development of the global economic system, it is probably best to solve it by understanding enslaved people as commodified 'capital of human bodies' and examining their role in the history of different capitalisms. Since around 1800, these capitalisms and their respective state forms have been networked with each other but also hierarchized through wars and politics.

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CHAPTER 15

LABOUR AS A COMMODITY

The Case of Rough Diamond Mining

KARIN HOFMEESTER

The question of whether or not labour can be considered a commodity is part of a long-running debate that started in the late eighteenth century amongst British political economists, as a reaction to the quickly expanding market economy. One of the first scholars who wrote about labour as a commodity was Adam Smith. In his *Wealth of Nations* (1776) Smith describes Britain as a 'commercial society' (we would call it a market economy or capitalist society), in which a division of labour had taken place and people could no longer live off their own labour but had to rely on the labour of others through exchange.[1] He recognized that not all workers sold the produce of their labour as independent labourers. Many were hired, by employers who owned stock and provided the workers with materials and subsistence or wages.[2] It is clear that Smith, in his thinking about labour as a commodity, referred to wage workers. He developed his ideas on the division of labour in the context of the commercialization of craft production in Britain that had led to subcontracting on a large scale, and the separation of master employer from the shop where the manual work was executed.[3] According to Smith, the wealth of people in such a commercial society was determined by 'the quantity either of other men's labour, or, what is the same thing, of the produce of other men's labour, which it enables him to purchase or command'.[4] Smith also made a distinction between objects that have value in use, such as water, and commodities that have value in exchange, such as diamonds, and then sets out to discover the exchange value of such commodities.[5]

How then was the exchange value of labour to be calculated, thereby determining the price of labour on the market? 'Labour, *like* commodities, may be said to have a real and a nominal price. Its real price may be said to consist in the quantity of the necessaries and conveniencies of life which are given for it; its nominal price, in the quantity of money'.[6] In other words, the real price of labour was the subsistence-level wage for both the worker and his dependents, and the money price of labour was regulated by both the demand for labour and the price of food, clothing, and housing needed to support

the worker and his family.[7] Taking all this together, Smith thought that in a market society, the amount of wage labour that one had access to, or the products of this labour (which were the same thing in his view), determined people's wealth. At the same time, the value of a product was determined by the price of labour needed to produce it but also by the amount of labour for which it could be exchanged.

While in the eyes of Smith the added value of labour went partly to the wages of the workers and partly to the profit of the employer, Karl Marx had quite a different outlook on how employers profited from the value added by labour. In the first volume of *Das Kapital* (1867), Marx made a distinction between labour and labour power. Though he was not the first to make this distinction, he was the first to make it a central part of his theory on how profit was made in the capitalist mode of production.[8] According to Marx, labour was the physical act of working, producing goods and services (though he is much less explicit about the latter), and giving them use value.[9] What was offered on the labour market 'to the possessor of money' was not labour, but the labourer, and what the latter sold was his labour power.[10] In a capitalist production system, employers pay workers a subsistence wage; however, the labour power (counted in labour time) that added value to a product also had to be produced and reproduced: 'the fact that half a day's labour is necessary to keep the labourer alive during 24 hours, does not in any way prevent him from working a whole day'.[11] The difference between the value of the product (the price for which it was sold on the market) and the value of the elements that were used to make it—the means of production and the labour power—was the surplus value added by the worker and the profit for the employer. According to Marx, labour power is the worker's *capacity* to perform both mental and manual work—thereby making it a commodity that can be bought or sold on the market.[12]

However, the labour movement has, at least since a Trades Union Congress in Dublin in 1880, long resisted the idea that labour is a commodity.[13] When the International Labour Organisation (ILO) was established in 1919, its first rule was 'that labour should not be regarded merely as a commodity or article of commerce'. This rule was reaffirmed as 'Labour is not a Commodity' when the ILO was re-established in 1944.[14]

In that same year, economic historian and political economist Karl Polanyi published *The Great Transformation*, in which he analysed the development of modern states and market economies. Following industrialization, economic relations were no longer embedded in their local social relationships, cultural values, and moral concerns, as had been the case in pre-industrial societies, in which the production and distribution of goods was ensured via reciprocity (mutual exchange of goods and services through kinship networks), redistribution (locally arranged along culturally specific principles), and householding (in which production was based on households for self-consumption).[15] Instead 'one big self-regulating market' was established, in which prices controlled, regulated, and directed the economic system and thereby society.[16] This modern market economy, characterized by self-regulating markets, was disembedded from the pre-industrial cultural institutions, and in Polanyi's view was unsustainable, because there could be no unregulated market for labour, land or money: 'Labour is only another name for a human activity which goes with life itself, which in its turn is

not produced for sale but for entirely different reasons, nor can that activity be detached from the rest of life, be stored or mobilized'.[17] He therefore calls labour (along with land and money) a 'fictitious' commodity.

Nevertheless, it is with the help of this fiction that actual markets for labour, land, and money are organized. This would eventually lead to resistance and in the end to protective measures and institutions thereby terminating the self-regulating system. 'For the alleged commodity 'labour power' cannot be shoved about, used indiscriminately, or even left unused, without affecting also the human individual who happens to be the bearer of this peculiar commodity'. Institutions are needed to protect not only human beings but also nature, otherwise landscapes would be defiled, rivers polluted, and the power to produce food and extract raw materials destroyed.[18] Labour should therefore be taken out of the market, and the basic wage and maximum number of working hours be determined by trade unions, the state, or other public bodies.[19]

Together, Smith, Marx, and Polanyi provide a foundation for more recent scholarly critiques of the question of labour as a commodity. What follows starts with an overview of the current state of this debate. A key aspect of this has been the widening of scope from previous almost exclusive concentration on wage labour, and how this developed in market economies, and particularly in industrializing societies. However, this is not the only form of commodified labour. To capture the full spectrum of labour relations that existed worldwide in the last five hundred years, and to understand how various forms of commodified labour coexisted and developed alongside other forms of labour relations, a group of labour historians have developed a Taxonomy of Labour Relations, which is introduced here as an alternative to the classical interpretation of commodified labour as wage labour only. This taxonomy is then applied to a case study of rough diamond production in India, Brazil, and South Africa from the seventeenth until the twentieth century to illustrate how the production of one particular commodity could in different contexts be produced by workers with entirely different commodified labour relations, and how these could change over time. This has implications, as emphasized here, for global labour history more generally and specifically for our global understanding of labour as a commodity.

Commodified Labour Revisited

Recent scholarship has resulted in a reappraisal of how we should understand labour as a commodity. While previously political economists, following Smith or Marx, saw the commodification of labour as a defining feature of the economic system itself, writers such as Richard Biernacki have challenged this. In *The Fabrication of Labor*, Biernacki describes how the commodification of labour was practised and understood differently in Germany and Britain (as well as France and Italy)—even within the same textile industry.[20] In the process, the specificities and differences of culture are brought centre stage in understanding the nature of labour.

Likewise, the assumption (promulgated by Marx) that labour power could appear on the market as a commodity only if its possessor (the worker) directly offered it for sale is being challenged.[21] Although Marx did write extensively about slavery, he did not consider enslaved labourers as commodified workers—focusing instead on slaves as assets rather than labourers within specific labour relations.[22] This restrictive definition of labour power has been critiqued, most prominently by sociologist and labour historian Marcel van der Linden.[23] In his view, Marx's idea that only the work of free wage labourers was commodified in the capitalist mode of production is not supported by the evidence. He also questions why only the possessors of labour power could offer it for sale; why they could not sell it along with the means of production; and why slaves could not be hired out by their owners to a third party. Alongside 'free wage labourers', sharecroppers, self-employed artisans, and subcontracted wage labourers also own their labour power—only the latter do not sell it themselves. In van der Linden's view, wage labour performed by slaves who do not own but could sell their labour power should also be taken into account, just like the wage labour of chattel slaves and children whose labour was sold out by others: 'In reality labour commodification takes many different forms, of which the free wage-earner only selling his or her labour power is only one example'.[24]

While van der Linden describes the many intermediate forms of labour relations existing between wage labour, slave labour, and self-employment, Tom Brass adds bonded, convict, contract, and indentured labourers as forms of labour relations characterized by the sale of labour power on the labour market by others than the owners of that labour power.[25] More recently, historians Christian de Vito and Alex Lichtenstein have also made a very elaborate and convincing argument to interpret various forms of convict labour as commodified. In this case, the state or local polities (or a semi-state like the East India Company) took care of law enforcement and at the same time enabled the commodification of convict labour in plantations, mines, and other commercial enterprises.[26] The leasing of convicts—former slaves—in the southern United States is just one example of this form of commodified convict labour.[27]

But the net needs to be spread still wider. Most necessities of life need to be worked on before they can be consumed—preparing a meal, for example—and without this kind of subsistence labour, often performed by women, wage labour cannot be reproduced. Feminist sociologist and art historian Lise Vogel explains in *Marxism and the Oppression of Women* how the production and reproduction of labour power in the household is an essential condition for the functioning of the capitalist system, making it possible to reproduce itself. This structural relationship between the two and the role of women in the production and reproduction process of labour power determines the unequal position of women.[28] Recently economic historian Paddy Quick added an interesting element to the debate, stating that non-waged household production of both petty commodity production and production for household use is an important part of the capitalist production process that should be studied.[29] In consequence, the idea that only 'free' wage labour can be commodified should be reconsidered, to encompass the household sphere.

Polanyi's prediction of an economic, social, and environmental crisis of capitalism makes his work a source of inspiration for academics from various disciplines, especially since his 'tool box' of concepts to analyse how the economic process is instituted in different times and places allows for a wide range of interpretations, often far beyond the scope of his original thinking.[30] But there is also critique, and both can help us understand the concept of labour as commodity better. The idea that labour is a fictitious commodity has been criticized by sociologist John Holmwood, who argues that capitalism coincides with chattel slavery under which 'the individual, and not his or her labour power, is treated as a commodity and is detached from the rest of life and 'stored' and 'mobilized'. So while the idea of labour power as a commodity may be a 'fiction', the commodified labourer is not.[31] He argues that Polanyi's view on the development of modern market societies was highly influenced by a Eurocentric perspective that made him—and many of his critics and other political and moral economists—overlook the importance of colonialism and race in the conceptualization of labour relations.[32] While the rise of market economies and the dispossession of land led to an increase of commodified wage labour in Europe, dispossession in the colonies led to slavery, indentured labour, and other forms of commodified labour.[33]

Polanyi also seems to suggest that the various forms of exchange were linked to stages in societal development: reciprocal exchange was dominant in primitive societies, while redistribution characterized ancient societies, and market exchange was predominant in modern societies. While he mentions slaves in his description of the redistributive system, he does not mention this form of commodified labour in his description of the market economy.[34] Various authors have refuted Polanyi's idea of 'stages'.[35] They show that markets and wage labour developed much earlier and were much more widespread and influential than Polanyi suggests. To give just one example: in *The Story of Work*, Jan Lucassen shows how labour markets developed as early as 1000 BCE in Mesopotamia, and later developed in the Mediterranean, North India, and China.[36]

Likewise, crucial for our understanding of labour relations in market economies is that reciprocal labour has continued to be important to the present day: it is still vibrant within households everywhere in the twenty-first century.[37] Economic historian Avner Offer has calculated that the household production of both goods and services in the United States, Australia, and the UK in the period 1945–1990 accounted for between a quarter and a third of national product, if calculated in notional wage extrapolated from women's paid labour.[38] Studies of household economies in other parts of the world, by van der Linden among others, have shown a large variety of forms of labour that supported the household.[39]

Reciprocal labour for the household is what Marx overlooked in his writings on the (social) reproduction of labour, and what Polanyi seems to limit to primitive societies. It is the work that is often done by women, as Lise Vogel pointed out and historian Corinne Boter showed in detail for the Netherlands in the nineteenth and early twentieth centuries.[40] This pattern can be found in many other market societies worldwide.[41] Neither is reciprocal labour restricted to household labour; it can also be performed within communities, as is still the case in many regions around the world, which Willem

van Schendel has shown for North East India in his plea for the inclusion of communal non-commodified forms of labour in global labour history.[42] Given these insights into labour as a commodity, a new overview is needed of all forms of commodified labour and how they fit in a wider framework of labour relations in which both household and community-level reciprocal labour relations have an important place. While Smith, Marx, and Polanyi focused on wage labour in industrializing societies, various developments have led to a reinterpretation of the concept of labour by sociologists and historians.

Labour history started as a discipline that studied the European and North American institutional history of labour, such as trade unions and labour movements and their actions. This began to change when groundbreaking works such as E. P. Thompson's *The Making of the English Working Class* (1963) helped to shift the focus to the social and cultural history of labour, to include the history of working lives, labour processes, and everyday culture. However, it was still focused on wage labourers in the industrialized parts of the world, and restricted to the boundaries of the nation state.[43] The collapse of communism in the 1990s and the crisis of working-class parties in many parts of the world led to a sense of crisis in labour history.[44] At the same time, decolonization led to the development of a strong historiography of labour in Latin America, Asia, and Africa that showed the importance not only of industrial workers but also of peasants and small business owners; the significance of the work of indigenous and Black people and immigrants; and the weight of topics such as (the legacy of) slavery and other forms of coerced labour.[45] At the same time, feminist historians and historians studying women's work pointed to the importance of gender, and the often overlooked work of women in both household production and (social) reproduction, suggesting that this unpaid work helped sustain and renew commodified labour power making this work 'invisibly commodified'.[46] Finally, globalization led to a growing consciousness of worldwide connections in production and consumption of commodities, and also in labour relations. All of this led to a new approach to global labour history by a group of researchers at the International Institute of Social History (IISH) in Amsterdam, led by Jan Lucassen and Marcel van der Linden, who explicitly wanted to look at all kinds of work and labour relations worldwide over a longer period of time.[47] This meant rethinking the concept of commodified labour.

To better understand the diverse forms of labour relations worldwide, the IISH set up the Global Collaboratory on the History of Labour Relations,[48] and a large network of international scholars developed a new taxonomy of labour relations based on a shared set of definitions that can be applied to all parts of the world, at least from 1500 onwards. Participants contributed datasets containing data on labour relations for various parts of the world at five cross-sections in time: 1500, 1650, 1800, 1900 (and, for Africa, 1950), and 2000. A second phase of the project is seeking explanations for shifts and possible patterns in labour relations.[49]

The collaboratory looks at 'work' rather than 'labour'—a distinction that can be made in English, whereas in many other languages one word covers both meanings. 'Labour' usually refers to paid work, is associated with labour power and the labour market, and

at the same time refers to workers as a group and their organizations. 'Work' on the other hand tends to be defined as productive activities in general, defined by Charles and Chris Tilly as including 'any human effort adding use value to goods and services',[50] and can be used regardless of whether these productive activities are paid or unpaid, free or unfree, or performed for oneself, the household, the community, the polity, or the market.

The point of departure in the taxonomy is the total population. It then distinguishes between those who are able to work and those who cannot work or cannot be expected to work because they are too young, too old, disabled, or studying; the affluent who do not need to work for their living; and the unemployed (Fig. 15.1). This has at least two advantages: it forces the researcher to be aware of what work is; and it covers the entire population, thus explicitly also taking working women and children into account in the datasets.[51] Since women's work is often not, or only partially, part of the 'formal' labour market, census takers often overlook the paid or unpaid work that women do, both inside and outside the household, and in doing so their commodified labour is also not part of official statistics. By 'forcing' participants of the collaboratory to think about the economic role of women and by adding data on women's work and labour relations, we are able to have a more complete picture of the productive and reproductive work of women.[52]

The taxonomy distinguishes between three types of exchange of goods and services, including work, linking these with three levels of analysis that reflect the target of production: the household and/or community, the polity, or the market. Labour relations also express under what rules people work. The first type of exchange is *reciprocity*—that is, work done for other members of the same household or a group of households that form a community. The taxonomy makes a distinction between leading household producers (heads of largely self-sufficient households), kin producers, (including spouses and children of the heads of households, who contribute to the maintenance of the household by performing productive or reproductive work) and subordinate kin. The next form of exchange is *tribute giving*—that is, work based on obligations vis-à-vis the polity, which could be a state but also a feudal or religious authority. This category is subdivided into obligatory labourers (who have to work for the polity, and are remunerated mainly in kind, including those subject to civil obligations, such as corvée labourers, conscripted soldiers and sailors, and work as punishment, i.e. convicts). The final form of exchange is that in which labour is *commodified*. In this case workers sell their capacity to work (or the product of their work) on the market—or, in the case of unfree labour, the owner sells the workers on the market. The category of commodified labour includes self-employed producers, along with members of the household who work together with the self-employed leading producers. Next are the employers: those who produce goods or services for market institutions by employing more than three labourers. Marx would certainly not have seen them as commodified labourers, but in the broad definition of work the collaboratory uses, this group of people is also considered as working for the market. Then there are wage earners who produce commodities or services for the market in exchange mainly for monetary remuneration.

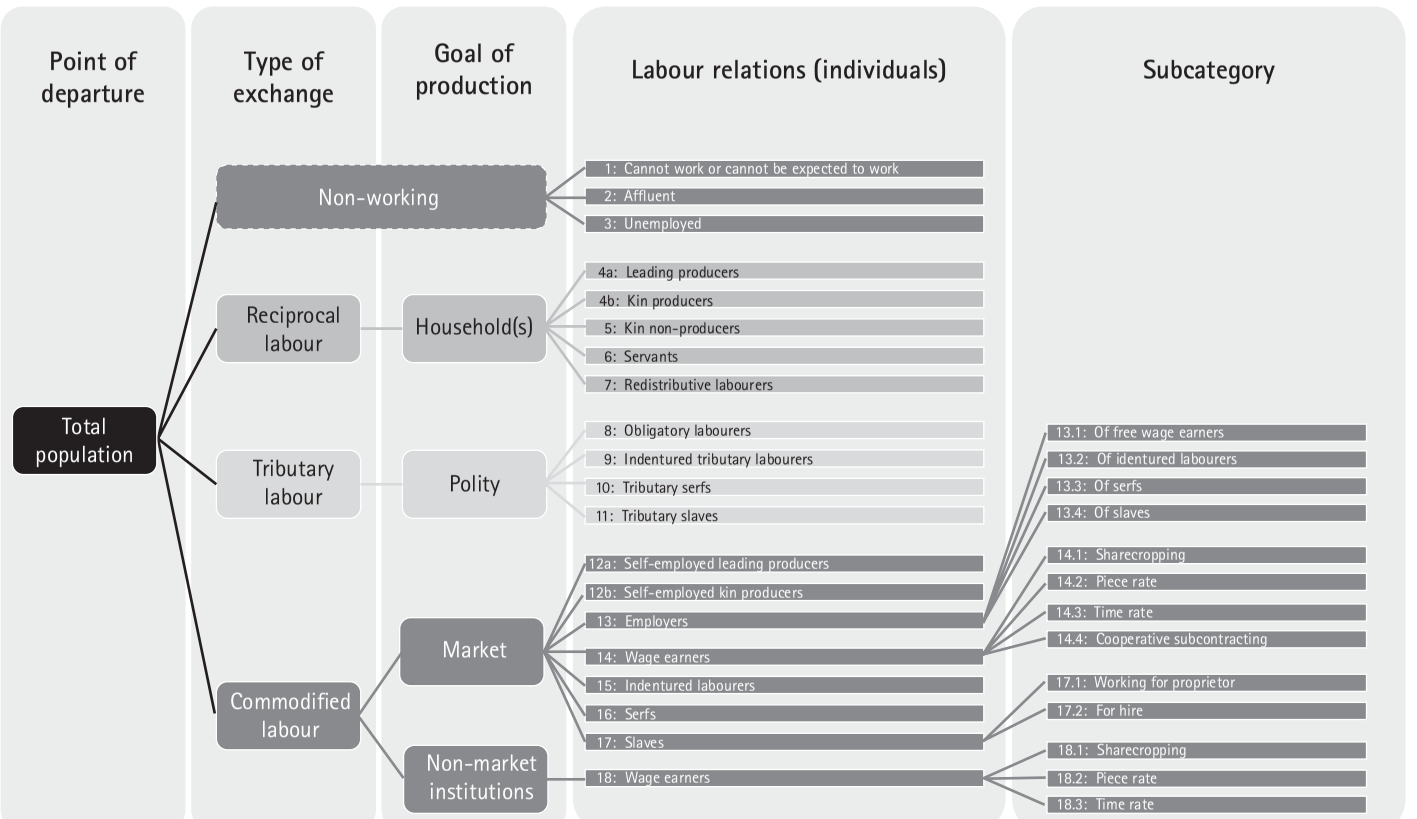


FIGURE 15.1 Taxonomy of labour relations.

© 2015–17 Global Collaboratory on the History of Labour Relations, 1500–2000, International Institute of Social History.

These are the classical commodified labourers in the definition of Marx, which the taxonomy divides into piece-rate and time-rate wage earners, but also includes other wage workers, such as sharecroppers whose remuneration is a fixed share of total output, and cooperative subcontracting workers on a piece-rate basis.

An important category of commodified workers who work for the market are the coerced workers, explicitly added by van der Linden and Brass, such as indentured labourers who are contracted to work as unfree labourers for an employer for a specific period of time to pay off a private debt. They did not sell their labour power themselves, somebody else did, as was the case with serfs—those bound to the soil and to provide specified tasks for a specified maximum number of days for private landowners. The most unfree type of labourers are slaves: those owned (bought and sold) by their employers (masters). They are deprived of the right to leave or to refuse to work. The taxonomy differentiates between slaves working directly for their owner and slaves for hire, for example, for agricultural or domestic labour. In the latter case, the enslaved labourer is not the commodity, but rather their labour power that is hired out by their owner, not by themselves.

Where Smith, Marx, and Polanyi primarily saw wage work as commodified labour, the Taxonomy of Labour Relations thus also includes other forms of labour, including coerced, as commodified. Moreover, it provides a tool to include reciprocal labour as an integral part of societies in which commodified labour seems to prevail. With this tool, members of the collaboratory have analyzed the development of labour relations in various parts of the world over the period 1500 to 2000.

The findings of the project to date suggest that over time, the share of the population engaged in commodified labour increased at the expense of reciprocal and tributary labour. Commodified labour started earlier than expected: in 1500, some 10 per cent of the world population we have data for had commodified labour relations as their primary labour relation. But at the same time reciprocal labour lasted longer than previously assumed: in 2000, 10 per cent of the total world population still had reciprocal labour relations as their primary labour relation, which can largely be explained by the inclusion of working for the household. In various parts of the world, in almost all cross-sections, people combined labour relations, either during the year (combining wage work with work on their own plot of land, for example) or over their lifetime.[53]

Commodified Labour in Diamond Mining: A Case Study

Illustrative of the definitions of labour relations developed by the collaboratory is the following case study on diamond mining in India, Brazil, and South Africa—one sector in three different places and time periods with very different forms of commodified labour relations, following different trajectories over time. For a long time, India had a

near monopoly on diamond production, until diamonds were also found in riverbeds in Brazil in the 1720s. In the 1870s, the discovery of primary deposits in South Africa meant another major change in the global diamond commodity chain. These primary deposits led to deep mining on an industrial scale and an enormous output of relatively cheap diamonds that found their way to a broader consumer market.[54] Diamond mining is very labour intensive, and the problem of labour supply and labour control (which has an extra dimension in the case of a precious mineral like diamonds) was solved in various ways by those exploiting the mines.[55]

India's alluvial diamond mines were located in and around riverbeds on the Deccan plateau, around Sambalpur in present-day Orissa and Panna in Central India.[56] Usually the emperor, king, or sultan owned the mines in his territory. He would lease the mine to revenue farmers who collected the fees (including rent, a fee per miner, a percentage from purchases and sales, and all diamonds bigger than ten carats) from the diamond merchants who actually commissioned miners to dig for diamonds.[57] The merchants sold the diamonds to consumers in India, the Arabian Sea rims, and Europe.[58]

Miners were contract labourers who worked for wages in cash, though they were sometimes also partly compensated in food.[59] Men, women, and children worked in the mines: men dug the pits (not deeper than fourteen feet) and removed the earth and superfluous water, which was carried away in baskets by women and children.[60] They carried the soil to where they would wash and dry it. Finally, they would sieve the earth for the diamonds.[61] Historian Ishrat Aslam categorizes the miners as 'possibly (. . .) pauperised peasants and landless workers from the villages'.[62] The fact that women and children joined the male miners supports this idea of landless workers, as, otherwise, they would have taken care of the land. We may assume that a large number of miners were labour migrants who moved with their families from agricultural areas to the mines and vice versa, working as wage earners in both sectors. If working conditions were considered too bad, miners would move from one mine to another.[63] In this case commodified labour took the shape of family labour, in which parents and their children sold their labour power as family. Most sources mention weekly wages as remuneration for this commodified labour, but sometimes the miners were paid per stone by the merchants, who in return supplied them with food: a combination of piece-rate and wage work that was remunerated by lodging only. As the miners might sometimes not find a stone for two or three months, they could easily end up in a position of debt bondage, another form of commodified labour.[64] If the miners were not hired by the merchants, they sometimes had to carry out mine work for the king, in exchange for only board and lodging. They were described as 'slave-like objects'.[65] This made them effectively tributary labourers for the king, as long as no commercial exploiters worked the mine.[66] The same miners could be commodified labourers one part of the year and tributary workers another, one of the many types of combinations of labour relations that prevail in the regions and cross-sections researched by the collaboratory.

The system of family labour was contingent. When the British gained control over the Deccan mines in 1796, they reported that men, women, and children were still working the mines.[67] The number of miners was much lower than in the earlier days, which

could point to the exhaustion of the mines, or at least the layers that could be worked with the simple methods that the miners had at their disposal. Now, most miners owned shares in what they produced, and only some were 'mere labourers for hire'. Given the prevailing output of the mines, British observers did not expect peasants to go working in the mines. One might conclude from this that labour migration continued, although not from agricultural areas to mining areas, but from one mining area to another. In addition, the number of wage labourers seems to have diminished in favour of the number of self-employed miners, probably as a consequence of the reduced yields that attracted lower numbers of entrepreneurs.[68]

In 1817, an East India Company (EIC) official suggested convict labour as a solution for the labour problem in the diamond mines because 'coolie hire' (in this context casual, unskilled wage workers) was expensive, and the rent of the plots was too high in relation to the profits.[69] He added an extra encouragement: 'The government of Brazil employs all its convicts and many slaves in digging and searching for diamonds'.[70] The Board of Governors of the EIC rejected the plan to use convicts as labourers, mostly because they did not want to invest money in the exploitation of the mines, but also because the surveillance of the prisoners—often accused of theft—working in the diamond mines would be too expensive.[71]

A century later, family wage work still seems to have been the rule in the diamond mines. When in 1904 the Maharaja of Panna—who still owned the diamond mines in his region—asked the British Geographical Survey of India for advice, its researcher concluded that the mines could still be worked profitably, as long as modern science and techniques were used. Of course, Indian labourers would still have to do the real mining work, and this should be family work: men, women, and children working together, as 'the Indians clearly preferred this way of working'. Strict supervision of the workers was needed, but since there were women and children involved 'such severe measures as are practised in the South African mines' were of course impossible.[72]

Meanwhile in Brazil, the Portuguese colonial powers exploited the riverbed diamond fields, the Crown having declared the diamond deposits to be royal property after their discovery in the late 1720s.[73] Initially, all merchants and miners were welcome to work the mines as long as they paid a tax per miner to the Portuguese treasury. The mining procedure was more or less the same as in India; the workforce, however, did not consist of wage workers. Most mineworkers were enslaved labourers; some of them had already migrated with their masters from the coastal areas to the interior when gold was discovered, while others were brought in later from Rio.[74] From a preserved slave list for the years 1753 to 1758 we learn that the enslaved labourers were all men, with an average age of twenty-eight. Over 43 per cent of them came from the Bantu West coast of Africa, almost 30 per cent from the Gold Coast, some 5 per cent from Sudan, and the rest from diverse groups.[75]

The uncontrolled diamond explorations of the Portuguese caused an enormous flow of rough diamonds onto the world market, leading to lower prices. To control production, in 1734, the Portuguese Crown established a demarcated Diamond District, where nobody except administrators, miners, and their enslaved labourers were supposed to

live.[76] An intendant was appointed, with far-reaching judicial, fiscal, and administrative powers, and the Portuguese Crown established a mining monopoly, with the actual mining entrusted to a single contractor or consortium. The contractor had to pay rent per enslaved worker, and was not allowed to employ more than six hundred, in order to avoid overproduction.[77] The slave force on the list quickly diminished, and by the end of the contract almost 20 per cent had died and 32 per cent had escaped. The largest percentage of enslaved workers died in the first four years of the contract, which is telling with regard to their working and living conditions. Most escapes took place in the first two years of the contract.[78]

Enslaved workers received rudimentary housing and food and sometimes other forms of remuneration. During the washing and sieving part of the work process, diamonds could be hidden; and although the overseers in this part of the process carried a whip, they also applied positive incentives to encourage the enslaved workers to report the diamonds they found. Depending on the size of the stone, slaves could 'earn' a hat, clothing, a knife, or a day off. Reporting a stone of seventeen and a half carats or more would lead to manumission.[79] Enslaved workers could also be paid in money for good finds, and thus they could save for their manumission.[80] In addition, slave owners sometimes allowed their enslaved labourers to work independently as itinerant miners (*faiscadores*) as long as they paid a daily fixed sum to their owner.[81] This specific form of semi-self-employed slavery is just one of the many varieties of commodified coerced labour that could be found in the diamond fields. In this case, the owner of the slave did not directly employ the labour power of the enslaved worker but let them employ it themselves.

As almost one third of the enslaved workers escaped, they formed a considerable group of workers who had to make a living. They usually ran away in ethnic groups and developed communities (*quilombos).* The runaways often lived off illegal mining, and as such resembled the *garimpeiros*: workers who became illegal miners after losing their official jobs. Runaway slaves worked as independent miners, and sold their diamonds via ambulant merchants to contractors in Rio and Bahia. Despite, or in many cases because of, the severe measures, illicit mining and trading continued. Intendants, lower officials, and the contract holders did not always obey the law. They employed more enslaved workers than allowed, and they bought diamonds from *garimpeiros*.

In 1772, in an attempt to control the production and the revenues, the Crown itself started to exploit the mines under the name *Real Extração do Diamante*. From then on, the intendant of the Diamond District would exploit the mines, directly employing enslaved labourers to mine the diamonds, hiring them from their masters. In this 'slaves-for-hire' system, masters received a monthly payment for their slaves, while slaves appear to have received a small daily wage.[82] Another consequence of this form of commodified labour, in which not the owner of the labour power offered it for sale but his owner, was the stimulus for importing more slaves from Africa. Slave owners hired out their enslaved workers on a large scale, buying new slaves specifically for this purpose. Even people who had not owned slaves before began buying them, so that they could profitably rent them to the Crown—perhaps the most commodified form of coerced labour.[83]

For the Portuguese Crown, the cost of slave hire, salaries of administrators, and other material costs made for losses on mining operations and after 1808, it allowed foreign powers to invest in the mines.[84] Mines were leased to private entrepreneurs, who continued employing slaves.[85] However, when new diamond deposits were discovered in Bahía in 1844, most workers were *garimpeiros* and not slaves.[86]

In the late 1860s, diamond fields were discovered in South Africa north of Cape Colony and west of Orange Free State. When they turned out to be primary diamond deposits, the British annexed the diamond fields—often located on farms—and a considerable additional part of Griqualand-West.[87] Diamond merchants bought the farms—for example, that of the De Beer brothers, which gave Cecil Rhodes's De Beers Mining Company its name. Alternatively, they could buy a claim to work part of a mine.

The workers in the diamond mines were Black male migrants, from almost all communities south of the Zambezi River, although the Pedi, the Tsonga, and the South Sotho formed the largest groups until at least 1885.[88] They had once lived off hunter-gathering and subsistence farming, but ecological pressures and regional conflicts had already driven many of them to look for other economic possibilities long before the development of diamond mining.[89] For many others, work in the diamond mines was a seasonal job that they took on for three to six months before returning home, thereby combining wage labour with subsistence farming. Family members, especially the women and children of the mineworkers, would work the land in their absence.[90] The money they earned in the mines was often spent on the purchase of tools to improve their agricultural output, but also on guns and bride wealth. Initially, a number of chiefs 'directed' the migrant labourers to the mines as part of their tributary obligations, a clear example of how tributary labour could be turned into commodified labour. They could also call mineworkers back home in the case of conflict or war.[91]

Because of the labour intensity of mining, there was a shortage of labour for at least a decade after the first discovery. Migrant mine workers could gain high wages by moving from one mine to another, or by going temporarily to the Cape for other wage work. As digging went deeper in the second half of the 1870s, several technological innovations were introduced. This made mining not only labour—but also capital-intensive, and claim holders transformed their firms into joint-stock companies. The capital-supply problem was now more or less solved, but labour was still an issue. To solve this problem the British adopted several land-grabbing strategies that provided them with labour, land, and a racially segregated population: they established so-called rural locations where Blacks in Griqualand-West were forced to live after the annexation of their land. These plots of land were too small to be self-sufficient, meaning that the black farmers had to hire themselves as wage labourers either to white farmers or mine exploiter.[92] This policy was extended later by the introduction of a hut tax. For people who were already unable to live off their land, this was an extra incentive to enter wage labour full time, instead of combining wage labour with subsistence farming.

Options for even harsher forms of labour mobilization and labour control, including the introduction of convict labour, were offered in 1880, when the Cape Colony annexed the Crown Colony of Griqualand-West and established the Cape Parliament, in which

Cecil Rhodes and other big diamond entrepreneurs had a seat. It enacted the Diamond Trade Act that presumed people accused of illicit diamond buying guilty until they could prove their innocence. It also reinvigorated the 1872 pass law with the help of extra police. Each employee was given a pass and when a worker wanted to leave the diamond fields, he had to present a discharge certificate, or a pass.[93] Men who broke the pass law were liable to three months' imprisonment.[94] This form of labour control was further enhanced in 1883, when the De Beers Mining Company established a privately controlled convict station on its mining compound.[95] The convicts carried out compulsory work in the mines, were housed in the convict station, and fed by De Beers.[96] This process clearly shows how close connections between the Cape polity and private entrepreneurs led to the development and enforcement of laws that 'created' convict labour as a form of unfree commodified labour of Black African workers.

As the production costs of open-pit mining kept rising, the mining companies decided to shift entirely to deep mining. This stimulated the process of amalgamation of the mining companies, the De Beers Mining Company being one of the three largest.[97] It also reduced the bargaining powers of the workers. Deep mining needed a stable, skilled workforce, and, since the position of the workers had weakened, the mining companies decided to fence off the compounds. Workers (apart from the so-called convicts) entered the compounds on a voluntary basis with a two- to four-month contract that could be voluntarily re-registered, though in practice, pressure was often used. However, a large proportion of the workers whose contract had ended stayed in the compound.[98] If piecework rates were low, miners had to stay longer to earn enough to be able to go home, and there were all kinds of fines that could oblige the miners to stay longer.[99] At the end of the 1880s, practically all black mineworkers were housed in closed compounds.[100] By that time the De Beers Mining Company had bought all remaining shares in the South African diamond mines and had reached a complete mining monopoly in 1888 as the De Beers Consolidated Mines.

Commodified Labour Contextually Defined

As this case study on diamond mining has shown, commodified labour could easily turn into tributary labour and vice versa, wage labour into debt bondage or convict labour, all of it for the market. Even under slavery, variations developed, in which slaves worked as semi-self-employed workers or rented-out workers who could keep a very small part of the rent as wage.

Viewed comparatively, in the case of the diamond mines of India, Brazil, and South Africa, labour was clearly commodified in different ways. In South Africa, mine workers could be transformed from more or less free wage labourers

(sometimes rented out by chiefs as part of their tributary duties) with relatively high wages and a secondary labour relation in subsistence or perhaps even some commercial farming, into racially segregated labourers working and living in closed compounds who could easily become convict labourers, with their freedom to move from one employer to the other and from wage work to subsistence farming diminished. In South Africa much more so than in Brazil, colonial powers had a firm grip on law enforcement and with it on the formation of commodified convict labour. The South African case demonstrates how law enforcement and labour control could be carried out efficiently.

In Brazil, the absence of a local population willing or able to work in diamond mining, led to enslaved workers from Africa being employed. The vastness of the area, the difficulties of labour control, and the corruption of the local colonial polity stimulated the development of enslaved commodified labour, in which it was more profitable for slave owners to put the enslaved workers to work as if they were self-employed, or to rent them out. The Brazilian case shows that even though the work process was more or less the same as in India, commodified labour took on a very different shape. In comparison, the Indian case illustrates that there was a variety of commodified labour relations, most dominant of which appears to have been family wage labour for wages and sometimes for remuneration in kind. At the same time wage labourers could also turn into indentured labourers if mining entrepreneurs decided to pay them per stone, giving them advances to live on—even becoming tributary workers if local rulers took control of the workers in absence of private entrepreneurs. When the British did not want to invest in mines that were no longer very profitable, they disliked the thought of using convict labour—mainly because of the surveillance costs—and wage labour was turned into self-employed commodified labour, with miners receiving a small share of the output.

What the discussion of the various thinkers and their present-day critics teaches us, and the case study here illustrates, is that a focus merely on wage labour in industrial(izing) settings nowhere near suffices to analyse labour as a commodity in a long-term global perspective. Various forms of coerced labour, including slavery and convict labour, are also commodified and played an important role in the production of commodities and services. Labour is an essential element of commodity production and exchange, and by taking into account how commodified labour is organized and fits within the wider framework of labour relations (including reciprocal labour), we can understand why and how commodities are produced in a specific region in a specific time frame. Only by broadening our definition of labour in all its facets and forms—free and unfree, productive and reproductive—can we compare developments in labour relations over time and in space. This not only provides us insight in the development of commodified labour itself in context, it also helps us connect developments in labour relations worldwide and can help us explain how the production of commodities and services could shift from one region of the world to another.

Notes

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4. Smith, *Wealth of Nations* 48.
5. Ibid., 44–46.
6. Ibid., 51.
7. Ibid., 103.
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CHAPTER 16

LAND-RIGHTS COMMODIFICATION

Communal Land Control and Rural Conflict in Bolivia

HANNE COTTYN

At the start of the twenty-first century, the context of community threats and revitalization has pushed rural communities and the struggles over their lands back on the global development and research agenda.[1] The 2008 food crisis and growing public concern over sustainable development, human rights, and climate change fostered new debates on the value and vulnerability of diverse land-control systems.[2] In light of rising tensions over land and territory under advanced capitalism, scholars across the social sciences are revisiting a strong tradition in peasant studies[3] and place contemporary enclosures, rural mobilizations, and environmental struggles in historical perspective.[4] In the same vein, this chapter historicizes the globalizing and contested process of land-rights commodification. While urban struggles over land rights are equally important to that process, this chapter focuses on the people 'of the land', following the UN's broad definition of peasants as 'any person who engages . . . in small-scale agricultural production for subsistence and/or for the market', emphasizing a 'special dependency on and attachment to the land'.[5]

Property is a bundle of social relationships between individuals and groups with respect to land and the fruits of land.[6] This chapter focuses on the commodification of people's relation to the land, a process that develops in relation to the (potential) production and extraction of commodities on that land. World-historical processes of commodification involved the incorporation of land and resource management in many localities under statutory laws and into exclusivist property titles. This gave rise to a modern land-rights regime that subjects land to the price form—an exchange value abstracted from concrete social and ecological relations to the land. However, the world contained by this regime intersects and coexists—not dichotomously, but dialectically yet asymmetrically—with a multiplicity of parallel existing land-rights regimes.

Recent findings demonstrate that a surprisingly large share of the world's land area—at least 50 per cent—is held under customary systems by Indigenous and peasant communities across all world regions.[7] Against the backdrop of a global wave of land appropriations, nongovernmental organizations denounce how rural people's access to land, and the land-tenure systems they rely on, are targeted by a 'reverse' land reform.[8] As conflicts over land and resources escalate worldwide, the solution put forwards seems to be reduced to the question of security—the fact that the control exerted over many contested lands lacks formal recognition.[9] This response is rooted in the idea that, without regulation of the access to and use of land, the pursuit of self-interest leads to a 'tragedy of the commons', as famously coined by Garrett Hardin.[10] The tragedy's inevitability has been confronted most notably by Elinor Ostrom's groundbreaking work on the role of economic institutions and collective regulation.[11] Even though Hardin's metaphor only applies to open-access commons and requires qualification, it tends to be interpreted as a powerful guideline for strict regulation in property debates.

In the face of multiple and increasingly more complex resource-management conflicts, most common propositions stick to a scale-up of efficiency and formalization. However, critical scholars point out that political regulation does not address the economic drive towards self-interest, nor the fact that the institution of property itself continues to be contested in multiple ways.[12] These contestations are embedded in longer trajectories of commodification and struggle that particularly intensified from the nineteenth century on. The accommodation of diverse relations to the land to a globalizing land-rights regime under (neo)colonial and subsequently developmentalist and neo-liberal schemes, drew peasant, Indigenous, and other rural communities closer into the rhythms of the market and the logic of the nation state.

What appears to be a universal experience of converting land and the rights to access and control into a commodity in fact differed wildly over time and space, and the chapter draws from research on Bolivian highland communities that remained outside the scope of privatization. It highlights the trajectories of these silenced but resilient worlds that reach beyond—yet in dialogue with—commodity relations.[13] While being the object of colonial exploitation and post-colonial extractivism, the Andean region demonstrates a remarkable, yet over the centuries increasingly eroding, margin for communal control over land. Andean countries present a mixed land system, in which collective, private, and state control over land continue to coexist in different gradations.[14] This mixed system is the outcome of historically interwoven processes of commodity history, state expansion, and community formation that have defined the conditions under which communities could defend communal control over their lands. A concrete example is Choquecota, a rural community situated on the Bolivian high plateau between the city of Oruro and the Bolivian-Chilean border and part of the Indigenous territory today known as 'Jach'a Karangas'. Throughout cycles of hacienda formation, land-rights formalization, and rural resistance, these communities have in broad lines maintained their collective control over community lands.

Resonating with Olivier De Schutter and Balakrishnan Rajagopal's recently published *Property Rights from Below*,[15] this chapter celebrates the plurality of existing relations

to, and meanings of, the land, without denying the effective erosion and elimination of this diversity nor idealizing alternative forms of land control. Without aiming to distil generalizations out of a specific community's trajectory, it draws on the story of Choquecota to illustrate how the safeguarding of a margin for autonomous land control is essentially shaped by rural people's participation in processes of state formation and market integration. The first section thus presents a theoretical discussion of land-rights commodification and the emergence of a standardized land-rights regime. In the following section, different phases and moments of acceleration throughout the last five hundred years in the commodification of, and conflicts over, land rights are identified. The third section zooms in on Choquecota's trajectory, and how it is embedded in a longer, global, and uneven trajectory of land-rights transformation and contestation. The fourth concluding section relates this longue-durée view on land-rights commodification to the ongoing global wave of land appropriations and closes with a reflection on how a critical historicization of the transformation of, and struggles over, land rights is key in destabilizing the idea of uniform and universally applicable land rights as a viable, let alone promising or inevitable, key to a sustainable future.

The Standardization of Land Rights

From the perspective of rural populations, access to, control over, and use of the land is probably the single most important variable in the organization and transformation of their livelihoods. It also forms a key motive to develop intensive interactions with other sectors of the human and non-human world. The relation to the land is conditional to rural people's socio-cultural reproduction, self-determination, and self-esteem. Over the last five centuries, these intimate relations have been profoundly reshuffled and subjected to commodity relations. The reorganization of the global countryside, in order to open up new agro-ecological reserves, constitutes an essential motor of the expansion of historical capitalism. The transformation not only of the land itself and of what can be grown on it or extracted from it, but also of rights to the land, is constitutive to the incessant search for cheap natural resources, food, and labour reserves. 'From a world-historical standpoint', Farshad Araghi and Marina Karides state, 'the history of capitalism begins with the transformation of land rights'.[16]

However, the degree to which something both as abstract and as fixed as land can be converted into a tradable commodity is disputable. As Tania Li observes, '[l]and is not like a mat: you cannot roll it up and take it away. . . . It is an assemblage of materialities, relations, technologies and discourses that have to be pulled together and made to align'.[17] In the words of Immanuel Wallerstein, this alignment, condensed in specific, exclusionary property titles, constitutes 'fundamentally a political question masked by a legal veneer'.[18] The political question means that land rights always come with a level of centralized control. As Li summarizes, to put land into value 'requires regimes of exclusion that distinguish legitimate from illegitimate uses and users, and the inscribing

of boundaries through devices such as fences, title deeds, laws, zones, regulations, landmarks and story-lines'.[19] The veneer, then, is the legitimation of that exclusion, forged in the erroneous equation between private property and 'development'.[20] On the assumption that privatization reduces externalities, transaction costs, and the risk of resource overexploitation, private property rights are perceived as essential tools to put land into value.[21] An essentially gendered and racialized process, the consolidation of a centralized institutional framework for the ownership, use, and transfer of land has profoundly disrupted rural people's material and spiritual relations to the land.

While manifesting itself in complex and varied ways across time and space, the transformation and alignment of relations to the land is characterized by a particular set of dynamics. Underlying drivers of five centuries of land-rights commodification are identified by Araghi and Karides as formalization (reducing the customary land-rights system to legal and written property titles); fixation (defining the authority over ambiguously established areas within specifically demarcated, and possibly enclosed spaces); rationalization (conditioning the use of such demarcated land ownership to a form of capital); and privatization of the land surface (dispossessing and displacing peasants and Indigenous populations).[22] These processes fuelled the emergence and convergence of standardized land-rights regimes, based on the principle of state-guaranteed land ownership.[23] The legal and fiscal incorporation of land, unlocking it for investment and allowing it to freely circulate, crucially relied on the design of surveying tools such as maps, property deeds, and cadastres, as first applied in a colonial context by the English in seventeenth-century Ireland.[24] Facilitating colonial modes of appropriation, the result was the emergence of 'racial regimes of ownership'.[25] Scholarship on capitalism is unpacking how this toolbox has allowed states and private actors to continuously move into new domains of natural resource control.[26]

The liberal myth of 'perfect' property has been revealed by historians as by far the most powerful notion informing still prevailing ahistorical readings of people's relation to the land.[27] It pushes towards a reclassification of a plurality of alternative locally grounded understandings of what land is, and how it could or should be governed, in terms of dichotomy and anomaly, separating perfect from imperfect property.[28] Rather than a reachable goal, 'perfect' property operates as a 'horizon' towards which commodification strives yet will never accomplish. Projecting a linear process of perfection towards universal property rights, this horizon serves to redress other arrangements as inferior conditions that can only be overcome through a catch-up—a new wave of primitive accumulation. Research on land legislation and land reform demonstrates how it has empowered the effective redefinition, assimilation, and legalization of alternative (spiritual, informal, communal) relations to land within dualist and exclusivist frameworks.[29] A contrasting horizon operates as well, in which the community as a landholding unit is idealized as a harmonious site of equality and sustainability. Just as the 'idealized, romantic, historically inaccurate' conceptualizations of communities have 'served the purpose of keeping alternative possibilities alive', as stated by Li,[30] so does the ideal type of perfect property play a strategic role in keeping the push for commodification alive.

While ahistorical, the abstract ideal of complete, absolute, and exclusive individual ownership has a history of its own. Starting to emerge in seventeenth-century Britain among political philosophers such as Thomas Hobbes and John Locke, it eventually gained global influence under neo-liberal adjustments since the 1980s.[31] This idea allowed neo-classical economists, notably Ronald Coase and Harold Demsetz, to reduce economic development (or blame the lack thereof) to the degree of property rights' security and exclusivity.[32] This optimistic belief in a linear development in legal regulation of land ownership towards optimal economic efficiency, mostly from communal to private systems, was qualified by the more realistic and historical approach of New Institutional Economics. Most prominently represented by Douglass North,[33] this approach has gained substantial influence on academic property-rights research and contemporary policies by pointing to the role of institutional change. The early twenty-first century saw the neo-liberal revitalization—but also growing contestation—of the perfect property myth within pro-poor development policies.[34] Historical scholarship eclipses this Eurocentric and linear focus on institutional and market efficiency. Outside or marginal to European influence, Asia and the Islamic world independently developed different models of private property in land.[35] Over past centuries, as today, property relations correspond to a myriad of practices subject to negotiation and contention that continue to defy a univocal understanding of private property and of property as such.[36]

Time and again, the land question has been reformulated and debated in the context of social and economic changes and emergent political ideologies. As a result, the commodification of land (rights) is not implemented as a clear-cut intervention but corresponds to a longer, highly debated, and largely frustrated history in which the law and daily rural practices constituted each other.[37] The ambition and outlines of a neatly commodified land regime are constantly undercut through the (re)creation of new frontiers of land control, which—in the words of Nancy Peluso and Christian Lund:

> are not sites where 'development' and 'progress' meet 'wilderness' or 'traditional lands and peoples'. They are sites where authorities, sovereignties, and hegemonies of the recent past have been or are currently being challenged by new enclosures, territorializations, and property regimes.[38]

As new actors and industries seek to reorganize and reinvent rural spaces, dissolving existing rights regimes, historical struggles, meanings, and memories attached to land are reactivated.[39] In that highly disputed transition process, local land users deploy a wide repertoire of reactions, very often countering, but at times also interiorizing state-imposed or market-led commodification.[40] New terms of participation were negotiated and defied through Western law and political action, abrupt violent opposition, or everyday resistance and defending moral economic sensitivities.[41]

What appears to be a global process of land-rights commodification towards a uniform regime results in an uneven trajectory that takes shape in the process and on the ground. Local resistance and large-scale restructurings, but also the potential (commercial) use of the land, nurture a long history of contested land control that rarely produces

a homogeneous outcome or the desired social effects. The outcome is a mixed, seemingly contradictory land-rights regime, usually marked by coexisting and overlapping tenure forms, ranging from very informal to sound ownership arrangements. Since Ostrom's emphasis on the role of governance in common-pool resource systems,[42] qualifying Hardin's influential theorem on the unsustainability of the commons, historians have actively contributed to the breakdown of the assumed dichotomy and linear development that characterizes collective to private rights.[43] The ahistorical myths of 'perfect' property and idealized communalism constitute the (unachievable) extremes of a continuum that is populated by much messier and more entangled forms of property control. Growing insight into legal pluralism substantiates the intersections between different land-rights regimes and the simultaneous reliance on multiple (state, customary, religious, economic) sources for claiming land rights.[44] These plural relations tend to be perceived as instances of state failure and anachronistic remnants desperately searching the way out to 'progress'. Rather, this hybridity accounts for a complex process of persistence, resistance, appropriation, and reinvention. Empirical studies have demonstrated that 'surviving' community-based tenure regimes are the product of co-evolution and reinvention and not the residual of a transformation process.[45]

Globalizing and Contested Land-Rights Regimes

Taking a very long perspective, the Neolithic agricultural revolution announced the onset of humans' impact on the land and the landscape, and of emerging forms of land-access regulation. Although this was a fragile, reversible, and coerced process, human lifestyles and technologies were slowly reorganized within sedentary agrarian societies and under expanding centralized state control.[46] Multiple land-rights regimes appeared, starting to converge under early modern imperial state control. The sixteenth century witnessed the gradual onset of processes of primitive accumulation in areas under European influence, from the English enclosures to the systematic dispossession of American peoples; a process that considerably accelerated in the nineteenth century. The role of land rights in European colonial rule varied widely across and within regions, being more vital in establishing control over the Americas than (initially) in Africa or in Asia.[47] This was not a mere transatlantic extension and one-directional transfer of European (far from standardized) notions of land rights. Resistance, appropriation, and adaptation defined the scope for the discordance, coexistence or hybridity between imperial models and diverse local institutions.[48]

Under a capitalist logic, land control functional to a feudal system was slowly substituted by land control at the service of increasing labour productivity within an emerging world market for diverse commodities grown on or extracted from the land.[49] The way in which property rights to land were reorganized differed substantially

according to what the land was used for. In the Andes, coerced mining labour was 'subsidized' by subsistence production on community lands recognized by the Spanish crown. In tropical lowlands, new commercial crops such as sugar, tobacco, or cotton were produced under a colonial plantation model based on slave labour, yet recent historical scholarship demonstrates how these large-scale landed estates often coexisted with smallholding peasants producing in the shadow of colonial commodity economies.[50]

From the late eighteenth century onwards, new ideas on property started to gain entry. This was not a smooth process, but a highly debated one, with influential intellectuals such as Locke supporting full, private property in the late seventeenth century, and others such as Thomas Paine, a century later, denying the absolute right to land ownership. Roughly between 1750 and 1840, Europe's population doubled and the number of cultivated lands considerably increased. The interventionist state in combination with an enhanced mobility of knowledge, skills, and technology brought about an 'Agrarian Enlightenment'.[51] The physiocratic doctrine, presenting private landed property as the sole productive factor in the economy, provided an arsenal of new tools to liberate the land, such as cadastres and taxes, while keeping the lid on the rural majority's freedom.[52] First in England, then on the European continent through the French Revolution,[53] and crystallizing in constitutions—particularly the US Declaration of Independence (1776), the Napoleonic Code (1804), and the Cortes de Cádiz (1812)—these new agrarianist ideas started to spread through revolutions and wars and gathered momentum around the middle of the nineteenth century. Both in the West and the East,[54] the notion of individual, exclusive ownership of land influenced central state bureaucracies and would bring the reigning plurality within and among land regimes under untenable pressure.[55]

Foreshadowed by the dramatic restructuring of land and labour relations in England centuries before, arguments that linked the defence of private property directly to (national) progress translated into an accumulation-by-dispossession strategy and widespread rural conflict. While agrarianism promoted the incorporation of European peasantries as citizens, lands in overseas empires and across the newly independent Americas were (often quite literally) cleared from colonial or Indigenous rural subjects.[56] Across Latin America, governments adopted land laws (*leyes de tierra*) seeking to neutralize the detected incompatibility between private and 'immobile' collective property ('property in mortmain'). However, financial and administrative constraints, peasant and Indigenous resistance, and landlords' anti-liberal objections or manipulations, all helped to thwart the grand ambition of commodified land rights that allowed property to freely circulate in the market. It led to contradictory feudal-like outcomes of land (re) concentration and growing popular unrest. Even in West European countries, which had stronger institutions and saw their collective lands almost entirely disappeared in the second half of the nineteenth century, the process oscillated between consecutive successes and resistance.[57] Elsewhere, popular rural resistance as well as a colonial form of romantic anti-capitalism on the part of White settlers, as in southern Africa—with the extreme case of South Africa's formation of segregated self-governing 'Bantustan' enclaves—halted the completion of a capitalist transition in land tenure.[58]

By the late nineteenth century, a global 'food regime' arose in which colonial Asia and Africa saw the expansion of grain and meat production in settler economies and the expansion of tropical export crops, coinciding with massive de-agrarianization and de-peasantization and more diversified, capital-intensive farming in Europe.[59] Meanwhile, Latin America's booming export economies and transport revolution incited an increase in land use, facilitated by concessions for mineral or rubber extraction, grants to new settlers, privatization of state and corporate land, and the—often fraudulent—appropriation of land, mostly concentrated in (semi)-feudal estates and mono-crop plantations.[60] In a reaction to exaggerated inequality and unfree labour, the Russian Stolypin land reform (1906–1917) and the Mexican Revolution (1910) announced an era of developmentalist land-rights commodification. After World War II, particularly countries in the Global South embarked on a more radical and planned redistribution of land, inspired by the economic theory of developmentalism or *desarrollismo* that promoted autonomous state-led economic development.[61] Strategically played out in the Cold War context, access to land became politicized and materialized in either moderate or revolutionary (even armed) political programmes.

As the twentieth century progressed, land reform increasingly became an economic planning method, including both collectivization and privatization strategies.[62] In an effort to contain social discontent, land policies were incorporated into a supranational, but fundamentally unequal, framework—for instance through the US-Latin American Alliance for Progress and programmes of the United Nations and the World Bank. The commodification and marginalization of peasant subsistence in the South coincided with the expansion of export crops like coffee, cocoa, tea, sugar, cotton, and palm oil, the promotion of high-value commodities like horticultural products, and the expansion of large-scale production of soy, sugar, and grains. The net result on land rights was a contraction, with the number of people losing their legal access to land being higher than the number of land rights expanding through land reform, and a growing disillusionment with classic state-driven (whether socialist or not) land reforms.[63] Post-World War II land-reform processes in East Asia, particularly South Korea and Taiwan, are commonly considered a key component in the countries' economic success, raising questions about why they managed to leave other developing regions such as Latin America behind.[64]

Land-rights commodification deepened in the 1980s. In the context of debt crisis and structural adjustment, land increasingly figured as a financial asset in supranational governance. This was accompanied by a restructuring and globalization of an increasingly volatile corporate food regime, reliant on biotechnology fixes and the transfer of transnational agribusiness's growing ecological and energy costs to the Global South.[65] In a response, powerful rural counter-enclosure movements developed such as the Zapatistas in Mexico, the Brazilian landless peasant movement *Movimento dos Trabalhadores Rurais Sem Terra* (MST), and the international peasant movement *La Vía Campesina*. As the 1990s saw the re-emergence of land-based demands, supranational governance institutions replied with market-led land reform, particularly directed towards post-conflict and ex-Soviet countries.[66] Having been largely ignored during earlier waves of land reform, the piecemeal process through which women

were included in land-rights policies in most regions accelerated under pressure from women's movements and growing recognition by supra-national institutions.[67] Albeit with diverging results, land policies also started to become more aware of customary tenure forms, yet remained largely gender-blind.[68]

Choquecota: Indigenous Negotiation, Survival and Memory of Property and Community

Choquecota forms a small pastoralist community of Aymara families—Bolivia's second largest ethnic group—situated in the department of Oruro on the Central Andean high plateau. Until the middle of the twentieth century, Choquecota and its neighbouring Aymara communities were integrated in the province of Carangas, extending westwards from the Desaguadero river and the Poopó lake to the border with what is today northern Chile. Since the late 1980s, when the vast region fragmented into multiple provinces, the communities have federated again in the Aymara native nation of Jach'a Karangas. The Indigenous leadership today seizes the fact that these communities never saw the consolidation of private rural property—aside from house plots in the provincial towns and mining sites—to underscore the communities' cultural continuity. However, just like explanatory framings of Andean rural society in a false community-hacienda dichotomy, this continuity risks hiding how Andean peasants negotiated their land rights in a much more complex, dialectic landscape.

A letter written in 1929 on the occasion of a jurisdictional promotion was taken as an opportunity by Choquecota's Indigenous authorities to sketch their land-rights trajectory:

> Since the time of colonialism, first of all, we have been recognized as the annex [administrative unit] of Choquecota, with all the obligations inherent to the service of the governors of that time, such as the tax payment to the Crown of Spain, the delivery of personal services to the authorities, and, worst of all, the pilgrimage to the City of Potosí, as *mitayo* [an Indian who pays a tribute in the form of forced labour] and to give our life in the mines of that City; all solely for holding in our power the lands distributed by the different Spanish authorities. Later, when we entered the Republic, services were equally imposed on us, in a more or less humane way, but always looking at us as true outcasts, until by the law of October 5 of one thousand eight hundred and eighty-four . . ., we have been declared masters and proprietors of our lands and that, thanks to these protective laws, today we have all the rights and guarantees that are granted to all citizens of the Republic.[69]

Written decades before obtaining the right to vote and the dismantling of a feudal-like land system, the letter seems to obscure the sustained levels of insecurity faced by

the communities of Carangas. At the same time, however, the way in which it (counter-intuitively) celebrates their protection as 'masters and proprietors' and 'citizens' hints at how these communities have consciously engaged with, shaped, and appropriated this trajectory.

When the first Spaniards set foot in the Central Andes in the early sixteenth century, the population of what became the province of Carangas lived in dispersed small hamlets. Aymara and Uru ethnic groups had been incorporated in the Quechua-dominated Inca empire (1450–1530), with the *ayllu* as the basic unit of organization along kin group lines. Inca rule subjected access to land to a tributary system that was backed by a redistribution logic.[70] Spanish colonization brought about the reorganization of land-control patterns to make them functional to Spain's economic apparatus. The papal bulls had granted Spain a legal basis for the colonization of those lands by incorporating the native population as vassals of the Catholic monarchs.[71] Initially, native population groups were allocated to the conquistadores under the *encomienda* system, until demographic and fiscal pressures forced the Crown to subject land access to a centrally regulated land-rights regime. The late sixteenth-century *reducciones* reform reorganized the rural population in centralized settlements within a segregated and (for the Spanish) 'legible' regime, backed by distorted versions of pre-colonial tributary mechanisms.[72] Local settlement patterns were concentrated into *reducciones* or principal rural towns, including Choquecota, and integrated in the province of Carangas.

Communities' customary organization of land tenure—which entailed individual and hereditary usufruct rights over non-alienable community lands—was safeguarded on the condition of tributary obligations and the purchase of colonial property deeds. Choquecota's 'recognition', and hence its incorporation into the Spanish empire, was formalized when its Indigenous authorities purchased a colonial land title (*título de composición*) in the 1640s.[73] In order to keep control over the lands they had managed since long before in Indigenous hands, the community members of Choquecota were subjected to the regular collection of a head tax and free labour service in the silver mines of Potosí. The Spanish crown guaranteed the safeguarding of these communal lands in return for communities' coerced participation in its colonial extractive economy. This asymmetrical relation has been coined as a state-community 'truce' by Silvia Rivera,[74] or a 'reciprocity pact' by Tristan Platt.[75] By enforcing the provision of cheap Indigenous labour to the Potosí mines, it incorporated communities as essential subsidizers of the colonial silver economy. While producing a major source of fiscal revenues for the Spanish state, this pact—materialized in land titles (*títulos de composición*) and a head tax (*tributo indígena*)—was appropriated by communities as a powerful bargaining tool to secure a vital degree of autonomy.

Under Spanish colonial rule, Carangas grew into an important mining centre, yet most lands remained under communal control. Those community lands played a vital role in the rise of capitalism in providing vast collectively used grazing lands for the llamas that mobilized the colonial silver route. The transport of minerals and mining supplies between the mines of Potosí and the ports of the Pacific relied critically upon Carangas's llama caravans. In late colonial times, the integrated 'Andean economic space' started

to fragment and mining began to decay.[76] The chaotic transition to independence initially permitted Indigenous communities to prosper,[77] until the breakthrough of liberal ideas started to undermine the persistence of colonially inherited land regimes.[78] The decrees of Bolívar (1824–1825) abolished the *tributo indígena* and ordered the individual distribution of community lands but were short-lived due to massive protest. While Church lands were subjected to confiscation or *desamortización*, the government was incapable of abandoning its protection of Indigenous corporate control over land until after the 1860s.[79] The treasury remained heavily dependent upon Indigenous taxes guaranteed under the reciprocity pact until increasing mining revenues undermined the communities' bargaining power. In 1866, a radical reform attempted to privatize community lands in a heavily contested way, followed by a less drastic but nonetheless disruptive *Ley de Exvinculación* or Alienation Act in 1874. With the law, the government one-sidedly terminated the reciprocal pact and explicitly denied the communities' juridical, fiscal, and political existence.

The reform subjected Andean communities to land measurements and distribution operations, in order to insert them in the land market, yet the outcome was a quite contradictory and regionally differentiated land regime.[80] The reality, and the irony, was that the reform provided the landlord class with a favourable legal tool to absorb—often in fraudulent ways—vast tracts of community land, materializing in a massive expansion of the hacienda between 1880 and 1930, rather than the development of a strong smallholder class.[81] This is particularly true for the most productive agricultural highlands regions in the La Paz department. In regions of Cochabamba, Sucre, and Potosí, communities had been weakened before the reform, limiting its transformative effect. Cochabamba valleys witnessed a fragmentation of its land structure, produced rather by internal fragmentation amongst smallholders than through legal dispossession.[82] In highland regions that relied more strongly on pastoralism, as in Choquecota, the land attracted little interest and strong communal organization managed to largely ward off land privatization. Yet both these 'free' communities and hacienda communities faced heightened vulnerability and an increase in inter- and intra-community land conflicts.

While Choquecota's trajectory tends to be explained in terms of negative ecological and economic factors, the inherited unequal colonial pact proved an essential discursive tool in protecting common land rights. A strong and coordinated inter-regional reaction developed among community leaders to halt commodifying procedures such as land inspections and the implementation of a cadastre. A combination of legal actions and political negotiations, as well as violent revolts, led to the creation of a loophole in the legislation through the promulgation of the law of 1884 mentioned by Choquecota's authorities. The law effectively exempted communities in possession of colonial land titles from these procedures, allowing Choquecota and others to exist as 'free' communities. Seemingly paradoxically, Andean communities successfully appropriated colonial commodification tools as bargaining instruments to counter liberal commodifying legislation and safeguard communal autonomy.[83]

However, government authorities did not abandon their attempts to incorporate free communities. In 1894, the visit of a land inspector to the province of Carangas in order

to subject community lands to the privatizing legislation ended with his dramatic assassination, a decisive moment that is still remembered in Choquecota. 'In any village in La Paz or Oruro', don Sabino—considered Choquecota's historian and one of Jach'a Karangas' *amautas* (wise men)—asserts:

> people will tell you that this region [Carangas] has never known *colonos* [tenants], *patrones* [masters], *hacendados*. No! This has a great history . . . [when] the commission arrived, all of Carangas came together . . . and made the land commission disappear. If this had not happened, we would have been ex-*colonos* now![84]

The legal exemption of 1884 was clearly not a guarantee. If Choquecota's Indigenous authorities in 1929 suggested they had become 'masters and proprietors' of their lands, they referred to the renewed confirmation of colonial arrangements. Very different was the view of the regional government authorities in 1929, who noted that no cadastral survey or tax reform had been executed in Carangas so far. In despair, they concluded that community lands in the province remained inalienable, depriving its Indigenous inhabitants from absolute ownership.[85] New liberal notions served to isolate Carangas' communities from modern society, denying their centuries-long developed state and world-economic linkages and creating the need for a 'catch-up' through unrealistic plans to commodify its livestock and mineral 'treasuries . . . [that] only wait to be moved and uncovered'.[86] Communities' margin of autonomy had to be constantly defended against commodification attempts, fuelling successive cycles of revolt into the twentieth century and reverberating throughout later land reforms.

Towards the middle of the twentieth century, a nationalist-developmentalist paradigm developed and broke through with the National Revolution of 1952. A combination of peasant mobilization, union organization, and the discovery of the peasants as political subjects led to an agrarian reform that reversed private land usurpations and servile labour relations on the rural highlands.[87] While the 1953 agrarian reform privileged individual smallholder rights, Indigenous communities actively petitioned restitution of their usurped communal lands.[88] Communal land tenure of 'free' communities such as Choquecota, was to be 'consolidated', replacing colonial land titles with collective property titles adjudicated to each family.[89] In Carangas, the titling process only started in the 1970s and was not completed by the time a new land legislation was implemented in the 1990s. Meanwhile, the reformed state-centred land regime failed to halt land fragmentation, extreme poverty, and marginalization in the highlands, pushing peasant-pastoralists off their grazing lands in Carangas and towards a new agrarian commodity frontier in the eastern lowlands through colonization policies.[90]

The land question was pushed back on the political agenda by national peasant and Indigenous mobilizations in the 1990s. Under a newly adopted neo-liberal/multiculturalist paradigm, the legal figure of 'Native Community Lands' or TCO (*Tierras Comunitarias de Origen*) was introduced and endorsed under a new land-reform law in 1996. While entailing a major innovation by explicitly recognizing Indigenous communal land rights, the law reproduced the dual private versus collective land-tenure

framework installed in 1953. In an attempt to cope with these tensions, the Morales government (2006–2019) modified the land legislation, broadened native communal land titles to Native Indigenous Peasant 'Territorial' titles (TIOC), and accelerated the titling process. Choquecota obtained its collective territorial title in 2010.[91] Bolivia has gained worldwide attention for propagating a more pluralist land-rights approach. However, it also presents important lessons regarding the limits of land titling to protect communities from fragmentation as witnessed in the country's western highlands and agribusiness pressures in the eastern lowlands.[92] In Choquecota and neighbouring communities, a newly emerging modest llama meat industry is increasingly competing with attempts to revive old mining frontiers.[93] Titling has not solved the Indigenous authorities' ever more complex challenge to balance coexisting individual and communal forms of land control with increased expectations of autonomy and security in a context of increasing ecological stress on the land.

Historicizing Contemporary Land Appropriations and Land-Rights Struggles

The 2008 World Bank report *Agriculture for Development* confirmed the re-emergence of land-rights commodification as a development strategy, driven by a growing financial interest in farmland.[94] Since the mid-2000s, growing pressures on land and speculation produced a high volatility of agricultural markets, translating into rising food prices. This escalated into the multiple crises of 2008. Food-importing countries were confronted with the question of how to feed their people without depending on unpredictable markets, while the financial crisis motivated large investors to seek a secure place for their money. Agribusiness, investment funds, and government agencies found the answer in the accumulation of productive farmland. Large-scale land deals, commonly labelled 'land grabs' in development studies literature and by NGOs, are mostly geared towards the bioeconomy, 'flex crops'—crops with new, multiple, and interchangeable uses such as soy, maize, sugar cane, and oil palm—and conservation.[95] While industrialization has characterized economic developments in the Global South, and several low-income and emerging countries recovered fast from the 2008 crisis, the increased push on land caused by the global food crisis across continents predominantly concerned that part of the world.

The global food crisis has led to an increasing overlap of land-rights commodification strategies with processes of financialization.[96] 'Secure' land rights were promoted as the ultimate solution to protect landowners against land concentration and speculation.[97] It was nevertheless land-rights commodification that had powered their vulnerability. In the name of poverty reduction and food security, land titling and increased capital investment had become the cornerstone of global development policies.[98] While eagerly adopted by

institutions such as the World Bank to make land more productive, this approach has been criticized for overlooking the issue of equal access, the role of the state, and the importance of gender and elite relations.[99] In the same fashion as late eighteenth-century land sales, twenty-first-century large-scale land acquisitions have resulted in intensified, often violent displacements of rural communities worldwide by private, public, and illegal actors. These transnational land acquisitions represent an acceleration of a longer rush for land, put in practice through the same colonial commodification tools.[100] Meanwhile, the logic of a standardized land-rights regime is extending beyond land, through 'green grabs' subjecting entire ecosystems, and even the atmosphere itself, to the law of value through ecosystem services or the carbon-offset market.[101]

While empowering agribusiness and global value chains over small-scale farming, the emphasis on transnational 'land grabs' tends to overlook an important degree of diversity and counter-pressure within the global countryside. Some countries and sectors, particularly cocoa in Africa, continue to be dominated by a strong and resilient smallholder class, which is nonetheless not immune to the effects of mounting market competition and land concentration.[102] While a global trend towards increased land concentration seems to emerge, this corresponds to a cyclical pattern of land-rights commodification intensification that is constantly interrupted. Through a wide repertoire of reactions, rural reaction generates a dialectic trajectory that precludes a definitive outcome of the current process.[103] Indeed, 'land grabs' are shorthand for a set of complex and contradictory processes that provoke irregular and uneven responses from below.[104] While drawing on accumulated historical experiences of local protest and strong moral economic awareness, what marks this wave of rural mobilization is an important degree of transnational organization, as most clearly represented by the *Vía Campesina*.[105] The latter's diverse peasant base, from rich European eco-farmers to landless workers, creates a platform in which various alternative concepts and imagined futures meet and have shaped the discourse and practices of the organization. Through new alliances with environmental, Indigenous, feminist, and human rights movements, rural struggles have adopted new paradigms to formulate and legitimize their demands. By placing a greater emphasis on territory, multiple, intersecting rights are evoked, from food sovereignty, gender equality, and the rights of nature.[106] Food sovereignty has proven to be a particularly strong approach to take a stance against the World Bank's emphasis on market-driven security, and as a point of departure to rethink the shaky global food system.[107]

In recent years, rural transformations across continents are considered to be increasingly marked by forms of populism, whether under leftist or right-wing regimes.[108] This regressive authoritarian trend comes with violent processes of exclusion and displacement, evidenced in the appalling rise in criminalization and assassinations of land and environmental defenders.[109] This aggressive context has emboldened the response from below, in terms of both resistance and the experimentation with alternatives. Instead of hammering away at property-rights security, De Schutter and Rajagopal stress the need to rethink property itself, and point to the role of social movements in shaping that process.[110] Of particular relevance is the way in which the idea of the commons

is undergoing a revival, as both a long-standing and a new form of relating to land, located beyond the market mechanisms that subject land to private property and the bureaucratic apparatus that reduce it to state property. While increasingly vulnerable to pressures on its land base, both from within and outside, the commons have proven to be capable of responding to a changing context and challenging hegemonic social orders, as attested by historical research and contemporary activist practices.[111]

While being the object of centuries-long processes of colonial exploitation and post-colonial extractivism, Andean communities such as Choquecota have maintained a remarkable (yet over the centuries increasingly weakened) margin for communal land rights. Through twentieth- and twenty-first-century reforms, this margin was eventually engraved in the constitution, recognizing Andean Indigenous peasants as 'masters' of their lands. This margin for autonomous control, and its endorsement in the national legislation, hints at the Bolivian state's reluctance to settle the land-commodification frontier without completely incorporating communal systems. It did not simply fail to acquire a comprehensive understanding of these communal patterns or to intervene in Indigenous territorial systems, but deliberately decided to retreat; the acknowledgment of plurality out of oblivion.[112] While this served to exempt the state from its responsibility in supporting those communities in resolving long and complex internal struggles over land, it also attests to communities' negotiation power. It is through the constant re-negotiation of this margin for plurality within Bolivia's land-rights system that the community, as a landowning institution, is repetitively re-created. Mainstream readings insisting on either its Andean or colonial European roots ignore other dynamics of repositioning such as the twentieth-century 'rediscovery' of the community by *indigenismo* intellectuals, revolutionary regimes, and development scholars and the current global 'reinvention' of the commons.

In 1994, Eric Hobsbawm announced the 'death of the peasantry',[113] only to have the UN adopting the 'Declaration on the Rights of Peasants and Other People Working in Rural Areas' twenty-four years later.[114] Without downplaying real processes of depeasantization, we can only state that this constitutes, at most, an incomplete and far from inevitable process.[115] That process was shaped through the dialectics of land-rights commodification and the accumulated historical experiences of negotiating land. Appreciating the historical trajectory of how relationships to the land have been reframed, and the kind of rights this produced, has implications for our assessment of the ongoing rush on land. Embedding the neo-liberal cycle of deepening financialization and escalating socio-environmental conflicts within that longer history, reveals how the structural drivers of land-rights commodification have remained the same, as new actors and alliances came into play, commodifying tools and technologies became more sophisticated, but were equally appropriated, and the scope of commodification extended ever further into the realm of nature. Such a critical historicization allows us to trace the roots of contemporarily assumed 'universal' and 'uniform' rights and to abandon a dichotomous view on the struggles over, and transformation of, land rights. In that way, increasing the visibility and our understanding of the diversity and intrinsic tensions among the many possible meanings of land can inform our response to the current crises.

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CHAPTER 17

CIRCUITS OF KNOWLEDGE OF TROPICAL COMMODITIES

LEIDA FERNÁNDEZ-PRIETO

Noel Deerr is considered the quintessential historian and technologist of the tropical sugar industry.[1] He acquired renown and prestige in agro-industrial sugar development by moving through academic and commercial tropical knowledge circuits, combining multiple governmental and private, productive, techno-environmental, and scientific interests. In fact, he was the prototype of the transnational, trans-imperial, and cosmopolitan sugar expert, trained in the practice of fieldwork within the knowledge circuits of all of the tropical sugar-cane-producing areas, at the intersection of the Caribbean, Indian, Pacific, Atlantic, and Arabian axes. At the same time, Deerr was representative of the new professional: a product of training in the scientific laboratories of governmental and/or private experimental stations, which had been created by transnational sugar companies, through which he attained deep knowledge and skills in all the chemical, agricultural, biological, and industrial aspects of sugar cane processing. Thus, Deerr became the highest authority of the twentieth-century sugar industry, whose services were requested by governments, multinational corporations, owners, farmers, scientists, and agronomists to confront various techno-economic and biological problems of the sugar cane agribusiness.

Deerr's professional career is a good example with which to contextualize the role of knowledge circuits as a key category of analysis in the techno-scientific developments of tropical products at different geographical scales: global, national, regional, and local. Knowledge accompanied and influenced each and every facet of the chain of relationships in the life history of basic goods from production to consumption, in multiple ways, speeds, and directions. This was a journey where the circuits of knowledge about commodities acted as supports, connectors, and multidirectional transmission channels that facilitated the flow, exchange, cooperation, diffusion, and transformation of knowledge, regardless of the final results. This was in addition to the emergence of new scientific disciplines, information, ideas, models, and training of experts and global and local networks to respond to socio-economic problems (competitiveness, reduction

of labour costs, higher productivity, etc.), technological and ecological issues (soil erosion, loss of fertility, comprehensive pest management, exchange of more productive and resistant hybrids and seeds, etc.), intensified by the greater linkage of tropical products with the world market. Likewise, circuits of knowledge about commodities were intimately connected to local and external historical, socioeconomic, political, and ecological processes, which encompassed both the production and consumption phases. For example, knowledge was an indispensable condition in the consolidation of the development of world capitalism, national and imperial expansion, the industrial revolution, and the worldwide decline or emergence of production centres.

The close relationship between knowledge circuits and commodity developments has received little attention within the intersection between the history of science, commodity histories, and the environment. The history of science and knowledge has privileged the study of circulation flows over circuits as research objects that mediated the organization, exchange, and formation of knowledge networks related to goods. Environmental history has underscored the objectification of nature to highlight ecological variables in tropical commodity biographies. Commodity histories have emphasized socioeconomic production relationships. Integrating these three methodologies provides useful tools and interpretations for tracing the emergence, operation, and interaction of the knowledge circuits that sought a scientific solution of the techno-economic and ecological problems of tropical agriculture in the context of greater integration of world markets—as was the case, for example, with the Latin American agro-export boom. In the same way, it reveals that the techno-environmental and biological problems associated with the modernization and intensification of commodity production were generators of new knowledge that formed part of the global science map.

Recent historiographical debates challenge the construction of grand narratives from established binary concepts (centre–periphery, empire–colony, North–South, development–dependency, state–nation). Studies of the circulation of knowledge, the environment, and commodity histories shed light on new trans-imperial, transnational, transatlantic, global, regional, and local connections. However, a look at the progress and standardization of science applied to the transformation of commodities suggests that they responded to the confluence and areas of negotiation between domestic strategies and global scientific projects.

Highlighted here is the necessary interrelation between 'domestic knowledge circuits' and 'tropical scientific knowledge' to understand the intimate connection between the developments of science and the clearly practical and productivist objectives of knowledge applied to commodities. This suggests complex and changing dynamics within the chain and life cycle of commodities and illustrates areas of encounter, negotiation, and hybridity in the production and circulation of knowledge. 'Domestic' refers to the interior of societies, where practical and scientific state knowledge is produced and circulated at different scales (national, regional, local), with the participation of multiple institutional and private agents. In this can be seen the role of the state and local agency and management in all territories, including the traditional European and US centres

and their colonial and postcolonial world. 'Tropical scientific knowledge' pertains to those projects, strategies, and actions that prevailed in the adoption, authorization, and global-local standardization of scientific codes of action to solve techno-environmental, biological, and production problems—as well as the fluctuations in the global commodity markets and trade—influenced by asymmetric power, economic, political, nationalistic, vocational, and cosmopolitan relations.

The first two sections discuss the historiographic elements, concepts, and debates within the recent literature on the circulation of state and scientific knowledge that may be fruitful for exploring domestic and scientific knowledge circuits of tropical merchandise. The third section illustrates the necessary interconnections between these two circuits for the generation of new scientific knowledge. This is explored in the context of the development of tropical phytopathology as it is related to tropical commodity diseases in the Hispanic Caribbean. In particular, the study refers to the control and eradication of the sugar cane mosaic virus (ScMV) in Cuba and Puerto Rico, which relied on the application of science to agriculture in the wave of imperial expansion after the Spanish-Cuban-American War of 1898. Finally, the conclusions suggest possible historiographic approaches and new lines of research for the study of the knowledge circuits of commodities.

Domestic Knowledge Circuits

Traditionally, the participation of the state in the generation of wealth and new scientific knowledge relating to commodities has been analysed within the great debates about the construction of the nation state, modernization, and dependency-development theory. In recent times, there has been a renewed interest in the production and circulation of knowledge as a cornerstone in the making of the modern state in European and Latin American societies. In this literature, key elements and actors for research focused on the formation and features of domestic knowledge circuits emerge from the histories of science, the environment, and commodities.

In 2019, Lothar Schilling and Jakob Vogel edited a volume with contributions relating to the thesis that state knowledge was not a monolithic entity; rather it was influenced by historical contingencies and group interests.[2] The compiled essays highlight the mediating participation of engineers, scientists, and experts in agriculture and other fields of knowledge in the introduction of their research agendas into government policy in the eighteenth and nineteenth centuries. The authors also consider the contribution of local knowledge in the construction of useful knowledge for the state. They define 'state knowledge' as the result of complex negotiation processes that involve multiple actors and institutional and private knowledge at different scales (national, regional, local-global, trans-colonial, transatlantic).

At the intersection between the history of imperial science and the notion of the nation state, Alexander van Wickeren describes a domestic example of how the market

growth and world domination of Cuban tobacco consumption favoured a transatlantic circulation of knowledge that was fundamental in the extension of state activities in the French public tobacco sector toward the colonial world.[3] He focuses on the acclimatization of tobacco varieties from the Spanish colony of Cuba in the European space, documenting the role of state engineers and scientists as administrators in the adoption of knowledge from the margins of the Atlantic in the context of economic globalization processes. The study introduces new readings that explain the failure in the global circulation of certain agricultural and scientific knowledge and practices. In this case, political influences and the public sphere are highlighted to sketch state scientists as fragile actors vis-à-vis civil society. However, elsewhere Leida Fernández points to the impossibility of reproducing regional ecological variables in Cuban tobacco cultivation of the *Havanensis* variety in other ecosystems.[4] Meanwhile, departing from the history of science and botanical knowledge, agricultural innovation, and biological exchange, Joseph Horan maintains that the failure of the Napoleonic project to introduce cotton cultivation in south-eastern France and areas of Italy—under French rule at the time—was justified because they had not established themselves as world production centres.[5]

Some authors shine the spotlight on new spaces of inquiry into the production and circulation of knowledge, redefining the region as a micro-laboratory and/or microcosm of more general historical processes and phenomena. Jeremy Vetter, for example, places the Rocky Mountain field stations, founded in the United States at the beginning of the twentieth century, as models of greater environmental representation.[6] The study refutes that the regional or local agency was an indispensable condition in the strategic selection of fieldwork sites to provide access to multiple and varied ecosystems that allowed for a broader epistemic knowledge. Vetter argues that national fieldwork was as valid an alternative for the globalization of knowledge as were the scientific practices produced by so-called residential knowledge, based on the experience of researchers living at the sites that were continuously under cosmopolitan study. He concludes that the knowledge produced in the Rocky Mountain field stations was simultaneously local in practice, regional in sharing political and economic influences, and transcontinental and global in epistemic aspirations. The essay engages with various current historiographical debates in the history of science and the environment interested in the local and situated nature of knowledge, in the places where knowledge is produced and circulated; and in the analyses of scientific field practices that blur the boundaries between the laboratory and the field—all central issues to the development, production, and circulation of commodity knowledge. Other historians consider the agro-industrial region as a model of know-how and a reflection of the prevention of, and possible solutions to, environmental and productive problems.[7]

New studies position the history of life sciences (genetics, microbiology, ecology, entomology, etc.) in conversation with agriculture through multinational comparison, exploring how science develops, through case studies in the United States, Europe, Russia, Japan, and China from the eighteenth to the mid-twentieth centuries.[8] The authors highlight the close connection between the development of science and the practical objectives of knowledge and administration that enabled the emergence of

new disciplines and/or the transformation of old disciplines. They also point out that the history of modern science has been promoted by national ambitions and imperialist expansion in competition with rival nations. From this perspective, the essays transfer analyses of scientific developments and the diffusion of ideas within the societies considered centres of knowledge, contrasting the traditional diffusionist perspective of Western science towards the so-called peripheral world.

The 'fruits of the earth', those essential basic commodities for domestic economies, were emblematic examples, within the discourse and political imagination of liberal and governmental elites, of the mobilization of resources and research for the sake of their transformation.[9] The contribution of tropical products to the industrial revolution and the modern world has renewed debates on the role of the state and local knowledge in the consolidation of global capitalism. For example, commodity historians, such as Sven Beckert, note the essential role of private entrepreneurial initiatives but also of the different European states in the domination of global cotton cultivation.[10]

The classic studies by Peter Bauer and Polly Hill demonstrate the powerful agency of the popular wisdom and local practices of peasants and smallholders for the development of successful commercial plantations of cacao and caucho in West Africa and South-East Asia.[11] In fact, Bauer argued that smallholders adopted a long-term perspective and were much more receptive to the fluctuation of prices in the world market in comparison to the model followed by European businesses. For his part, Gareth Austin highlights the place of local African knowledge in the diffusion of effective systems of commercial cultivation and control of plagues.[12]

Some narratives consider the transfer of knowledge and technologies as domestic strategies for controlling the global market. For example, some interpretations of Cuban sugar highlight the introduction of sugar varieties, technological innovations, and hiring of expert personnel who travelled within the trans-imperial, transatlantic, and intra-Caribbean circuits, connecting the colonial economy with the major European industrial Atlantic centres as well as with other producing colonies in the tropics.[13] Ada Ferrer points out the participation of Cuban colonial elites in transferring experts and machinery from Saint-Domingue in the quest to become the primary tropical sugar producer at the beginning of the nineteenth century.[14] Other authors focus on the contributions of landowners to industrial modernization during the technological sugar revolution of the so-called 'second slavery' in Cuba in the mid-nineteenth century.[15]

Tropical Scientific Knowledge

Studies of scientific knowledge circuits reveal that—as with domestic circuits of commodity knowledge—they were agreed upon among various actors and historical processes. The expansion of global production and trade in tropical products, with the subsequent greater pressure on agro-industrial ecosystems, required the global-local creation of new scientific knowledge to face the competition and agricultural techno-productive

and ecological issues. Studies have paid attention to the role of the tropical scientific knowledge circuits of basic goods, whose predominance, authority, and dissemination of codes of action were the result of complex collaborative and negotiated processes among various knowledge sources—academics, amateurs, experimental culture, and institutional and private actors—that were part of the global tropical-agriculture scientific map. All the producing spaces were active participants in the construction of a more open science that transcended the great narratives of universal and Western science, centres and peripheries, empires and colonies, North and South.

Historians of commodities and the environment place the agro-export boom in Latin America and the Caribbean between 1840 and 1930.[16] The two approaches converge in highlighting the economic overexploitation and environmental degradation of tropical monocultures as a consequence of changes in the world market and trade: European and American imperial expansion and the intervention of the liberal governments in the region. Stuart McCook coined the term 'liberal epidemics' to signal the participation of the economic policies of liberal governments in the unchaining of, and responses to, the multiple and simultaneous agricultural plagues of the long Latin American and Caribbean nineteenth century that affected tropical products such as coffee, sugar, and cacao.[17] These were an example of the 'commodity diseases'—a concept established by John Soluri to describe events caused by the intertwining of economic social and political processes that operated at different local, regional, and transoceanic geographic scales—which reaffirm unsustainable management of ecosystems of economic and ecological production.[18]

The historiography of science and the environment emphasizes the nature-knowledge relationship to analyse how agricultural knowledge was produced and circulated in the nineteenth and twentieth centuries, and how this knowledge was shared by the changes in the spaces considered. The essays in Jeremy Vetter's *Knowing Global Environments* argue that the emergence of disciplines such as chemistry and phytopathology shared the changing dynamics in agricultural practices and global trade, while making no distinction between scientific and local knowledge to obtain solutions in the management of environmental problems—as McCook shows in the case of pests in coffee cultivation. Accordingly, a negotiation of knowledge systems and local practices were agreed upon for development.[19]

The contribution of tropical plant pathologists has been insufficiently explored within the history of science and knowledge. Scientists and naturalists were the first to identify pathogenic organisms as causing diseases in commodities in the wave of global simultaneity of agricultural pests that occurred in food and export crops between the nineteenth and twentieth centuries, giving rise to phytopathology that depended, in turn, on other related disciplines such as mycology and bacteriology. In 1935, Wendell M. Stanley was able to isolate (without loss of virulence) the first virus identified by scientists as the Tobacco Mosaic (TMV), whose discovery later earned him a Nobel Prize in Chemistry. This finding had profound implications for the advancement of new medicine and molecular biology because the virus, which initially affected a basic product, became the object of research for other scientific developments.[20]

Environmental and science historians highlight the insatiable appetite of US expansion through the analysis of the massive inflow of transnational agro-industrial capital in the tropics.[21] Recent approaches transcend geographical boundaries in analytical constructions—for example, 'hemispheric', 'Atlantic', and 'Caribbean'—to reconsider the usual geopolitical interpretation of the United States, which has orbited around the dependency-development model based on the participation of transnational sugar and banana companies in Latin American and the Caribbean.[22] Other studies, such as those of Juan Carlos Santamaría, underscore the role of multinational sugar corporations in the creation of informal networks throughout the US imperial expansion.[23]

McCook considers the Greater Caribbean a representative space of neo-Columbian exchange characterized by the influential presence of imperial and transnational scientific institutions, whose actions were tied to the economy.[24] More recently, other studies observe the counterproductive effects of the agro-export economic development system on the region—causing soil erosion, pests, deforestation, and so on—as a focus of global-local knowledge. Megan Raby suggests the Caribbean origin of the notion of biodiversity in the agronomic stations established by the United States after the end of the Spanish-Cuban-American War, in 1898. Raby points out the complex web of economic, political, and social interests that influenced scientists in US and Caribbean institutions.[25]

New trends in the history of science, interested in the production and circulation of knowledge, have advanced our understanding of the origin of production, how knowledge travels through scientific networks, and the participation of new subaltern agents within the global knowledge map.[26] They are critical of the diffusionist and developmentalist models upheld by the narrative of the exceptionality of Western science in earlier colonial historiographies. Actor-network theory, articulated by Bruno Latour, has been particularly influential. This underlines both human and non-human (plants, pathogens, etc.) agency in the generation of new knowledge and connections in multiple directions, transforming each sphere of action with its movement.[27] Inspired by these assumptions, Warwick Anderson argues that post-colonial analyses of technoscience trace the flows and circuits of scientists, machines, and techniques crossing geopolitical boundaries, based on a rereading of actor-network theory that asserts a mutual reorganization of the global and the local.[28] Thus, the traditional dichotomy between centres and peripheries is blurred and the centre is considered just another point in a network, which suggests following the connections with other sites through the trafficking of people, practices, and objects. Under these premises, each movement and connection makes it possible to trace the multiple forms, speeds, and geographical scales of analysis of the knowledge circuits operating in the production chains and consumption of commodities.

Analyses of the negotiation processes in the creation and circulation of knowledge tend to take note of studies on science and empires that reconsider the place of local knowledge and its position within the colonial world. These argue that empires, like colonies, were not static entities, nor were they already formed when they launched their colonizing endeavours, and that local knowledge had a lot to do with the scientific

identity of the metropolis—a thesis supported by Kapil Raj, among others.[29] Others have assessed the relationship between science and empires based on Mary Louise Pratt's concept of 'contact zones', which she conceives as places that are not only geographical with stable meanings that may also represent attempts at hegemony but, at the same time, sites of multivocality, negotiation, borrowing, and exchange.[30] Other interpretations of the history of science and technology emphasize the correlation between the global and the local to observe that knowledge was co-produced and negotiated between multiple actors and sources of financing: institutional and private. Regina Horta Duarte affirms that scientific knowledge, even so-called universal knowledge, was *mestizo*—hybrid and transnational.[31]

Studies point to the growing development of economic botany globally and internally applied to agriculture in American academic and institutional circles in the late nineteenth and early twentieth centuries.[32] They argue that botanists and agronomists created independent institutional and private networks of tropical knowledge during imperial expansion. Other authors analyse the interaction of United States and local knowledge circuits in the newly acquired territories that formed the fabric of the global community of tropical scientists in the first half of the twentieth century.[33]

The tropics re-emerge with force as a category of analysis in the history of agricultural and environmental sciences, to include multiple sites and actors involved in the production and circulation of global-local knowledge. Christophe Bonneuil points to the co-production of global science in the same movement as economic science in his studies on the role of the tropics as a vast area of research, intervention, and control in the development of plant science in the French colonies.[34] Aligned with the thesis of the scientist as a cosmopolitan figure interested in scientific developments beyond an enterprise between empires and colonies, Paul Sutter reassesses the role of North American entomologists in the control of infectious tropical diseases during the construction of the Panama Canal, to demonstrate that their activity and research agenda went beyond alleged agents of empire.[35]

The renewed historiography of science, commodity histories, and global capitalism illustrates the greater importance of subaltern actors and intermediate figures of colonial society in the development of Western science. They have been key to understanding that the number of people who helped build science in the colonies was much greater than we assumed. Several authors document the formation and circulation of networks of industrial experts at the intersection of the global and the local.[36] Daniel Rood analyses the connections established between American, Cuban, and Brazilian planters to hire a transnational group of chemists, engineers, and other 'plantation experts' to help them adapt the technologies of the industrial revolution to 'tropical' needs and to maintain profitability.[37] Rood points out that the experts depended on the knowledge of the slaves they worked with, whose existence as skilled workers contradicted the racial ideologies that underpinned slavery and allowed Blacks to exercise new kinds of authority in the plantation world, reinforcing the economic dynamism of the slave economies of Cuba, Brazil, and the southern United States. Geographers and historians, such as Judith Carney, study the contribution of the knowledge of slaves

to the development of commercial rice, indigo, and coffee plantations in the southern United States and Brazil, as well as in the advancement of food and medicinal crops, expanding the number of subjects and knowledge involved in the construction of agricultural and scientific knowledge of basic products.[38]

Greater attention has begun to be paid to the participation of science in US imperial expansion in Latin America and the Caribbean, beginning with the history of science, knowledge, and colonialism. These approaches caution that the intense scientific activity that accompanied the US hegemonic construction over the region benefitted from expeditions, and that they took advantage of economic enclaves to establish scientific stations to carry out fieldwork. Camilo Quintero Toro emphasizes that science helped expand the ideals and discourses of American civilization and modernization.[39] Several authors highlight the participation of the United States in the development of research projects and the transfer of hegemonic technologies after World War II. In particular, they highlight the leading influence of the Rockefeller Foundation in the application of science to the production and expansion of US research projects and agendas in the region, which became global; this was the case with the diffusion of wheat hybrids—experiments initiated in Mexico were key to the food programmes of the Green Revolution in Asia.[40] Likewise, US scientific capacity was weaponized during the Cold War.[41]

Other perspectives qualify this narrative where elements, connections, and actors are provided for studies focused on the creation of the tropical scientific knowledge circuits. Derek Byerlee places the beginning of the global diffusion of US research and knowledge transfer agendas and technology in the hybrid corn programme developed in 1921, long before World War II.[42] He introduces key questions for understanding the expansion of development programmes and technologies in other scientific contexts—such as, for example, the contributions of US public institutions, figures, and universities in the training of national experts and scientists, who, upon their return to their countries of origin, transferred the knowledge and skills acquired, while establishing new knowledge networks. Similarly, Byerlee affirms the uneven circulation of an innovation developed within a country that has become hegemonic. In other words, not all the scientific knowledge that circulated caught on with equal force in different local contexts. Instead, this explains the success of the adoption of knowledge and technologies in the participation of national scientists who had access to local research systems, and the forging of more stable alliances between US universities and local universities to guarantee scientific capacity and informal personal networks for the exchange of materials and knowledge. He also highlights the institutional and private roles of other actors involved in the dissemination and maintenance of hybridization, science, and investment programs. Along these lines, he mentions small farmers and indigenous peoples of the Americas as fundamental suppliers of germplasm, breeds, and varieties developed by them in their productive ecosystems. Gabriela Soto-Laveaga proposes delocalizing knowledge about the Green Revolution and hybridization programs to establish more far-reaching comparisons between countries and to illuminate new actors in the exchange, dissemination, and transfer of knowledge.[43]

In addition, the tropical sugar industry depended on the introduction and global and local circulation of varieties. Jock Galloway has focused on the importance of Barbados in the global and intra-Caribbean sugar varietal biological revolution.[44] Inspired by this text, other authors observe the diffusion of knowledge and sugar cane hybrids in local contexts from the intersection of global history, science, and commodity histories.[45] These papers assert that Cuba adopted the hybrids from Java, and Puerto Rico from Barbados.

Assembling Knowledge Circuits: Domestic and Tropical Scientists

Histories of science, commodities, and the environment have paid little attention to the areas of confluence and/or resistance between knowledge circuits of the United States, Cuba, and Puerto Rico, mediated by global, local, scientific, economic, cosmopolitan, and political interests. This could answer how and why the study of tropical crop pathologies permeated the research agenda of the experimental agronomic stations established after 1898 in Cuba and Puerto Rico. An explanation can be found in the common negotiation points between domestic strategies and global scientific projects that blurred the borders between empire, colony, and neo-colony. In my case, the disease known as the ScMV was the necessary bridge between the global and local knowledge circuits for the support of tropical plant pathology, whose foundations were laid in the agronomic stations in Cuba and Puerto Rico with the study of multiple agricultural epidemics in the wave of imperial expansion. Furthermore, they were the unequivocal consequences of profound transformations in ecological and economic ecosystems, produced by the intensity of tropical monocultures during the Latin American and Caribbean agro-export boom.

The ScMV broke out in Cuba and Puerto Rico between 1915 and 1916. The pandemic threatened to destroy the tropical sugar industry, especially in Puerto Rico, with losses valued at more than eight million dollars.[46] Tracing the footsteps of the American mycologist Franklin S. Earle and the team he led at the Central Agronomic Station of Cuba (and that later worked in Puerto Rico) is an ideal case study to observe how the sugar cane epidemic connected various circuits of institutional and private knowledge—governmental and private experimental stations and agro-industrial sugar companies in the two Hispanic islands—with American and local agronomic and scientific communities.

The various interactions can be traced in a comparative, multi-situational, and multi-local way from the aforementioned 'actor-network' theory that underlines the roles of plants, pathogens, objects, and people in generating the circulation of knowledge. In the same way, connections can be traced through the 'following' method, born from anthropological and ethnographic practice, which allows for following subjects, objects,

and ideas in their varied trajectories throughout different contexts and locations to reveal their multiple purposes and complexity during the creation and circulation of knowledge.[47] Studying the knowledge circuits of commodity diseases from these two methodologies enables exploration of the consensus reached between the domestic and tropical scientific knowledge in the wave of US imperial expansion. These circuits were established to standardize research and action protocols that would organize and legitimize the key participation of plant pathologists within the global-local tropical scientific community, stimulated by the emergence of agricultural epidemics. At the same time, knowledge circuits became multivocal sites. Franklin S. Earle, for example, is illustrative not only of the participation of plant pathologists in the development of Caribbean agriculture during US expansion, but also of structured networks of formal and informal scientific knowledge between academic and local communities in the United States, Cuba, and Puerto Rico.

Geographers and historians of science, commodities, and the environment have traced the supposed circulation of the virus from the importation of sugar cane hybrids from Java to Argentina and from there to Puerto Rico.[48] The route of introduction to Cuba is unclear, but it is known that the disease was detected in infected hybrids from Barbados at the experimental station founded in Cienfuegos by American sugar baron Edwin Atkins, in collaboration with Harvard University, which specialized in obtaining sugar cane hybrids that respond to local ecosystems.

The migration of sugar cane hybrids from Java and Barbados had thus ended up spreading one of the worst global epidemic pests at the beginning of the twentieth century. The pathogen circulated within trans-imperial and transnational commercial and scientific circuits, but so did the knowledge and solutions for controlling the disease. Puerto Rico was considered the epicentre of the epidemic and a model island-centre of knowledge for the other tropical producing territories.

McCook points out that the ScMV epidemic in Cuba and Puerto Rico changed the perception of science, transformed the ecological, economic, and social relations of production, and favoured the emergence of new disciplines.[49] Rather than situating Puerto Rico as an island-model of knowledge, the epidemic illuminates the contribution of each producing region as a centre of knowledge for shaping global scientific tropical sugar phytopathology.[50] In fact, the traditional established geography of the virus made emerging islands of knowledge visible as the disease moved throughout the monoproducing cane-sugar tropics that connected the Global South—including, of course, Cuba and Puerto Rico. In all the regions affected by the virus, it forced producers, scientists, and governmental and private institutions to actively participate in the study and exchange of solutions at various scales (global–regional-local) that travelled within various circuits of knowledge—scientific, sugar, commercial, academic, and governmental—and also highlighted multiple vertical, horizontal, North-South, South-South, trans-imperial, transnational, symmetrical, and asymmetric connections.

The varietal revolution kept the Caribbean sugar industry from collapsing, transforming the economic, political, and social relations between planters and settlers in the new conditions imposed by the large-scale diffusion of hybrids in the first half of

the twentieth century. McCook, for example, notes that it led to the formation of a new class of scientists and technicians, such as chemists, to measure the sucrose content in new hybrids.[51] The differences between Puerto Rico's active participation in the varietal revolution and the resistance of Cuban settlers to the spread of sugar hybrids to replace the Crystalline variety have also been the object of attention within environmental studies and commodity histories.[52]

In 1904, American mycologist Franklin S. Earle assumed the direction of the first Central Agronomic Station founded by the nascent neo-colonial republican government of Cuba.[53] Two years later, Earle resigned from his position during the second US military intervention in Cuba, amidst strong nationalist tensions, especially from some local agronomists. At the same time, he published an article in *The Cuba Review* exhorting transnational agro-industrial companies and US settlers to invest in the largest of the Antilles. The text, entitled 'Cuba, the Land of Opportunities', is an emblematic piece on coloniality and the commodification of the lush tropical nature that accompanied the agricultural scientific discourse of US colonialism. However, Earle was also the architect of the scientific design of Cuban agriculture with an emphasis on the study of tropical crop diseases, whose legacy continues to this day. He resided in Cuba until his death in 1929.

Tracing Earle's footsteps illustrates the interconnected and comparative history of tropical plant pathology in the United States with Caribbean agricultural diseases, particularly the ScMV in Cuba and Puerto Rico. The two Hispanic islands had different political statuses but were united by US hegemonic control over the Caribbean region. The appointment of the American scientist illuminates a horizontal and vertical exchange, and successful negotiation space between the American and Cuban botanical and agronomist scientific circuits to propose a bridge figure in the tropical outposts in the Hispanic Caribbean focused on the pathology of tropical crops. Earle was one of the main advocates for plant pathology to enter the research agenda of the networks of experimental stations and agricultural colleges in the United States. He worked at the Mississippi and Alabama agronomic stations and was the first mycologist hired by the New York Botanical Garden (NYBG).[54] This institution facilitated the connection with scientists from the Midwest who were essential players in the development of the science of tropical plant pathology during US imperial expansion in the Hispanic Caribbean. At the same time, Earle was a pathologist and horticulturist for the United States Department of Agriculture (USDA). Under the aegis of the two scientific institutions, he undertook botanical expeditions and studied tropical crop diseases in Jamaica, Cuba, and Puerto Rico between 1901 and 1903, including the epidemic that had affected Caribbean coconut plantations since the late nineteenth century. All of this likely explains why Earle, at nearly fifty years old, was the appointee agreed upon by Lord Nathaniel Britton, director of the NYBG, Secretary of Agriculture James Wilson, and the Cuban ambassador to the United States, Gonzalo de Quesada, to organize the agrarian policy of the protectorate during the Americanization of the island.

Earle was a multifaceted scientist, an effective mediator between the various knowledge circuits interested in tropical agriculture within the Agronomic Station, without

forgetting that the official funding came from the Cuban government. The NYBG and the American botanists had a new tropical laboratory. The USDA, transnational agribusiness companies, and settlers hoped that Cuba would become the winter garden and site for field study to eradicate tropical crop diseases and other agricultural problems unknown to them. The emphasis on tropical plant pathology and botany also suggests some personal agency for Earle, especially in creating a team with family and personal networks, as well as diverse scientific circuits of American botanists and agronomists interested in the pathology of tropical plants, rather than sugar cane. In fact, he made up for his lack of knowledge of Cuban agriculture by working with Francisco B. Cruz, an agronomist specializing in tobacco cultivation, trained at the School of Agriculture created by the *Círculo de Hacendados* under the Spanish Empire.

The Cuban agronomist community was divided between those who desired agricultural diversification, and the sugar sectors, rife with nationalist and scientific tensions. For this reason, Earle encountered numerous obstacles in the sugar agronomist community, which was more interested in the problems of reduced land fertility than in sugar cane diseases, until then caused by insects without serious damage to the plantations. Instead, his work was supported by local botanists who had researched the agricultural epidemics of the coconut plantations in Baracoa, a region that exported between ten and eighteen million coconuts to the United States. The sugar community in Puerto Rico was more inclined to include tropical plant pathology as the central nucleus of the research agenda of the first experimental station, founded in Mayagüez after 1898. The institution was indebted to the one created by Puerto Rican farmers during the Spanish colony to face the irruption of sugar cane pests since the end of the nineteenth century.

Earle participated in the vertical and trans-imperial connections among knowledge circuits to obtain sugar cane hybrids from material donated by agronomic stations in Barbados and Louisiana.[55] This latest exchange indicated that the enthusiasm for research and experimentation transcended American scientists' concern of spreading disease, an aspect that has gone unnoticed within the historiography of science and knowledge. R. E. Blouin, director of the Audubon Park experimental station, warned Earle that the experimental seeds were infected by an insect, which Earle saw as an excellent opportunity for study because he thought it was probably due to the borer, the insect that most affected sugar cane plantations. However, he developed his sugar scientific knowledge after he had resigned from the Agronomic Station in 1906—and subsequently Earle was then hired by the USDA to study sugar cane diseases in Puerto Rico and later by transnational sugar companies.

The American mycologist formed a team of tropical plant pathologists and botanists who worked interchangeably in the three territories, including Melville T. Cook, from Earle's professional and personal circle in Illinois and the NYBG. Cook was the head of the plant-pathology department at the Central Agronomic Station of Cuba and, later, director of the Experimental Station at Rio Piedras, Puerto Rico, in the midst of the global varietal revolution between 1923 and 1940. He became an expert in the study of tropical agricultural diseases. After Earle's death, Cook wove informal networks of scientific collaboration and friendship with the aforementioned Cuban,

Francisco B. Cruz.[56] In addition to the reports, newsletters, and other channels usually used by the scientific authority, the exchange between Cook and Cruz reveals that correspondence and photographs became key research objects for scientific validation in the identification of sugar cane mosaic disease in a hybrid from Java, without Cruz ever leaving Cuba. He sent the photograph to other American researchers such as William T. Horne, a scholar of agricultural pests in the Caribbean, and former director of the plant pathology department at the Cuban station (and Earle's brother-in-law). At the time, Horne was a professor at the University of California. Similarly, Cruz sought Deerr's approval in his research on the official dissemination of hybrids in Cuba. Likewise, he mediated and articulated networks of scientific knowledge with local agronomists.

Earle was one of the scientists who discovered the viral aetiology of sugar cane infection with the participation of American and Puerto Rican scientists, whose local communities had extensive experience in the study of sugar pests since the late nineteenth century. In this context, the figure of Carlos Chardón emerged—the first Puerto Rican mycologist to identify the transmitting agent of the ScMV. To do this, Chardón verified in practice the laboratory experiments that were carried out by E. W. Brandes, a USDA pathologist who studied the disease in Cuba at the request of the government.[57] Chardón forged new knowledge networks throughout other Latin American and Caribbean producing centres in Cuba, Colombia, and Venezuela.

This study would be incomplete if we ignored the role of circuits of sugar knowledge and know-how during the control of the epidemic, and the experimentation, obtaining, and dissemination of sugar cane hybrids. Sugar cane plantations became nodes of knowledge and scientific validation of essential experiments. Similarly, transnational sugar companies were key actors in the creation of laboratories and experimental stations to combat the pest. In fact, Earle forged connections between science and business—amongst government and private experiment stations, multinational sugar companies, and the USDA—to study and search for sugar cane hybrids and varieties that were resistant to sugar cane mosaic disease. Likewise, Earle's intervention sheds light on the active research and experimentation agenda within transnational corporations in Puerto Rico, such as the Central Aguirre sugar mill and the Baraguá sugar estate in Cuba—the latter with the participation of other agents such as researchers into sugar crop diseases from USDA and Harvard University.

Despite his scientific reputation regarding sugar cane, the opinion and hiring of Deerr was prioritized over Earle—as was the case, for example, in discussions within the Atkins Experimental Station to eradicate sugar cane mosaic disease. This suggests that the sugar expert was the decisive agent in the validation and/or final scientific and practical decision-making regarding agro-industrial problems, rather than the scientists. The answer probably lies in the fact that Deerr symbolized the balance and consensus reached between know-how and proven knowledge acquired within the long-standing global sugar circuits, with newly created scientific circuits at the beginning of the twentieth century. Like Deerr, however, Earle wrote one of the most important textbooks for the study of the history of sugar, published just a year before his death in Cuba.[58]

The simultaneity of pests in Caribbean agriculture also suggests the occurrence of exchanges and transfers of study models among expert pathologists who put their expertise in various epidemics of tropical crops into practice in alternating official and private institutions, as well as transnational agro-industrial companies. This was the case of John Robert Johnston, a USDA pathologist who worked at the Rio Piedras Experimental Station in Puerto Rico and in Cuba on the mosaic virus epidemics at sugarcane and coconut plantations, but also on the pests in banana fields owned by the United Fruit Company.[59] Johnston illustrates that the sense of belonging, complicity, authority, and scientific superiority granted by sharing backgrounds at elite American centres, such as Harvard University, was often invoked to negotiate established codes of action, which were revealed when he prohibited the importation of hybrids during the inspection of the sugar plantations at the Atkins Experimental Station by order of the Cuban government. Johnston and Atkins were representative of the close links between the sugar circuits of the Eastern United States and Cuba from the nineteenth century until shortly after the Cuban Revolution in 1959.

Exploring Research Paths: Conclusions

Knowledge was an indispensable condition for the generation of new wealth and techno-scientific developments of basic products that traversed multiple commercial, financial, labour, scientific, and technological circuits, whose interactions are little explored within current narratives. Following such interactions is a challenge in commodity biographies to visualize multiple intersections on various geographic scales. This allows the application, for example, of geographic systems to the investigations of the circuits of knowledge from commodity histories.

The histories of science and the environment and commodities have paid attention to the processes of knowledge circulation. New studies suggest observing circuits of commodity knowledge as research subjects that illustrate multi-place, multidirectional, and multivocal spaces to illuminate new connections, comparisons of greater scope that transcend traditional binary analyses (empire-colonies, centre-periphery, North-South), formal and informal knowledge networks, and various human and non-human actors (such as plants and pathogens) involved in the production and circulation of knowledge throughout the life histories of basic goods, from production to consumption. In the same way, a new interconnected history in the studies of the commodity knowledge circuits must consider the interconnections among multiple variables (economic, commercial, political, labour, social, ecological, scientific) and geographical scales (global, national, regional, local, trans-imperial, trans-colonial, transatlantic, intra-regional, among others).

The knowledge circuits of domestic goods and scientists show that both resulted from consensus among historical contingencies, knowledge systems, and global-local agricultural and scientific practices. On the other hand, they reflect the porous frontiers

between science and business, science and investment, and science and innovation that underscore the ambiguous dimension of knowledge applied to commodity development. They also suggest addressing the agency between multiple socio-economic and political factors, and institutional and private actors, during the diffusion of innovations and technologies in different contexts. From this perspective, knowledge considered hegemonic is re-evaluated as a process that did not necessarily mean asymmetries of power, imposition, and control, and more studies will no doubt illuminate new areas of confluence, negotiation, and resistance to highlight the hybrid character of knowledge, often co-produced and cosmopolitan, beyond companies amongst empires and (former) colonies.

Exploration of commodity knowledge circuits reaffirms the thesis of Robert E. Kohler that sees field sciences as the ideal spaces in which to illustrate the opportunities for professional careers that blur the lines between field and laboratory.[60] Scientists discussed, interacted, and/or incorporated the knowledge of peasants and farmers within commodity-research agendas. Nevertheless, the impossibility of reproducing the agricultural ecosystem within the laboratory meant that the scientists had to become farmers and depended upon fieldwork in order to study and practically confirm their theories—which shades the separation established between farmers who work in the fields and scientists in the laboratory.

Studying the knowledge circuits of commodity diseases establishes far-reaching comparative approaches that traverse centres and peripheries, empires, and colonies. It also includes the tropics as an analytical category of particular relevance in agro-export societies from the history of commodities, science, and the environment. The contribution of agriculture to the advances of medicine and other scientific disciplines facilitates the inclusion of new methodological perspectives, such as, for example, from the history of science and medicine and the contribution of local knowledge. Gabriela Soto-Laveaga analysed the use of Mexican wild yam as germplasm for advances in medical biotechnology and the appropriation of so-called peasant knowledge by multinational corporations.[61] Finally, new studies on local knowledge encourage the incorporation of diverse voices and interactions from across societies—including indigenous peoples, country-dwellers, and enslaved people, but also of technicians, amateurs, and the like, who are insufficiently represented on the global scientific map of basic commodities.

Notes

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PART V

ENVIRONMENTS

CHAPTER 18

TERRITORIAL MAPPING AND THE FORMATION OF FRONTIER ZONES

The Trucial States (1930s–1950s)

SABRINA JOSEPH

Territorial control over the physical environment for the purposes of commodity extraction intensified across different regions of the world from the eighteenth century onwards and was in large part instigated by the mapping and quantification of lands undertaken by colonial experts, scientists, and government officials. Legal, scientific, and political drivers motivated the mapping, measurement, and survey of lands and their productive potential for the purposes of capitalist exploitation. These processes propelled the incorporation of new frontiers into global networks of commodity production and exchange, thereby transforming the social, political, and physical landscapes of frontier zones.

Following an overview of the scholarship on the subject, an examination is made of the understudied case of the Trucal States. Although not a colony of the British Empire, from the seventeenth century the Trucial States (modern-day United Arab Emirates) were squarely within Britain's sphere of influence. In close proximity to India, the Gulf region was of strategic significance to the British who sought to establish commercial dominance in Gulf waters. During the nineteenth century, they signed various treaties with local rulers in an attempt to ensure maritime peace in the Arabian Gulf Waters.[1] It was not until the early part of the twentieth century that the prospect of oil discovery came to the fore. The mapping of this region's physical and social environment by British explorers and experts during the first half of the twentieth century had political underpinnings and paved the way for the discovery of oil and the demarcation of geographical spaces that accompanied (and in fact supported) the development of the oil frontier economy. The unfolding of this process, however, was informed by local forces with their own vested interests.

The existing scholarship on commodity frontiers devotes significant attention to the 'results' and ramifications of the commodity frontier at the local, regional, and international levels. At the forefront of this research, Jason Moore addresses the spread of capitalist forces and economic drivers of frontier expansion and the subsequent 'market widening and market deepening' that result from this.[2] Mapping sheds light on the processes involved in creating a frontier—a physical and social space that can accommodate or facilitate economic exploitation (and thereby global economic integration) and in so doing forever alter social and political relations on the ground. The case of the Trucial States provides an example of this, where mapping and surveying activities—interpreted broadly to include the drawing of boundaries, as well as the systematic documentation of the physical and demographic characteristics of the region—were instrumental in shaping what would become the 'oil frontier' in the early part of the twentieth century.

Scholarship on Territorial Mapping

The scholarship on mapping is geographically diverse and interdisciplinary and encompasses a broad definition of mapping activities, including not only cartography and map-making but also surveying, topographical descriptions, geographical or demographic classifications, and other depictions and illustrations of the physical or social landscape. The work on territorial mapping focuses predominantly on the relationship between mapping and the emergence of nation states, and the centrality of mapping initiatives to imperialist projects. Scholars also explore the cultural dimensions of mapping, shedding light on the relationship between social and territorial mapping. Finally, there is a growing body of literature focusing on the role of local populations in informing mapping activities and thereby challenging state narratives.

According to Moore, 'the most significant commodity frontiers were based on the exploitation of the environment'.[3] More specifically, he elaborates that 'early capitalism's landscape transformations . . . were unthinkable without new ways of mapping space'.[4] Thus, the emergence of territorial mapping, linked to the rise of capitalist nation states, is central to the history of commodity-frontier formation, even if the scholarship itself does not consistently draw out this connection.

Various scholars highlight how cartography or territorial mapping was key to the affirmation and consolidation of state power and national identity after the sixteenth century. During the Middle Ages, maps were not commonly used in Europe to depict geographical information or delineate states; political rule was exercised over people rather than land.[5] In a similar vein, Arabo-Islamic geographers in the medieval Muslim world did not conceive of distinct territorial boundaries in their cartographies.[6] By the seventeenth century, however, European sovereign power was based on the control of territory and thus spurred the delineation of boundaries and the widespread use of maps.[7] The theoretical principles and techniques that informed modern cartography

were shaped by developments that took place during the Renaissance, specifically the rediscovery, via the Muslim World, of Ptolemy's ancient Greek text *Geography* and the rise of print capitalism.[8]

According to Mark Neocleous, maps are a political tool that in the post-sixteenth century were intimately tied to the rising merchant class and embodied the territorial imagination of the state.[9] Jordan Branch also explores the relationship between maps and the rise of sovereign territorial states after the sixteenth century. By the seventeenth and eighteenth centuries, rulers and governments became more involved in map production, and political authority was increasingly based on territorial rule. Maps did not just visually demarcate the boundaries of modern states but also spurred transformations in how political rule was conceptualized and executed, thus contributing to the institutionalization of territorial forms of authority.[10] Cadastral maps were a particularly powerful political tool used by states to consolidate power. In their extensive research on cadastral maps in Western Europe from the late sixteenth to the early twentieth century, Roger Kain and Elizabeth Baigent explain how such maps contributed to the commodification of land with states using them as a tool to exert control over land for tax purposes and natural-resource exploitation.[11]

Branch goes further than Neocleous by examining how early modern mapping, specifically the application of mathematical cartography, facilitated and supported claims to colonial territories, which in turn also drove the shift from non-territorial to territorial forms of authority within Europe.[12] The application of the latest scientific techniques to mapping extended beyond Europe and also characterized early modern cartography in China, where the Qing court, influenced by Jesuit cartographers, used modern cartographic and ethnographic mapping to bolster, expand, and demarcate the state's territorial authority.[13] Mapping was a tool used by the Qing to stake its imperial claims in the face of an expansionist Europe.[14]

Nancy Appelbaum's work on nineteenth-century Colombia utilizes reports, maps, illustrations, and texts from the Chorographic Commission of Colombia to explore how elites visualized the nation and how, through their depictions, they sought to re-order or redefine the realities they encountered on the ground. The Commission's visual texts depicted racial diversity even while commissioners advocated unity and associated it with progress and modernization. This resulted in the privileging of certain regions over others—specifically the more 'advanced' whiter inhabitants of the Andean highlands over the African/indigenous peoples of the tropical lowlands. By advocating a regional organization based on such racial stereotypes, the commission not only left a lasting legacy of regional identities but also sought to justify the colonization of more 'backward' lowland regions in the interests of promoting a capitalist export-based economy.[15]

Susan Schulten also explores the changing role of maps in the nineteenth century, with a focus on America. Similar to other scholars, she highlights the essential role of maps in cultivating national identity and establishing territorial authority.[16] Schulten goes beyond this, however, and argues that maps were more than just political tools or visual illustrations but also increasingly important tools of social, environmental, and

economic organization that record a nation's past and shape its future development. Elizabeth Sutton's work on cartography in the Dutch golden age explores the link between mapping, state power, and commercial expansion. Maps served as a tool that reinforced the political and economic power of the governing and merchant elites in large part by legitimizing land claims and the exploitation of natural and human resources. Embodying the rationalism that informed the social, political, and economic organization of the seventeenth-century Dutch nation state, maps legitimized state sovereignty and propagated capitalist and imperialist expansion.[17]

In the eyes of colonial authorities, territorial claims had to be secured, and efficient exploitation required the 'civilization' and pacification of local populations. Mapping was an integral part of these processes and proliferated with colonial expansion. According to Brian Harley, maps were imperialist tools that allowed for lands to be claimed on paper before they were officially occupied.[18] Bernardo Michael examines how maps generated by revenue surveys conducted by the British in South Asia during the nineteenth century not only provided information on the boundaries of the subdistricts (*parganas*) and the property of indigenous populations but also informed the creation of administrative districts and territorial reorganization, thereby consolidating the power of the colonial state.[19]

David Spurr and Joseph Morgan Hodge both shed light on imperial narratives that informed the surveying, classification, and mapping of new lands. According to Spurr, colonial discourse implicitly lays claim to the land surveyed on the basis of promoting economic development (through the use of technology) and the restoring of order.[20] Thus, there is a moral dimension to colonial territorial claims. Hodge traces this mindset back to earlier centuries, arguing that agrarian improvement had always been associated with the reclamation of unused lands or what was often known as wastelands. Interestingly, colonizers regularly referred to lands in different parts of the world as 'empty' or sparsely inhabited but with great potential. They often articulated that making such lands productive was a religious and economic obligation.[21]

As Spurr further elaborates, the colonial imagination believes that land should be controlled by those who most efficiently exploit its resources in line with Western capitalist and industrial values.[22] In a sense, therefore, it was the duty of Europeans to colonize and develop lands that had been under-utilized or inadequately exploited by 'backward' nomadic peoples who did not have the technological expertise to produce 'valuable agricultural commodities'.[23] Agricultural development, however, did not always entail the uprooting of pre-colonial land tenure systems by British colonial authorities, as in the case of British West Africa.[24] Nonetheless, colonial powers often promoted agricultural development as an effective way of introducing 'civilization' and modernization.[25] This is explored later in the case of the Trucial States, where mapping activities were linked to oil and water exploration and agricultural development. On a moral level, British authorities believed that agricultural development would improve the living standards and enhance the dietary intake of local populations, thus minimizing any social upheaval that might occur as a result of rapid economic development.[26]

According to Hodge, science played a key role in the process of developing and populating frontiers by 'helping to identify potential opportunities as well as barriers to colonization through an extensive surveying and classifying of new lands, resources, and peoples'.[27] In his work on the rise of the Northern Rhodesian Copperbelt in the 1930s, Tomas Frederiksen explores how new scientific prospecting techniques, including the use of geology to map mineral resources, played a key role in transforming a newly acquired territory into a profitable site of colonial extraction.[28] Along similar lines, Schulten explores how maps in nineteenth-century America facilitated the exploitation of land for agricultural purposes by classifying regions most suitable for agricultural production (in this case cotton) and documenting the presence or absence of slave labour across regions.[29] Toby Jones's work on Saudi Arabia also sheds light on how science and technology were instrumental in the rise of the modern Saudi state. Working closely with Saudi power brokers, American geologists and other experts drove the creation of state boundaries and the compilation of knowledge about nature and society during the first half of the twentieth century. This extensive mapping of territory and populations was instrumental in consolidating the power of the emerging state, incorporating 'under-developed' territories into a broader national economy, and laying the groundwork for the development of infrastructure, including a road network.[30]

By focusing on the political ecology of the Arabian Gulf during the modern, pre-statehood period, Jones fills a gap in the current scholarship on the region. While research on the environmental history of the Middle East and North Africa (MENA) has expanded over the last fifteen years,[31] much of the available work on Arabia's environment is limited to prehistoric times and draws on archaeological evidence.[32] Even this scholarship highlights that Arabia gets marginalized in archaeological work on western Asia due to perceptions that the development of arid environments depends upon foreign intervention.[33] Furthermore, research on the Gulf pertaining to conservation, sustainability, pasture lands, and environmental management is mostly in the context of early Islam or present-day initiatives aimed at alleviating the impact of development.[34]

Jones examines how the Saudi state was forged through the development of water and oil. Science and technology, via global networks of expertise, were essential in harnessing these resources. Thus, the interplay between state institutions, multinational corporations, and engineering companies proved instrumental in reshaping Saudi society and the environmental landscape.[35] The case study explored in this chapter builds on Jones's work as well as that of such scholars as Diana Davis and David Schorr, who explore how colonial administrators, experts, and scientists informed environmental policy and actions in the MENA region through their cultural and scientific views, which included narratives of environmental decline (i.e. deforestation and desertification).[36] It sheds light on the historical role of Western experts, particularly in harnessing natural resources to consolidate imperial power and the power of the emerging state. According to Robert Home, British colonial land surveyors in the Middle East, serving the interests of a colonial state, were instrumental in effecting a redistribution of land and facilitating the replacement of 'communal land ownership with individualized tenure'[37]—reforms that would encourage capital investment in land. Hodge's work

explores how the engagement between science and the state informed twentieth-century British colonial development agendas in sub-Saharan Africa, Southeast Asia, and the Caribbean. Scientific experts shaped and implemented rural development projects and environmental policies, often drawing on their prior experiences in other colonial areas.[38]

Surveying was one of the many administrative and legal tools used by increasingly centralized states to exploit hitherto unproductive resources and thereby consolidate power.[39] During the nineteenth century, 'colonial mapping bureaucracies' emerged that spearheaded resource development, the extraction of various natural resources, and the management of concessions.[40] Various scholars have outlined how states have altered land tenure patterns and commodity production through the mapping of territories across different parts of the world, including Latin America, the Middle East, and Africa.[41] According to Derek Byerlee and Ximena Rueda, 'historically, the state has been the major regulator of land use changes', through its land-use policies and redistribution of land.[42] Byerlee and Rueda highlight how the lack of territorial surveys, land registration, and boundary demarcation in forest frontiers sometimes worked to undermine customary law and benefit plantation companies that were eager to receive land concessions from the state.[43]

Some scholars have approached the issue of mapping from an anthropological or literary perspective, exploring the relationship between culture and territorial mapping. Prem Kumar Rajaram, for instance, explores how mapping has been instrumental in not only legitimizing territorial authority and the exploitation of natural resources but also in justifying relations of exploitation between people. Mapping was part and parcel of broader colonial processes of ordering space that ultimately produces a 'typography of exploitation' based on the exclusion of marginal groups.[44] Malreddy Pavan Kumar also explores the relationship between territorial and cultural mapping, emphasizing how territorial mapping is not static and, in the present time, must be understood in the context of the 'regionalisation of cultural identities'.[45] Madeleine Reeves explores the contested and fluid nature of state borders in rural Central Asia. Basing her findings on ethnographic fieldwork, Reeves sheds light on how diverse groups, including state and non-state actors, play a role in constructing borders.[46] Through the lens of literary and cultural geography, Sarah Wylie Krotz explores how Canadian settler text maps challenged the colonial imaginary by depicting the complexity of places.[47]

In recent years, scholars have devoted more attention to the role of local populations in informing territorial mapping. The mapping activities that accompanied the spread of commodity frontiers involved multiple forces and were at times contentious, pitting state or colonial mapping projects in confrontation with local populations, but at other times a vehicle for co-opting local stakeholders into colonial bureaucracies. Regardless, however, local communities were integral to shaping the evolution of modern mapping activities. In the context of colonial Kenya, indigenous communities in the early 1930s employed countermapping strategies to protect their land rights in the face of intrusive mapping practices used by the colonial state to facilitate the exploitation of newly discovered gold resources.[48] Recent research on mapping as an instrument of

dissent examines how local populations in different regions of the world—including Scandinavia, Africa, and Latin America—challenged state narratives and imperial cartography by putting forth alternative modes of mapping, such as community-based mapping projects or participatory and collaborative mapping.[49]

Alternatively, local populations also contributed to the development and legitimization of state-led mapping and cartographic efforts. Jamie McGowan's work, for instance, examines the role of Africans in mapping activities during the late nineteenth century through mid-twentieth century. He examines how and why local populations in the Gold Coast became surveyors and draftsmen. These individuals contributed to the institutionalization of surveying while also bolstering the power of the colonial state.[50] In their research on sixteenth-century surveying practices in New Spain, Richard Hunter and Andrew Sluyter argue that surveying was inherently a social undertaking in which surveyors 'modulated the complex interactions among local actors, centralized state power, and specific landscapes'.[51] According to Hunter and Sluyter, textual surveys (as opposed to instrumental surveys) were compiled by the Spanish, French, and British in their colonization of the Americas from the sixteenth through the eighteenth centuries.[52] Thus, the process of territorial construction and appropriation was a negotiated one involving multiple actors at the state and local levels.[53]

Overall, the existing scholarship focuses predominantly on how mapping activities have been instrumental to the rise of nation states and the pursuit of colonialist and imperialist agendas. There is a more limited body of work, however, that explores the intersection between territorial mapping, the emergence of nation states, and commodity-frontier formation. British explorers and surveyors in the Trucial States during the first half of the twentieth century provided the first systematic survey of the region's geography, which thereafter came to define this landscape to the outside world. This was instrumental in the delineation of boundaries, the formation of the modern nation state, and the development of the oil frontier.

The Case of the Trucial States

The discovery of oil during the 1950s and 1960s in what is today the United Arab Emirates forever changed the economy and landscape of this desert region. The rise of the oil frontier was made possible by the various experts—including military personnel, explorers, surveyors, and geologists—who had been 'mapping' the physical landscape of the Trucial States since the early part of the twentieth century. Prior to this period, there was little documented information on the area's natural environment, particularly in the interior areas. By mediating and controlling the relationship of these experts with local sheikhs, the British residency in the Trucial States, particularly after the 1930s, was able to consolidate its influence and power over key local rulers and, in turn, the latter's control over natural resources. Thus, the role of technical experts in the Trucial States had an important political dimension to it. Furthermore, the knowledge generated by these

experts informed perceptions of the desert, understanding of local people's interactions with nature, and scientific data on the region's land and water resources, animal life, and natural history. This environmental mapping facilitated and spurred the marking of territorial boundaries, the expansion of water resources and agriculture, the adoption of new technologies, and, ultimately, the rise of the oil economy.

As oil exploration got under way in the 1930s, a growing number of experts made their way to the region. This was also the beginning of increasing British involvement in the internal affairs of the Trucial States. Prior to this period, British interests in the region were mostly commercial, and characterized by limited involvement in internal tribal issues.[54]

These British experts were involved in mapping, measuring, documenting, or surveying the physical landscape of the region for the purposes of oil exploration, the location of water resources, or the recording of the region's natural history. Many who came to the Trucial States in the 1940s and 1950s were geologists or surveyors with experience in other parts of the Gulf. The type of work they undertook includes geophysical work, gravity surveys, magnetic surveys, and topographic surveys.[55] Some came to the Trucial States at the bequest of the British government, but others came as explorers or oil-company engineers with experience in drilling for water and oil in different parts of the Gulf.[56] Several British representatives in the Gulf complemented their official duties by collecting geological, botanical, and zoological data and publishing their work based on individual observations.[57]

British explorers who travelled to the Trucial States from the late nineteenth through the mid-twentieth centuries played a significant role in framing environmental perceptions of the desert and its people during a formative period. Their discourse also informed development initiatives undertaken by the British during the 1940s and 1950s. Although many of these explorers often provided detailed descriptions of the region's flora, fauna, wildlife, and geography, they perceived the physical landscape as 'empty' and one that needed to be 'tamed' and made conducive to surveyors, military personnel, and a host of other experts. Such views typically lacked a meaningful understanding of how local populations engaged with the natural world around them.

According to Diana Davis, 'environmental orientalism' has long dominated the discourse on the MENA's physical environment. Propagated in large part by Western imperial powers, this discourse depicts the region's environment as marginal and dominated by wastelands that have been degraded over time by overgrazing and deforestation. Local people, including Bedouins, nomads, and peasants, are often blamed for this environmental destruction, echoing biases previously propagated by nineteenth-century Ottomans.[58] Unfortunately, such views survived into the post-colonial period and shaped government policies and the work of development agencies, in spite of scientific research highlighting the resiliency and heterogeneity of the region's landscape.[59]

During the late nineteenth and early twentieth centuries, some notable British explorers came to the Trucial States and its immediate surroundings. While Charles Doughty was a traveller and poet, the explorations of J. R. Wellsted (a British lieutenant)

and Bertram Thomas (a civil servant and Arabist who was the first documented Westerner to cross the Rub' al Khali) were in part motivated by their professional roles. They each highlighted the barrenness of the desert and the deficiencies of its people. For Doughty, the 'empty' and lifeless landscape had implications on the very nature of the people who occupied the land, who he describes as uncivilized, 'primitive', 'lawless', and plagued by anarchy.[60] While Wellsted's *Travels in Arabia* provides detailed descriptions of the vegetation, animal life, and geology of the Omani mountain ranges, the author also laments the lack of initiative displayed by local populations. Referring to the dire condition of agriculture in the open plains, he states 'natives bestow neither labour nor expense to remedy the defect'.[61]

British travellers to Arabia exhibit two tendencies when describing the region's landscape: on the one hand, they romanticize and mystify nature or, conversely, emphasize its harsh and 'primitive' characteristics; on the other, they measure, quantify, delineate, and map the physical environment. By the early twentieth century, there emerged a general mindset among British explorers in the region (particularly Arabia) that technology could improve the land.[62]

An RAF officer in the Trucial States during the mid-1940s, Raymond O'Shea, highlights how the desert is not all 'romantic' but rather a 'barren', 'dirty and smelly' environment where most villages do not have basic sanitation or drainage, animal carcasses are left lying around, and garbage gets thrown just outside houses. Furthermore, unlike 'insect-free' Europe, the Arabian landscape is infested with flies.[63] O'Shea describes the geological characteristics and ecology of the area, including prevalent trees (frankincense and acacia), date plantations, valleys, and animal life.[64] This mapping of the physical terrain is a common feature of travelogues and geographies of the Middle East, dating back to at least the nineteenth century. British explorers in Palestine, for instance, often romanticized the region's landscape, painstakingly drawing linkages between the region's geography and biblical history and perpetuating Orientalist paradigms that paved the way for British imperial interests.[65] As O'Shea states, 'By flying over the desert our explorers have re-discovered the hidden cisterns from which the Israelites drank. . . . Vast Arabia has surrendered all her keys to the British Empire'.[66]

O'Shea exhibits a limited understanding of local people's environmental practices, economic activities, and tribal customs that shaped their use and management of natural resources. He depicts sheikhs as feudal lords with absolute power and Bedouin as a menace who compromised security due to their frequent attacks.[67] Although he acknowledges the role of tribesmen in maintaining irrigation systems, he overlooks how they typically shared natural resources with other tribes or engaged in diverse economic activities throughout the year—including fishing, date agriculture, pearl diving, and camel rearing.[68] In reality, a sheikh's power was by no means absolute; it was not until the mid-twentieth century that coastal sheikhs exerted greater control over the hinterland. Sheikhs, moreover, used various strategies to consolidate power over tribes and ensure their loyalty, including negotiation, alliance building, and payment of subsidies.[69] Such strategies were key, as prior to the mid-twentieth century, power was defined by control over people rather than land.[70]

O'Shea provides a glimpse into the role played by British Political Officers in mediating disputes related to natural resources. For example, he describes complaints submitted to the Political Officer regarding congested water channels and limited water flow to plantations.[71] Thus, the environment figured prominently in British interference with inland affairs. He argues, furthermore, that the area was in dire need of development and that the British should play an active role in planning and funding the creation of schools, hospitals, sanitation projects, roads, and agriculture.[72] Thus, he highlights the significant role of the West in lifting Arabs out of their 'backwardness' and emphasizes that strategically Britain 'cannot do without a place in Arabia, which is the main overland route to India'.[73] During the twentieth century, as George Trumbull describes, we see the emergence of 'economic orientalism' among Western travellers, explorers, and government officials in the region, who represent the local people and desert environment as in need of imperial intervention: 'technological and economic interests in the desert at the end of empire never abandoned the genesis of politically interested representations of people and land as part of the pursuit of the maintenance of imperial monopolies on power and economy'.[74]

Like O'Shea, Edward Henderson came to the region in a professional capacity, specifically in the service of Petroleum Development Trucial Coast. He explored the Trucial States between 1948 and 1956 and documented his experience in an autobiography. His imaginary of Arabia was shaped by the romanticism of earlier travellers to the region. Henderson provides a general description of the natural landscape of the region, including the sand dunes, mountains, vegetation, agriculture, and bird and marine life.[75] He portrays Arabia's physical environment as one that poses an obstacle for exploration, centralized control, and unification of indigenous peoples. The environment needed to be controlled and secured for oil drilling to take place, thus, the need for geological surveys and establishing communication lines.[76]

Perhaps given the nature of his work in the Trucial States, Henderson displays a more sophisticated understanding than O'Shea of the relationship between leaders and tribes and the tribal management of land and water resources. He emphasizes the lack of centralized leadership over interior tribes.[77] Furthermore, he describes how tribes customarily managed natural resources prior to the advent of oil, focusing specifically on the Duru tribe in the south and west region of Oman. Given his team's interest in ensuring Duru allegiance to the Sultan (who supported their oil exploration efforts in the interior) rather than the Imam (a more conservative figure who commanded loyalties among tribes in the interior), Henderson takes an interest in Duru land and water-use practices. As he explains, the Duru, similar to other tribes in the region, were familiar with the location of water holes in parts of the Omani interior. The Duru held exclusivity over their ranging grounds and the water holes located in these grounds. Thus, other tribes could not travel through their areas without permission from the Duru. Henderson highlights that the complete exclusivity of Duru desert lands was somewhat unusual; in other parts of Arabia, tribes demonstrated greater flexibility in making arrangements with other tribes to use or cross their grazing grounds.[78] As alluded to by explorers at the time, local populations traditionally relied on less tangible

methods to 'map' the desert terrain, including customary knowledge and tribal practices and negotiations. This is an area of study that requires further research in the context of the Arabian Gulf. Through the process of mapping and documenting the physical terrain, British imperial authorities and experts systematized knowledge of the region's natural resources, ultimately disempowering local tribes, particularly those of the interior, which had hitherto laid an exclusive claim to this knowledge.

Because the Duru invested a significant portion of their wealth in date trees located in villages on the edge of settled areas, Henderson knew that whoever controlled these villages had control over the Duru. It is not surprising, therefore, that the Imam threatened to destroy Duru trees if they did not declare allegiance to him.[79] Henderson and his team understood that the control and security of natural resources was essential to the success of their oil exploration efforts in the interior.

Overall, Henderson's narrative highlights the conflictive nature of tribal relations. Tribal practices and traditions acted as an impediment to oil-exploration efforts. As a result, the British established the Trucial Oman Levies (later, Trucial Oman Scouts), whose key role was to mediate resource-related disputes between tribes over wells, grazing, and travel.[80] The British realized early on that centralized control of natural resources and security in the hinterland would help facilitate oil exploration. Henderson believed that the discovery of oil would greatly improve local people's lives and provide rulers with the funds to create the infrastructure of a modern, centralized government, build a military force, and detribalize society.[81] For British authorities, it was easier to negotiate with a centralized authority based in the coastal region rather than various tribal rulers in the hinterland who were difficult to reach.

Unlike O'Shea and Henderson, whose experiences in the region were largely shaped by their professional affiliations, Wilfred Thesiger was an independent explorer who travelled through the Arabian Empty Quarter between 1945 and 1950. Initially, he was hired by the Middle East Anti Locust Unit (MEALU) to search for locust breeding grounds in southern Arabia.[82] In his classic travelogue, *Arabian Sands*, he provides an overview of Bedouin life and temperament. Unlike O'Shea and Henderson, he laments the onslaught of modernization and development in the region. Thesiger recognized the suspicion that local Bedouins harboured towards oil company and British political officials and thus sought to distance himself from such individuals during his travels. He documents local practices for handling resource-related disputes and control over resources. Furthermore, like Henderson, he highlights the control that tribes exercised over their lands and wells located in those lands.[83] Thesiger openly acknowledges that RAF officers had 'little understanding of Bedu life'.[84] He recognized the power of the Bedu and the political insecurity of sheikhs who relied on Bedouin support to preserve their power. However, rather than portray the desert as an exclusively harsh environment that restricts what its inhabitants can accomplish, Thesiger was sceptical of modernization efforts and sympathetic to the Bedu's belief that desert life offered an individual true freedom devoid of materialistic concerns.[85]

The enterprise of mapping, measuring, and exploring the desert terrain was not just an exercise in scientific data-gathering but a fundamentally political undertaking that

would shape the geographical boundaries of the future United Arab Emirates (UAE), the key actors and infrastructure of the nation state, and the development and control of the country's natural resources. The abundant correspondence between the British government, oil companies, and local sheikhs illustrates the roles and motivations of all these actors as well as the process of negotiation involved in 'mapping' the region's terrain.

British political authorities in the 1930s and 1940s defined the conditions under which oil companies had to work. As outlined in official correspondence, explorers and surveyors had to be British subjects. Other conditions that exploring parties had to abide by include obtaining permission from the Political Resident before proceeding with geological surveys or other work; following the Resident's instructions or advice on where to conduct geological or exploratory work; securing (with the help of the Political Residency) written agreement from the local sheikh that he is responsible for the safety of explorers in his territory; and obtaining Her Majesty's Government (HMG) approval for entering into negotiations with local sheikhs to secure concessions.[86] Essentially, the British government wanted to secure its interests, which included keeping foreign powers at bay (particularly Americans) and ensuring that oil companies did not overstep their authority.[87]

By the 1930s, there were calls from within the British government that HMG should take a more active interest in the internal affairs of the Trucial States. Many of the early agreements that oil exploration companies had with local sheikhs stipulated that their geologists would explore the specific territory for oil and water. Local sheikhs were keen on expanding water resources. For instance, the Sheikh of Ras Al-Khaimah, in his communications with D'Arcy Exploration, expressed his eagerness to know about water prospects in his territories. The D'Arcy team entered an agreement with the sheikh in 1935 that provided them with two years' exclusive exploration rights in his territory to search for oil and water. The sheikh promised to provide protection for the company's employees, and the company in turn agreed to bore several artesian wells or pay 750 riyals per month for two years.[88] British political authorities from at least 1934 officially documented that finding water in the Trucial States was in British interests.[89] Along with the oil companies, they knew that boring for water provided them with an opportunity to get invaluable geological information and assess the possibilities of finding oil.[90] In fact, in the case of Abu Dhabi in 1934, British political authorities took a proactive role in seeking out oil companies to bore for water.[91] By 1935, the Anglo-Persian Oil Company sent a geologist to examine the possibility of boring for artesian wells in Abu Dhabi. The Political Agent in Bahrain believed that such efforts would pave the way to 'further cement the good relations resulting from Colonel Loch's recent negotiations on the subject of air facilities'.[92]

Beginning in the early 1950s, British efforts to find potable water in the Trucial States continued and were no longer necessarily connected to oil-exploration efforts as during the 1930s. The British government continued to pursue such activities in part to appease local rulers and as part of their broader development agenda in the region. Water was key to their emerging agricultural development interests, which entailed expanding the

production of crops other than dates—a significant marketed commodity in the Gulf. One such crop was lucerne or alfalfa, a potential feed for cattle that could be marketed regionally and internationally.[93]

In British official correspondence from the period, one of the more frequently mentioned experts involved in the development of subsoil water and working on behalf of the Foreign Office was Colonel K. W. Merrylees, a British army officer and professional water diviner. In one of his early reports dated from April 1953, Merrylees details the geology of the area and existing supplies of water. He concluded that adequate supplies of water could be found in certain areas;[94] however, the costs of locating water could be quite high.[95] Although water exploration efforts in these areas were often unsuccessful,[96] they did provide colonial experts with the access required to map, survey, and document territory.

W. F. Crawford, a representative of the British Embassy in Beirut who worked as part of the Development Division, also drafted a report on the state of water supplies in the Trucial States in 1953. He had prior experience working on water projects in Egypt.[97] Crawford's report details the condition of *aflaj* (water streams that transport underground water to the surface) in Buraimi; available water in Sharjah; recommendations on which drilling company to employ (in this case, United Drilling Company); suggestions on how to expand date gardens through the potential development of windmills; feasibility of growing market vegetables in different areas; and general recommendations on how to allocate funds to the expansion of drinking water supplies, the improvement of *aflaj*, and agricultural development.[98]

The biggest challenge confronted by oil companies working in the Trucial States during this period was the opposition they often encountered from local tribes. Although exploration teams were supposed to receive protection from local, coastal sheikhs as per agreements reached with these rulers, this protection was often lacking due to the limited control that sheikhs exercised over tribes in the hinterland. Nonetheless, British political authorities and oil company experts still expected this protection and warned of penalties if it was not provided. As oil-exploration efforts expanded during the 1940s, these issues occupied more and more time of the British political authorities. By the mid-1940s, much geophysical work had been completed.[99] The Political Resident was responsible for negotiating with and informing local sheikhs of the protection they should provide oil companies working in their territories. For instance, in a letter to the Residency Agent Sharjah, Mr. B. H. Lermitte (the legal representative of Petroleum Development) informed the Resident of the geophysical work to be conducted by the company's chief geophysicist and asked him to inform local rulers to provide guides and guards.[100] The British Political Agency in Sharjah also played a key role in introducing company experts to local sheikhs and in mediating problems that company officials encountered with local Bedouin.[101]

British political authorities worked closely with coastal sheikhs in setting the conditions of company work. Rulers provided security to oil company experts who had British government approval to undertake geological work in their territories. As part of this role, these sheikhs were expected to not only provide company experts with guides

and guards but also secure the cooperation of tribes in the hinterland through written agreements and cash payments. The cash payments demanded by hinterland tribes were sometimes unreasonable, prompting British political authorities to intervene and assist sheikhs in reaching equitable agreements.[102] When coastal sheikhs failed to uphold their end of the bargain, they were warned to do so by British political authorities or otherwise risk having their territory unexplored. Such a situation arose in February 1947 when oil company engineers encountered resistance from local tribes in the Khawatir area. Upon investigation into the matter, the British Agency Sharjah learned that the Sheikh of Ras Al-Khaimah had not paid or negotiated a written agreement with the Khawatir as he had promised to do. After a 'good deal of altercation' between the two sides and oversight by the Political Agent, a written agreement was formulated and accepted by all parties.[103]

Company work brought the issue of geographical boundaries to the forefront and spurred the delineation of territorial boundaries between the Trucial States. Company officials regularly complained in official correspondence that the lack of clear boundaries made their job more difficult. It contributed to the difficulty they faced in securing adequate protection from coastal sheikhs vis-à-vis interior tribes when undertaking survey or geological work in hinterland areas.[104] There were often disputes between sheikhs regarding the territories which did or did not fall within their areas of control.[105] Thus, for company officials, the establishment of boundaries was an urgent issue. There were tensions, however, between British government representatives and oil company officials regarding the issue of boundaries. The former believed it was the government's role to investigate boundaries and tribal limits, while geologists should focus on 'mapping' out the terrain since this was a 'preliminary to any detailed exploration for oil'. In this same correspondence, the British government is urged (as part of its effort to settle boundaries) to obtain aerial photographs of the region given that they did not have a detailed map of this part of the world. Part of this tension between government and company officials emanated from the fact that local sheikhs themselves often perceived that the experts would be the ones who determined where boundaries would be drawn.[106]

Conclusion

In the Trucial States, the status and role of British experts, as well as the work they carried out, was negotiated by agreements between British political authorities, oil drilling companies, and local sheikhs. With British political officers acting as mediators, these agreements tried to account for the strategic, geopolitical, economic, and social interests of all actors involved. The work of British surveyors and explorers who mapped the physical terrain of the Trucial States during the first half of the twentieth century informed not only perceptions of the desert environment and people's relationship to that environment but also the development of the country's natural resources (including oil,

water, and land), the drawing of territorial boundaries, and, ultimately, the emergence of the modern nation state with all its infrastructure.

While British explorers in the Trucial States in the 1940s and 1950s often went to great lengths to map the characteristics of the region's physical terrain, they did not always appreciate or understand the customary environmental practices of local populations and how such practices ensured the sustainability of limited natural resources. Rather, they often perceived tribal practices as an obstacle to modernization and development. This view was reinforced by the resistance that experts encountered on the ground from tribes in the interior. British mapping initiatives served British imperial interests and facilitated the exploitation of natural resources and integration of the region into a global market economy. Indigenous populations and local power brokers, however, were not passive bystanders in this process. They influenced surveying and subsequent drilling activities through resistance, negotiation, and agreements—demonstrating how territorial mapping is a social process. Ultimately, local and global stakeholders informed how mapping processes unfolded on the ground, impacting the delineation of territorial boundaries, the evolution of political power, and economic development.

Approaches that focus on the global, transnational dimensions of commodity frontiers risk overshadowing the important state- and local-level processes that informed the rise and development of frontier zones.[107] The history of territorial mapping post-seventeenth century offers a window onto both the transnational and state-level dynamics at play in establishing control over land for the interconnected purposes of state formation and capitalist exploitation of resources. Mapping has contributed to the consolidation of state power and identity, albeit with compromises along the way instigated by the counter-mapping strategies of local populations. Post-seventeenth-century mapping practices allowed for and facilitated the commodification of land and capitalist exploitation of resources that underpins state power and the expansion of frontier zones.

The case study of the Trucial States contributes to the broader literature on territorial mapping by shedding light on how processes of surveying, topographical documentation, and boundary demarcation were shaped by socio-cultural assumptions, negotiated agreements, and changing geopolitical and strategic interests at the local and global levels. Mapping as a negotiated process involved both local and global forces and was frequently characterized by conflict and disagreement. Even within 'colonial ranks', disagreements were common and shaped by evolving political and economic interests. Territorial mapping initiatives also unveil the tensions between old and new power brokers at the local level. Thus, mapping was not a straightforward endeavour simply executed by a state, and as a process it was integral to the formation of the state itself.[108]

Mapping activities in the modern period were instrumental in transforming traditional modes of natural resource management. There is a clear link between mapping, state formation, and the exploitation of natural resources for commercial purposes, while the emergence of the modern state was founded on the centralized control over water, land, and resources such as oil. Thus, territorial mapping legitimized and enabled

the shift to more centralized forms of power by appropriating and ordering the use and management of land and other resources and facilitating global capitalist exploitation of these. This is at the heart of commodity-frontier formation.

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CHAPTER 19

LAND USE AND COMMODITIES

Amazonian Cocoa Production

RAFAEL CHAMBOULEYRON, LULY FISCHER, AND KARL HEINZ ARENZ

Since the late fifteenth century, European expansion in the New World engendered the intensive exploitation of land and labour, based on the cultivation of local and imported plants and animals by native and alien workers. Landscapes were entirely transformed to meet the demand for new and old products in new and old markets. One of the main consequences of this was the intensive use of lands to produce and export commodities.

This chapter analyses the issue of land use and commodity exploitation, especially in the early-modern period. By land use we understand how land was appropriated for economic production of commodities and the consequences of this appropriation. Even though this question can be addressed from a variety of viewpoints—such as politics, labour, or the cultural implications—the text focuses primarily on the role played by the expansion of commodities in regard to the impact on the environment and on access to land and natural resources.

The first section consists of a review of literature organized through three main axes of discussion: firstly, how the expansion of commodities in the New World generated a new organization of landholding, notably the constitution of vast estates; secondly, how commodity production interacted with older forms of land use, transforming traditional patterns of agro-pastoral production, and how this led to different processes of land appropriation (and conflicts) by states, corporations, groups, and individuals; and, thirdly, how the expansion of commodity production in the new and old worlds interacted with local environments, in terms of their transformation (often with disastrous consequences), and how environmental factors influenced commodity production.

The second section follows on from the historiographical issues raised, focusing on a specific commodity and region: cocoa in the Luso-Brazilian Amazon, from the

seventeenth century until the nineteenth century. From the mid-seventeenth century onwards, the Portuguese began to exploit this product through cultivation and the gathering of wild fruits mainly by natives. Cocoa production had an important role in the spread of Portuguese dominion over the Amazon Forest and continued to be exploited throughout the nineteenth century. After the Amazonian rubber boom in the late nineteenth and early twentieth century, cocoa production waned in the region. Nonetheless, since the early twenty-first century, the region has experienced a third boom of cocoa production, notably based on smallholder cultivation. Examination of Amazonian cocoa enables us to understand how the exploitation of this commodity engendered different forms of land use for its production and diverse interactions with the vast Amazonian rainforest.

Commodities, Land Use, and Environmental Change

The development of the colonial agro-pastoral world and the production of commodities have been associated with the formation of large estates. This has been particularly the case in Latin American historiography. The role and modern legacy of social and economic inequalities of colonial latifundia, *haciendas*, *estancias*, and plantations are a central topic in agrarian studies in Latin America. Colonial estates producing commodities are frequently related to the formation of an elite who thrived on acquiring new lands, encroaching on native communities, depleting natural resources, and dominating local political power. Some historians, however, point out that the modern land issues in the continent, related to land concentration and violence in the countryside, are actually the result of nineteenth- and twentieth-century land policies rather than exclusively a consequence of the colonial period.[1]

The historiography stresses that colonial economic development in Ibero-America engendered the territorial expansion of estates, especially to the detriment of native populations and competitors. In many cases, such as in the large Mexican *haciendas*, the growth in demand did not result in an increase of productivity but rather the occupation of fallowed lands and the acquisition of new territories. Expansion of estates allowed proprietors to eliminate competition and to guarantee a labour force recruited from the nativecommunities deprived of their lands. The growth in exploitation of tropical products thus meant the intrusion of Europeans into local traditional production and marketing dynamics, which caused natives to lose control of production and lands. Land concentration forced deprived native communities to enter into the local labour market but also decreased competition. Thus, it could also mean the intrusion of commodity production and land expansion into other crops produced for the international market—such as happened in Cuba, where sugar planters expelled tobacco producers from their lands, from the second half of the eighteenth century onwards.[2]

However, it is notable in Latin American historiography that expansion of cultivated land for the production of commodities and its concentration was considered to be not only the result of the increase of demand for tropical goods in European markets but also the consequence of the development of local, regional, and interregional markets of, for example, sugar, wheat, tobacco, and cocoa. Mining centres and the growth of colonial cities influenced the constitution of these agrarian hinterlands. Some scholars consider that production for the internal market, thought to be crucial for the development of agriculture in colonial Latin America, paralleled production for the European markets.[3]

From the late sixteenth century, sugar production epitomized the constitution of large estates related to the production of commodities. Scholars note the increasing land concentration related to sugar cane cultivation in the Americas and the Caribbean, although land tenure regimes were different. During the sugar boom in colonial Peru, from the 1650s until 1720s, for example, landowners benefitted from their position and personal contacts to acquire control over more lands. In the French Caribbean, grants of land were handed to planters, who increased their estates by buying plots of abandoned tobacco fields or acquiring other sugar estates—the *habitations-sucrières*—a process that displayed different rhythms in Saint Domingue and in the Iles-du-Vent.

The historiography shows the diversity of land use related to sugar production in the Americas. In colonial Brazil, for example, sugar was cultivated both by sugar-mill owners (*senhores de engenho*) as well as by farmers (*lavradores*) who were either tenants or had their own lands (of various sizes) and ground sugar cane in others' mills—a Portuguese tradition inherited from the first sugar plantations in the Atlantic islands. Thus, in Portuguese America, sugar cane cultivation was not dominated by a group of large estates that integrated production, such as happened in other places. Meanwhile in Barbados, after the 1650s sugar boom, as Richard Dunn has pointed out, farmers were 'not used to sharecropping'. Thus, even if at the beginning there existed a partnership for the settlement of sugar production, planters concentrated land and sugar production, combining the roles of mill owner and cane grower. In contrast to the Brazilian *engenhos* and French Caribbean *habitations* (a 'closed world', according to Christian Schnakenbourg), everything else needed in the Barbados plantations depended on outside suppliers.[4]

The constitution of large estates for commodity production, however, was not the rule. Cacao cultivation in the Americas, for example, depended on smaller estates, although production could be concentrated in the hands of an elite, such as happened in colonial Venezuela. In the case of tobacco production in the Spanish Caribbean, production was concentrated on royal lands, located along the rivers (*vegas*), and was held by small landholders without property rights and under strict control over how they managed their crops. Tobacco production in Brazil, although an important commodity, was overshadowed by sugar plantations. While widespread throughout the colonial territory in the eighteenth century, it was an activity developed only on modest land—in contrast to North American production. Tobacco production in Bahia and Pernambuco was associated with other crops (beans, peanuts, manioc) in order to speed up soil regeneration.[5]

In some cases, production was not even in the hands of European settlers, such as in the case of cochineal, an insect used for the preparation of a dye much appreciated in Europe. Plantations of the cacti on which the insect lived were rare, and most production remained in the hands of the native population, especially in the southwest of colonial Mexico – although production depended on Spanish Crown financing (*repartimiento*). Cochineal production and trade predated European conquest. Nevertheless, in colonial Mexico, the unit of production was not the *hacienda* but rather the *huerta*, a small peasant plot. Cacti cultivation could be complementary to traditional agriculture and could be carried out on marginal lands, and even in home yards. Moreover, labour was non-intensive, and production could be performed by the available household labour pool.[6]

Specialized literature, however, states that colonialism in general ignored or misinterpreted pre-existing indigenous land-tenure systems and legal systems in the New and Old Worlds in which expansion of commodities took place—a process that led to the expropriation of native groups.[7] Under Portuguese and Spanish colonization, for example, indigenous dispossession was, according to Tamar Herzog, both a strategy to justify the Crown's possession over the discovered territories and the recognition of vassalage relations. Elinor Melville agrees that Spaniards acquired access to natural resources by force and law: even though violence played an important role in conquest of the New World, legal manoeuvres and manipulations were more frequent. Sinatives did not have knowledge of the Spanish laws, Spaniards took advantage of the situation to 'legally' acquire natural resources.[8]

Trading companies from England, France, the Netherlands, Sweden, and Denmark also played an important role in the land dispossession of aboriginal peoples in seventeenth-century Asia. According to John Richards, when analysing the role of the Dutch in land-use change in Taiwan, these companies were vested with quasi-state rights, including the creation of settlement frontiers. After the territory's conquest, the Dutch trading company altered the traditional productive activities, imposing the culture of rice and sugar, as well as massive migration of Chinese peasants to the island.[9] Cultural disagreements over land use also resulted in dispossession, arising, for example, from divergent interpretations of communal land rights. In South Africa and the Fiji Islands, communal lands were mistakenly translated into commons, and considered 'empty spaces'.[10]

Analysing the main export commodities of the humid tropics (rubber, cocoa, palm oil, and bananas) during the twentieth century, Derek Byerlee and Ximena Rueda state that there are important differences in the way they were produced and the markets they served. The main incentives for the development of tropical commodities in developing countries were cheap public land given to plantation companies. In the case of large concessions (bananas in Central America and oil palm in Congo and Indonesia), even when the contracts recognized the value of the forest and local land rights, their implementation was flawed and stimulated land speculation.[11]

This large-scale land acquisition trend has not changed yet in developing countries. The worldwide increase in population and consumption has produced a growing

demand for commodities, resulting in the intensification of land investments to cope with this need in detriment of development for local people. However, land grabbing is perceived as a major international issue impacting on socioeconomic and environmental conditions in Africa, and to a lesser degree in Asia and Latin America.[12]

A different trend can at the same time be seen in a partial shift away from estates towards smallholders. Resulting from reassessments of risk and productivity, this process began in the interwar years, and could be seen, for example, in rubber and sugar in the Asia-Pacific region. This became more widespread in the second half of the twentieth century, in the production of a number of commodities, partly due to the independence of many states and the emergence of environmental movements. Production costs led companies to establish arrangements with small landholders, which might improve social conditions and reduce the expulsion from the land of local groups. Scholars argue that if this production benefits from natural forest ecosystems (through agroforestry or extraction), this change may be beneficial to biodiversity preservation and climate-change mitigation.[13] Nevertheless, in some regions, such as West Africa, independence actually led to a swing back in favour of large estates, often under the disastrous ownership and management of the state.

In fact, the spread of commodity production has entailed radical changes in the use of land and the exploitation of natural resources throughout the world, which has had important historical ecological consequences. The period that spans from the late fifteenth until the early nineteenth century anticipated later, more radical changes.[14] However, scholars agree that these effects accelerated in the last two hundred years, owing to the use of fossil fuels, widespread mechanization, scientific and technical innovation, and the shift of production to industrial levels. This was the case of sugar and rice production, for example, since modernization often meant an increase in ecological devastation and landscape transformation, even in non-capitalist economies.[15] Thankfully, however, the picture has not been entirely one-sided: over the last century, initiatives such as reforestation and contour ploughing have been introduced in some locations; and attempts at conservation have been made, for example in the Dutch East Indies, with their private agricultural research institutions.

Nevertheless, land use for commodity production played an important role in the expansion process that reduced biomass and biodiversity throughout the world in the early-modern period. This has been understood as a consequence of European expansion overseas. First in the Atlantic islands, thought to be the first laboratories of sugar cane cultivation, then in the New World, Africa, and Asia. Sugar production, for example, became a 'catalyst of social and ecological change', causing deforestation, erosion, and changes in rainfall regimes affecting the course of rivers, and giving way to new plant pests.[16]

Some scholars, however, have pointed out the Eurocentrism of such a perspective, which obscures similar and parallel processes undertaken by non-European agents, such as in early-modern China, or Japan.[17] It also overlooks specific arrangements and ecological developments, derived from local conditions and the interaction (often violent) of settlers with the indigenous populations.[18] In spite of the impact commodity

expansion had mainly in the New World, in terms of land use and environmental change, these were not empty lands, and many had a long tradition of complex land use before the arrival of Europeans. In several cases, settlers adopted and adapted local systems.[19] Manioc cultivation in Portuguese America, for example, was based on the techniques that natives people had been developing and using for centuries.[20] In the colonial Amazon region, manioc cultivation was adopted by the Portuguese and continued to concentrate on the fertile riverbanks of the main rivers, just as the natives had done before the conquest.[21]

The role played by indigenous agents entails a discussion on local and non-European knowledge as a crucial element of commodity expansion and, thus, modes of land use in the early-modern and modern world.[22] The story of American and Asian dyestuff plants or insects, for example, indicates the importance of local knowledge on products and land use for the discovery and exploitation of local commodities.[23] As Melville explains for Spanish America, the importance of the *haciendas* as colonial production units cannot be understood solely as a process by which colonial agents took control of land and labour for the establishing of commercial agriculture. In fact, the rise of the *hacienda* depended on the 'ability to access local knowledge', which related to the production of local as well as alien species.[24] This debate includes, for example, African knowledge of livestock management and rice cultivation in the Americas.[25]

Scholars have pointed out the importance of local environments in the expansion of commodity production around the world. The case of rubber is exemplary. In its original landscape, in the Amazon region, plantations of *Hevea brasiliensis* failed, mainly owing to a local fungus that attacked the trees. This leaf blight, however, did not affect *Hevea* trees naturally spread over the forest.[26] When transplanted to Southeast Asia, rubber cultivation thrived, since the fungus was contained within the Americas.[27] Owing to their global spread, the same commodities did not necessarily entail the same forms of land use, nor did they have the same environmental consequences. This can be seen in rice production, cultivated globally, from Japan to Brazil, and which was not only produced under colonial contexts.[28] Even in the same geographical region, commodities engendered different forms of land exploitation. This was the case of livestock in the *pampas* region. Garavaglia and Gelman, for example, advocate the necessity of a 'regional focus' to avoid 'inaccurate generalizations' concerning the Río de la Plata region and its grazing industry.[29]

The environment shaped land use (as well as labour) for commodity production.[30] According to John Richards, environmental factors, such as 'moisture, soils, seasonality, temperature, flora, fauna, water tables', had to be learned and considered by settlers (often through indigenous knowledge) and thus have to be taken into account when assessing commodity production and land use.[31] Moreover, scholars have pointed out the necessity of reassessing the 'myth of automatic European success', since the advantageous environmental conditions for the success of commodity production could have been 'entirely accidental'.[32] Sometimes, settlers' decisions concerning land use were made based on European assumptions or even ignorance of local environmental dynamics (despite native knowledge of them), with devastating consequences. This was

the case of the Mezquital Valley studied in depth by Melville. According to her, pre-conquest productivity masked 'the fragility of the ecosystem'. However, Spaniards made their economic choices based on production levels they encountered at the time of their arrival in the continent, rather than on the 'capacity of the land to support new and different regimes'. These choices caused deterioration of the landscape and forced the spread of large latifundia rather than smaller ones.[33]

Amazonian Cocoa: a Case Study (Seventeenth to Nineteenth Centuries)

Cacao (*Theobroma cacao*) became an appreciated commodity in Europe and other parts of the world following the Iberian conquest of the Americas. Already in the sixteenth century, the Spaniards extended cacao cultivation from tropical zones in Mesoamerica to coastal regions of present-day Venezuela and Ecuador.[34] As to the Portuguese, from the second half of the seventeenth century onwards, they began to exploit cacao in the vast Amazon basin, turning it into the most important product of the region's economy during the colonial period and throughout most of the nineteenth century. The intense exploitation was facilitated by the fact that the so-called Maranhão cacao (*cacau do Maranhão*)—a *forastero* species, which produces smaller and bitter beans—is originally from the Amazonian rainforest.[35]

Indigenous peoples knew cacao trees for centuries before the arrival of the Europeans, both as a wild and a domesticated tree. Contrary to other plants in the Americas, though, as had happened with Mesoamerican cacao, it was not native tradition or use that aroused Portuguese interest in this commodity. At the time of its 'discovery' in the Amazon region, in the mid-seventeenth century, cacao and its main output, chocolate, were already well known and widely consumed in Europe. Nevertheless, the native labour force and environmental knowledge were crucial for its exploitation, notably in the remote hinterland. The Portuguese depended also on indigenous fluvial navigation skills and their capacity for topographical orientation to reach the widely scattered cacao groves in the rainforest. Native knowledge therefore became essential for cocoa production in the Amazon.

From the late seventeenth until the late nineteenth century, Amazonian cacao was systematically exploited through both collection of wild fruits (*cacau bravo*) and cultivation (*cacau manso*).[36] This double dimension of gathering and cultivating relied on the complex river network and, thus, contributed significantly to Portuguese expansion in the region. On the one hand, the watercourses constituted the main routes of access to the cacao orchards in the largely unexplored hinterland (*sertão*). On the other hand, the fertile floodplain (*várzea* or *várzeas*) along the Amazon River and some of its principal tributaries, such as the Tocantins, Tapajós and Madeira, whose soil was enriched with nutritive sediments due to annual flooding, turned into the centre of cultivation of

cacao trees, especially in the late eighteenth and throughout the nineteenth centuries. Environment, thus, played an important role in shaping land use for cocoa production (both cultivated and gathered) in the Amazon region.

For more than two hundred years, the Amazon valley was the most significant cocoa producer and exporting region in Portuguese America—although other areas such as Bahia were emerging, from the second half of the nineteenth century, as important production centres.[37] Since the mid-seventeenth century, colonial accounts gave notice of the abundance of natural cacao groves in the *sertão*.[38] From the 1670s onwards, cacao was already both gathered and cultivated in the two hydric ecosystems of the Amazon basin (whitewater and clearwater rivers).[39] In the western hinterland, native cacao trees were abundant on the alluvial banks of the Amazon/Solimões River, and on some of its main tributaries, such as the Javari, Juruá, Purus, and Madeira. These watercourses are known as 'whitewater' rivers (due to their muddy appearance), since they carry a considerable number of sediments from the Andes, which make their riverbanks extremely fertile. The northern bank of the Amazon delta (near the mouth of the Jari River), and the south of Marajó Island, were also described as copious in feral cacao (see Fig. 19.1). Colonial documents from the second half of the eighteenth century confirm the abundance of natural cacao orchards along the rivers mentioned, where gathering was, therefore, predominant.[40] Jesuit father João Daniel (1722–1776) even complained that the fruits growing in these areas were not duly exploited.[41] Accounts from the early nineteenth century still mention the frequency of feral cacao woods in the westernmost parts of the Amazon basin.[42] Although this information has to be taken with caution, it suggests that the intensive cacao gathering since colonial times did not necessarily deplete native cacao orchards.

Cacao cultivation was first concentrated around the city of Belém (see Fig. 19.1). This area is located in the less fertile eastern part of the Amazon basin, whose fluvial network consists of so called 'clearwater' rivers, which come down from the Brazil Shield, carrying fewer sediments. Nevertheless, already in the last quarter of the seventeenth century, colonial authorities thought that planned cultivation in this strategic region could bring more profit than gathering wild fruits in the vast and distant hinterland. The Spanish cocoa economy served as a model and incentive. At the same time, the growing European demand for chocolate convinced the Portuguese Crown that it had to improve cocoa production in the Amazon basin.[43] From the late eighteenth and through the nineteenth centuries, cultivated cacao developed upstream in the surroundings of the colonial cities of Santarém and Óbidos, within the fertile Amazon valley, and in the colonial city Cametá, on the banks of the lower Tocantins River (see Fig. 19.1). Aware of the fertility of the alluvial land strips along the riverbanks, many settlers who cultivated cacao occupied lands on both sides of these broad watercourses. Father João Daniel, while describing the region's nature and climate, states that those lands which flooded during the rainy season were the best for cacao. Actually, the higher parts of the floodplains were most suited for intense cacao cultivation. This meant clearing land strips from forest vegetation and planting trees along the rivers, a common feature since the beginning of cacao cultivation.[44]

The deleterious effects of conquest, caused by wars, enslavement, and epidemics, had affected the indigenous populations, even before cacao cultivation began in the late seventeenth century. Thus, the area surrounding the city of Belém, where cacao was first planted, was simply occupied by settlers from the city, who started to clear the *várzea* vegetation and forced the displacement of native groups. Cocoa production, thus, deprived native communities of their territories and lands. Within the early-modern Portuguese land-tenure system, possession of the land was an effective argument for claiming official recognition for its occupation. In fact, many settlers demanded their lands years after they had occupied them. In 1729, Father Custódio Álvares Roxo, for example, claimed the land he had been occupying for twenty-five years, and where he cultivated cacao, arguing it did not have a 'legitimate owner'.[45] That was also the case of the widow of Captain Domingos Aranha, Inês de Couto, in 1703. When asking for a grant, she claimed she had been living on her land for sixty years, 'without contradiction',

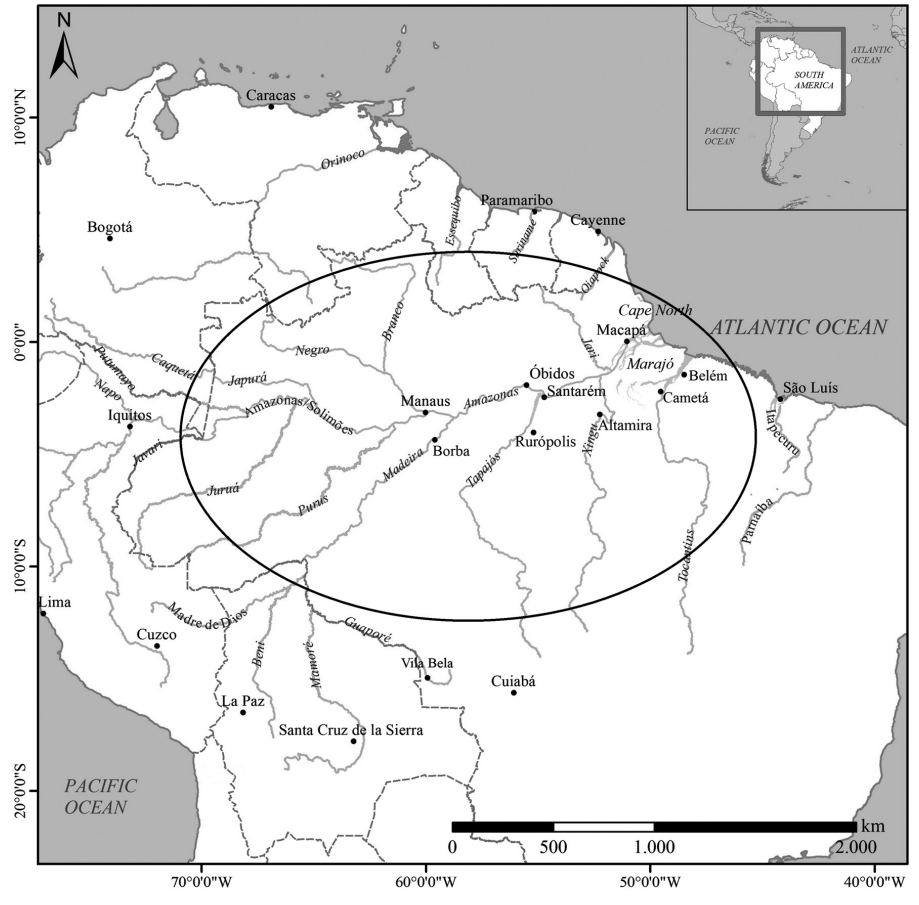


FIGURE 19.1 The Amazon region.

Source: Laboratório de Informação Geográfica/UFPA and authors.

cultivating four to five thousand cacao trees.[46] During the region's first cocoa boom, in the mid-1720s, when prices for the commodity were increasing, settlers generally cultivated cacao on lands—occupied or granted by the Crown—that did not surpass two leagues in length, always on the riverbanks.[47] But it is worth noting that cacao was never the sole crop grown on these lands, since settlers also planted manioc, tobacco, annatto, and coffee. In the case of Amazonian cocoa, exploitation did not necessarily entail exclusive production of a unique commodity.

Official land grants (*sesmarias*) were not the only way of accessing land resources in the region. Since occupation was an important argument when claiming an official concession, in many cases land registries indicate a considerable number of (White) 'neighbours', whose names were used to delimit the location of the grants, but rarely mention the existence of neighbouring lands cultivated by natives. The impact of the cocoa boom in the first decades of the eighteenth century is evident from official registries, since new grants, conceded by colonial authorities for the cultivation of cacao in the surroundings of Belém, almost quintuplicated between the early 1720s and the mid-1750s.[48] Two decades later, in the mid-1770s, Judge Francisco Sampaio advocated the importance of cacao cultivation and private property, even if the land had been granted by the Crown, affirming that 'there can be no wealth without property. If I plant a cacao orchard, for example, this orchard is mine, I can sell it, I have to keep it for my inheritors. Nothing of this happens with the cacao in the woods'.[49]

The abolition of the mission system and the expulsion of the Jesuit fathers and a group of Franciscan friars at the end of the 1750s, ordered by the reform-oriented Marquis of Pombal, had a deep impact on Amazonian cocoa production. First, the religious who had a considerable participation in producing and trading the commodity were abruptly excluded; second, the Amazonian natives from the former missions, although emancipated from the priests' tutorship, were reorganized to form a more easily accessible labour force; and, third, the Portuguese authorities introduced a trading company, as in the Spanish colonies—the *Companhia Geral do Grão-Pará e Maranhão*, which monopolized the cocoa commerce with Lisbon from 1755 to 1778.[50] After the company's extinction, the civil servants responsible for the administration of the indigenous workers concentrated much of production and transport, at least until the abolition of the compulsory labour system in 1798. During this period, many natives, albeit officially free, fled the villages where they had been under permanent supervision. African enslaved, brought to Amazonia by the trade company, were mostly forced to work on new cacao plantations, especially on the Lower Amazon and on the Tocantins River, around the cities of Cametá, Santarém, and Óbidos (see Fig. 19.1), but were also used as gatherers of wild fruits.[51]

Many of these White settlers received land grants, especially after the 1780s,[52] and the colonial authorities even urged them, during the early nineteenth century, to systematically cultivate cacao in the *várzeas* of the Lower Amazon.[53] This expansion occurred to the detriment of colonial natives, *mestizos*, and runaway slaves, who usually established themselves over the years on the fertile riverbanks and nearby forests. Many of them cultivated and gathered cacao at a modest level without formally possessing the

land they lived and worked on.[54] Local authorities and elites generally ignored their presence. Dona Ana Xavier Freire da Fonseca, from the township of Óbidos, for example, declared having cultivated on the Amazon River more than fifteen thousand trees in 1795, in 'empty lands' (*terras devolutas*), of which she did not have any legal title.[55] One would wonder how she could have such a large plantation of cacao without encountering native or *mestizo* people scattered along the riverbanks. As Mark Harris points out, land-grabbing 'is nothing new in the Amazon and took place with each successive economic phase'.[56] This second expansion of colonial cacao meant also depriving local communities of their land.

As private trade initiatives prevailed after the suppression of the *Companhia Geral*, in 1778, cacao estates along the *várzeas*, as well as systematic 'wild' gathering in the forest, gradually expanded towards the western part of the Amazon basin—mainly to the Lower Madeira River (Borba) and the region around the confluence of the Solimões and Negro Rivers (see Fig. 19.1).[57] This steady expansion evinces the relevance of cocoa in the regional, as well as in the Portuguese, economy. In fact, trade records reveal that, since the late seventeenth century and up to the end of the colonial period, cocoa represented the most important product exported from the Amazon region to Lisbon. From 1730 until 1755, it made up an average of almost 80 per cent of colonial exports, and during the functioning of the monopolistic trade company (1756–1778), a little more than 60 per cent of total exports. In the periods 1778–1781 and 1784–1786, cocoa constituted almost 40 per cent, and between 1796 and 1806, about 48 per cent of all goods exported to Portugal.[58]

Those who annually sent their canoes to the hinterland used to consider the *sertão* as an open frontier for cacao gathering. Collecting wild cacao, thus, meant a specific form of access to natural resources and land use. In fact, wild cacao orchards did not have their boundaries delimited by colonial authorities or settlers, such as would happen with native rubber trees in the late nineteenth century. As stated by Judge Sampaio, mentioned above, there was no sense of property involved (or at least, not necessarily). Moreover, the many places where feral cacao could be found coincided with indigenous territories. Therefore, exploitation of wild cacao did imply conflicts with native groups' territoriality, mostly engendered by the seasonal presence in certain areas of gatherers (i.e. during the harvest period). The Aruã people of the Island of Marajó, for example, had rebelled against the Portuguese (in the 1720s) and used to capture those who went up the Araguari River, in the Cape North region (see Fig. 19.1), to collect *cacau bravo*.[59] In the 1750s, Jesuit Father Anselm Eckart relates that Indians from a missionary village on the Marajó Island were attacked and some of them killed by the Mura people, while collecting feral cacao on the Madeira River.[60] In the 1770s, Judge Francisco Sampaio complained that although cacao was abundant in the Madeira valley, the region was 'however assaulted by the Mura'. Later in his account, he noticed that the Javari River, 'fertile in cacao', was inhabited by many indigenous 'nations', such as the Marauá, Uaraicú, Pano, Chaiauitá, Chimaana, and Yameo.[61] Exploitation of wild cacao in the *sertão* thus interfered with indigenous territorial dynamics, which encompassed native uses of land resources not related to cacao, and which the Portuguese could not ignore.

The case of the Mura is exemplary of how cacao exploitation affected and could be affected by the indigenous agenda and territorial demands.

After independence (1822), the violent *Cabanagem* rebellion (1835–1840) ruined numerous cacao estates and caused a general breakdown in the region's commercial activities.[62] Even so, cocoa production did not come to a standstill but rather underwent some changes. First, forced labour corps, mainly composed of *mestizos* and natives, were officially implemented after the rebellion to guarantee the collecting and cultivating of cacao. This new compulsory work system was only abolished at the end of the 1850s. Second, from the 1840s onwards, cocoa production increasingly depended on modest smallholder peasant families, nearly exclusively of *mestizo* or indigenous origin, as many foreign naturalists, such as Henry Walter Bates, Alfred Russel Wallace, Richard Spruce, and Robert Avé-Lallement, remark in their reports.[63] Third, records show that the larger cacao estates not only recovered rapidly, but even expanded after the rebellion. Thus, the estate inventory of José Manuel da Silva, from Óbidos, mentions that he had two cacao orchards (5,680 and 1,753 trees, respectively), one around his house, and the second 'from the house downwards', possibly meaning lower lands closer to the riverbank.[64] Antônio Ferreira Picanço, also from Óbidos, had two orchards (1,933 and 2,050 trees, respectively) located in a *restinga*, which meant a strip of forest on the bank of a river.[65] Examining a land registry concerning Cametá, Francivaldo Nunes noted the omnipresence of cacao cultivation in the Tocantins River region. Moreover, he points out that many owners only registered the length of their lands on the riverbanks, but not the width inland. In fact, the size of the estates was defined rather by the quantity of cacao trees than by units of length.[66]

During the nineteenth century, cacao cultivation transformed, at least to a certain extent, the landscape. Mark Harris points out that a steadily growing number of plantations were scattering along the riverbanks.[67] This meant that long land strips were cleared of forest vegetation and planted with cacao trees, mainly upstream following the course of the Amazon River and its principal tributaries.[68] More and more, the trees were planted in dense rectilinear rows close to the riverbanks, rather than increasing inland and forest occupation. Thus, in many areas, the river landscape was characterized by successive cacao groves belonging to different owners (see Fig. 19.2). Elias Ferreira Gato, from Óbidos, for example, had three cacao orchards (with 456, 754, and 600 trees) located between the lands of six different neighbours. His properties were not contiguous but were all located on the riverbank.[69] As Antonio Baena wrote in 1839, describing the town of Santarém, 'cacao can be seen in all the lands that are not dry'.[70] Travelling through the Tocantins River in the mid-1860s, Domingos Ferreira Penna noticed that, since near the city of Cametá the river did not flood excessively the low lands, 'all the farmers cultivate this interesting plant.'[71] Given these data, we can even talk of a second cocoa boom, which took place in between 1840 and 1870.

The population that had often been dispossessed by the expansion of cacao plantations, or incorporated as a cheap labour force, throughout the nineteenth century, took the form of what some historians have been calling *campesinato caboclo* (mestizo/indigenous peasantry). The *caboclos* were predominantly established in the *várzea*

areas, where they constituted endogamic and rather self-sufficient communities, commercializing their modest surplus of cacao and other commodities with mobile traders, the *regatões*.[72] Louis and Elizabeth Agassiz report on their travel to Brazil (1865–1866) that, on the riverbanks between Santarém and Óbidos, they were greeted by 'groups of Indians' (probably a *mestizo* population), who lived in houses around which the forest was cleared to give place to 'little plantations of cacao trees mingled with mandioca shrub'.[73]

Cacao was cultivated in a variety of landholding sizes. Nineteenth-century cocoa production in the Amazon region thus combined medium- and small-sized production entities, generally belonging to native (mestizo/indigenous) families or communities, with large estates owned by local elites. According to Oscar de la Torre, the latter also 'combined cacao production with other crops', forming a heterogeneous group in 'terms of wealth and property'. Near the Amazon delta (i.e. the first cocoa frontier in the region), a group of large landowners who cultivated sugar, for example, planted some cacao to 'diversify their sources of income'.[74] At the same time, another group, composed of free and contracted collectors, continued to roam through the forests more upstream, especially in the Madeira River valley, gathering wild cacao fruits in the distant orchards—generally in addition to the extraction of latex from rubber trees, which was becoming more and more profitable.[75]

During the two decades from 1847 to 1867, cocoa still constituted 22 per cent of total exports, whereas rubber already made up almost 59 per cent in the same period.[76] With

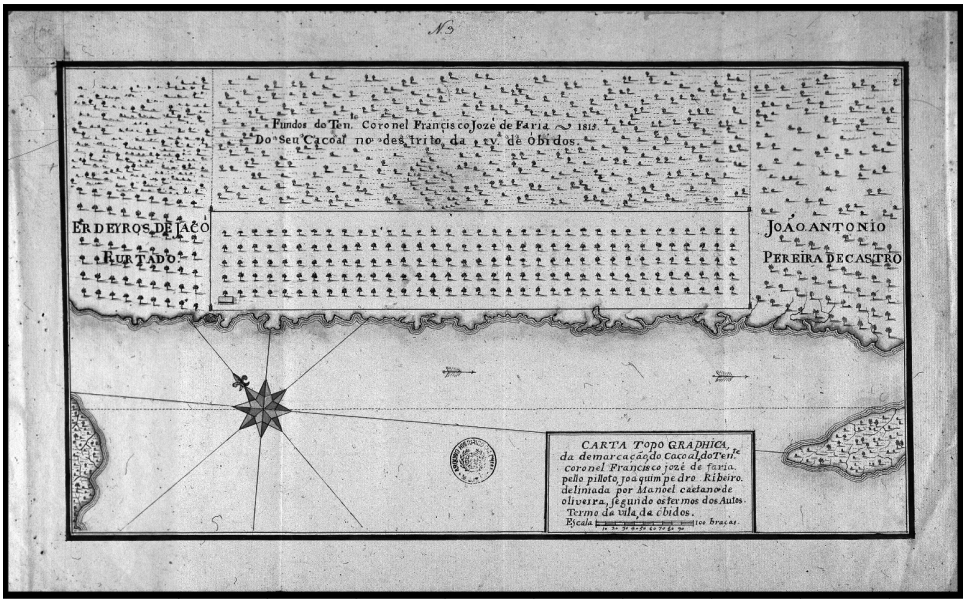


FIGURE 19.2 Cocoa cultivation of Lieutenant Coronel Francisco José de Faria in Óbidos (Amazon River), 1815.

Source: Cedida por Portugal, *Arquivo Histórico Ultramarino*, Lisbon, Coleção Cartográfica.

the opening of the Amazon to international navigation, in 1867, latex became the main commodity, but, again, cocoa did not lose its importance. Around that time, the enterprise of Denis Crouan from Nantes in France became the principal exporter of cocoa beans from Brazil, with 3,500 tons leaving the Amazon region annually during the 1870s bound for France, to supply growing chocolate production in Europe. The fact that taxes and fees for export and internal transport of cocoa raised far less than those for other products, and also that land for cacao cultivation was rather easily available, contributed to this ongoing regional cocoa economy, even during the so-called rubber boom. As a consequence, during the 1880s and 1890s, local enterprises were founded, mainly by Portuguese immigrants, stimulating systematic cacao cultivation on medium-sized plots, mainly to satisfy the growing demands for cocoa powder on the national market. At the same time, the abolition of the already ailing slavery system, in 1888, and the massive arrival of migrants from the draught-ridden Northeast of Brazil meant an augmentation of labour contingents in the region, many of whom were not only hired for latex extraction but also for collection of cacao in remote forest areas.[77]

Nevertheless, it is worth noting that, at the end of the nineteenth century, Bahia had undisputedly turned into the main centre of Brazilian cocoa production. As to the Amazon basin, cocoa was rather neglected throughout the twentieth century. Only in recent decades has systematic cacao cultivation again resumed in the region—especially along the Transamazonian Highway, between Altamira and Rurópolis (see Fig. 19.1),[78] and on the banks of the Solimões and Tocantins Rivers.[79] Thus, in 2018, the State of Pará was again responsible for nearly half of cocoa produced in Brazil, owing to the fertility of soils, whereas the State of Bahia produced 44.5 per cent.[80] This recent development, which is beyond the remit of the present chapter, can even be considered a third cocoa boom in the Amazon region.

Conclusion

From the fifteenth century onwards, European expansion generated a new quest for products, especially tropical goods, which were exploited and consumed at an increasing scale. This process began in the Atlantic islands and spread to the Americas, Africa, Asia, and Oceania, where Europeans settled colonies or implemented trade posts. Although they were not pioneers in this process, Europeans transplanted animals and plants, on a never previously seen scale, which were manipulated in different biomes and landscapes, often displacing the original flora and fauna. With these new products, new forms of labour and access to land took place, often clashing with local peoples and traditions, and dispossessing them of their territories and lands. As widely discussed in the historiography, new crops entailed the formation of large estates and land concentration, although many commodities would be produced in smaller units, and in different ways according to the location where they were exploited.

Land use for the expansion of commodities thus engendered landscape and territorial transformation—a process that accelerated in the nineteenth century and had severe ecological consequences in many places of the world. Moreover, colonialism imposed new types of access to natural resources, whether they were original or transplanted, often obliterating or transforming traditional rights and systems of land use. Commodity production transformed land use in a variety of ways, a process that was aggravated over the last two hundred years. This process had significant consequences in the ways in which humans relate to landscapes and ecosystems, and how they construe access to them in the search for goods and commodities for trade and consumption.

However, as recent scholarship has shown, environmental characteristics and local practices and knowledge have to be taken into consideration for the understanding of how commodity-led economies developed and changed the uses of land in each place since early-modern times. Environmental constraints conditioned the way land could be used for the development of crops and pastures. This was one of the reasons why the same product resulted in different forms of exploitation and land use, and why it had different environmental consequences. The understanding of land use for commodity production must therefore consider the diversity of landscapes and ecosystems but also the diversity of peoples and local knowledge concerning the environment that played a crucial role in the development of colonial land use for production of commodities. Not only was it central for the development of commodities, but also the ignorance or negligence of native traditions could lead to misunderstandings about how to develop and process crops worldwide.

The relationship between commodities and land use cannot be a narrative about the economic achievements of colonial expansion. Environmental consequences and how they affected land use, on the other hand, do not have to be seen only in terms of their negative outcomes, although these were (and still are) plentiful over the centuries. In fact, environment, local knowledge, and local traditions were transformed, but also shaped commodity land use and expansion over time.

The case of Amazonian cacao shows how local environment and native knowledge affected exploitation of this product and land use by the Portuguese and later Brazilians, up to the twentieth century. Without doubt, cacao cultivation and the gathering of wild fruits had a notable impact on native peoples and their access to natural resources, as indigenous peoples (and later traditional communities) were dispossessed from their lands (and were incorporated as labourers).

The consequences on the environment, however, were more complex in the case of early-modern Amazonian cacao, since both cultivation and collecting concentrated on the riverbanks, the *várzeas*. Thus, the expansion of cacao did not have a direct impact on the vast dry lands of the Amazonian Forest, although it affected the *várzea* ecosystem. Even if twenty-first-century expansion of cocoa production in the Amazon region implied the clearance of the forest, since it is now produced on the dry lands, its environmental consequences continue to be complex. Contrary to other cocoa producers, such as many African countries, or even in other Brazilian-producing regions (Bahia),

Amazonian cacao is now seen and used as a means to struggle against deforestation, caused mainly by the spread of cattle ranching.

Notes

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CHAPTER 20

COMMODITIES, TRADE, AND ECOLOGICAL TRANSFORMATION IN THE MODERN WORLD

COREY ROSS

Over the past forty years, a growing stream of research has investigated how the expansion of capitalism has converted a multitude of natural things into salable commodities. Although the process is often referred to as the 'commodification of nature', the label is in some ways inappropriate.[1] Of course, many constituent parts of the biophysical world—water, land, plants, animals, minerals—have been altered, processed, valued, and made exchangeable on markets. We can put a price on a tree, on a certain amount of water, on a plot of land or on a deposit of ore beneath it. But the natural environment as a whole is a different kind of entity: it is a network, an intricate web of interaction that constitutes more than the sum of its parts. Viewed from an ecological perspective, commodification is fundamentally a process of dissolving and rearranging these interconnections. Assigning monetary value to particular parts of nature and converting them into fungible goods generally involves ignoring or concealing the wider implications for the biophysical environment, and ultimately for the people who depend on it. Consequently, as capitalism has expanded and 'internalized' more and more things once considered natural, it has simultaneously 'externalized' the costs on to other things—whether people (usually those with little power), or the physical environment, or both.[2]

This is a problem with a long history, but its scale has multiplied dramatically over the past 150 years. From the mid-nineteenth century onwards, the expansion of empires and industrial economies assembled markets and transport networks that spanned oceans and continents. The period from 1870 to World War I is widely regarded as the 'first era of trade globalization', a time in which annual trade growth averaged around 4 per cent and in which foreign investment rose more than sevenfold. From 1870 to 1940, world trade more than quadrupled.[3] After World War II, tighter economic integration

reversed the temporary decline of the Depression years and fostered an even faster increase in global commerce. World maritime trade rose from 500 million tons in 1950 to around 4,200 million tons in 1992, and continued to grow rapidly thereafter.[4] Today, seaborne trade alone moves just under eleven billion tons of goods each year, and the momentum of all this matter in motion shows little sign of slowing.[5]

This enormous upsurge of commodity trade was part of a wide-ranging transformation in the relationship between humans and the rest of nature. It was entwined with a bundle of long-term trends—imperial expansion, technological innovation, population growth, and rising per capita consumption in the wealthiest parts of the world—which together generated severe pressures on the planet's resources. Most importantly, perhaps, it was closely associated with the revolutionary transition to fossil fuels in the heartlands of industrialization. The vast acceleration of industrial processes made possible by the availability of cheap and abundant fossil energy created a ravenous demand for goods and raw materials from around the world. Commodity markets served as the global provisioning system for this new energy regime. By forging new links between industrial heartlands and far-flung areas of supply—new 'ecological teleconnections'—commodity exchange became a significant driver of environmental change in the modern world.[6]

Historians have made great strides in understanding the evolution and character of commodity flows. By and large, however, their interpretative frameworks have tended to privilege social and economic relations over ecological ones. At one level this is not surprising: ever since the days of Marx, the intellectual separation of economics and ecology has been recognized as a fundamental—albeit curious—feature of the modern industrial era. Until Ernst Haeckel coined the term 'ecology' in 1866, the two concepts had been closely entwined, and the notion of 'nature's economy' as a set of relationships spanning people and their environment only slowly went out of fashion.[7] Among historians, attempts to put the two back together came mainly with the emergence of environmental history as a distinct subfield in the 1970s and 1980s, inspired by seminal works such as Donald Worster's *Dust Bowl* or William Cronon's *Changes in the Land*.[8] It took until the 1990s for commodities themselves to become a central focus of environmental history research. Cronon's path-breaking *Nature's Metropolis* pointed the way by highlighting how Chicago's commodity markets converted 'first nature' (natural resources such as animals, grass or trees) into 'second nature' (exchangeable goods such as meat, grain, or timber).[9] Chicago and its vast hinterland were inextricably interconnected by commodity webs; economy and environment profoundly shaped one another. Since then, a growing number of scholars have studied how similar processes shaped the rise of commodity production in other parts of the world, creating new sets of interdependencies between increasingly distant global markets and particular biophysical environments.

In order to make sense of the many ways in which historians have approached these issues, the discussion here will revolve around three core themes that run throughout the environmental history of the global commodities boom. The first section focuses on time, or more specifically on the temporal dissonances that often arose between

market demands and the rhythms of organic production systems. The second explores the spatial teleconnections of commodity exchange, in particular the distancing effects caused by the spatial detachment of production and consumption, and the related tendency of markets to focus far-flung demand onto limited areas of supply. The third section then considers how pressures to maximize profits through specialization led to both radical simplifications of production ecosystems as well as unintended environmental consequences. Each section discusses significant issues raised by the extant literature before taking a more detailed look at specific commodities that illustrate the dynamics involved: gutta-percha, tin, and rubber. In all these cases, the outcomes varied in different parts of the world and for different groups of people. Yet the overall pattern is unmistakable: land, water, plants, animals, and soils were exploited on an unprecedented scale to meet the demands of a rapidly expanding world market.

The Economics of Depletion

By the late nineteenth century, the extraordinary accomplishments of modern science and industry had nourished a widespread sense that humankind was extricating itself from 'nature'. Modern civilization, it seemed, was developing the capacity to dominate its surroundings and escape the material limits of what Braudel famously called the 'biological old regime', or the reliance on solar and muscular energy that had previously imposed fairly narrow limits on humankind's prosperity.[10] But even in the era of mass production and global supply chains there was no clean escape from the constraints of the material world. This applied not just to those commodities—such as minerals—that cannot reproduce themselves, but also to the many bio-commodities (goods based on living resources, whether animal or vegetal) whose production was still governed by the availability of water and fertile soil, reproductive rates, growing times, and disease risks. Because many of the raw materials and foodstuffs on world markets were subject to these constraints, the enormous growth of industrial and consumer demand in some parts of the world relied on a parallel increase in organic forms of production in many others.[11]

The difficulty of reconciling supply and demand is a staple theme of commodity histories, but environmental historians have emphasized how the very different pace and rhythms of these systems—industrial and organic—could simultaneously shape both economic and ecological outcomes. When demand for a particular plant or animal resource rose sharply, it often outstripped their capacity to replenish themselves. The most common remedy for this problem was to devote more space or energy to the production of the resource in question, for instance by clearing more land to grow a cash crop, purposefully breeding animals for slaughter, or opening more pasture for grazing. Other possibilities included the search for suitable substitutes or the reduction of wastage in harvesting or processing. Yet alternatives were not always available, and

sometimes the pressure on a particular resource was so severe as to jeopardize the availability of the commodity itself.

Historians have long observed these dynamics of depletion, though mostly from an economic and social perspective. In North American history, the rise and fall of the fur trade was conventionally viewed in this light. Much of the initial stimulus for European commercial expansion in North America derived from the profits to be made from animal skins. Market demand for fine leathers and furs transformed the hides of several species—deer, beaver, marten, foxes—into valuable commodities, which in turn helped finance further European settlement and frontier expansion. Histories of the American frontier thus routinely discussed how the relentless search for pelts eventually destroyed its own resource base.[12] But as John Richards has shown, there was more to it than just the dwindling of the fur economy itself. As millions of commodified animals were removed from the forests, the wider impact on ecosystems was profound and long lasting. The precipitous decline of beavers—an important 'keystone' species—not only altered the composition of the forests (due to their preference for birch, willow, and poplar), it also dramatically shrank the extent of wetland and pond habitat for many other species. The reduction of deer populations, the main prey of several carnivores, likewise had numerous knock-on effects, as did the targeting of top predators (wolves, wolverines) that kept other species numbers in check. Altogether, these ecological changes affected not only the fur trade but also a range of other resources and economic activities from forestry to fishing to livestock farming.[13]

In the hands of environmental historians like Richards, the biophysical world features as more than just a limiting factor on economic activity; it was a broader context in which commodity production and trade were embedded. From this perspective, the intersection of ecology and commodity history is about more than economic processes re-shaping nature; it is also about nature shaping the outcome of commodification processes. Just how far we should grant things such as soil, water, climate, or animals a full-blown form of historical 'agency' remains a matter of debate. It is, however, widely recognized nowadays that they mattered, and that they were deeply intertwined with human action.[14]

We can see this mutual entanglement in the stories of many different commodities, including even those where the pressure of markets was at its most destructive. Perhaps the most well-known historical example of the temporal dissonance between market forces and biological rhythms was the near disappearance of the American bison in the late 1800s. From a population of thirty to fifty million at the middle of the century, fewer than one hundred survived in the wild by 1902. We have long known that overhunting for the hide market—by both Euro-American and indigenous hunters—was largely responsible for the collapse, which historians have generally interpreted as a story of human excess and catastrophic mismanagement. But as Andrew Isenberg has shown, a focus on human action alone does not fully explain the dynamics of the collapse, for the natural volatility of the bison population also played an important role. Its vulnerability to drought, fire, and other factors that influenced the carrying capacity of the grasslands periodically raised the likelihood of a precipitous decline, and this vulnerability soared

when high mortality rates coincided with an unprecedented uptick in human predation. If overexploitation was the ultimate cause of the collapse, the calamitous dimensions it assumed were also the product of a changing natural environment.[15]

For many years, historians and social scientists tended to view such instances of resource exhaustion through the lens of the 'tragedy of the commons'. The concept was popularized by Garrett Hardin in 1968, and has influenced studies of resource use ever since.[16] The basic idea is that shared or open-access resources tend to become overexploited because the incentive structure encourages individual users to extract as much as possible from the common pool even to the point of jeopardizing the resource itself. Scholars have argued over the accuracy and utility of the theory for decades, pitting examples of imprudent overuse against instances of cooperation among resource users to regulate exploitation levels for the common good.[17] Whatever its value for explaining individual cases of resource decline, for our purposes here it suffices to note that open-access resources—often those gathered in the wild such as bison hides, beaver pelts or gutta percha—have proven to be particularly prone to the disjuncture between market rhythms and biological rhythms.

The links between common property and resource depletion—and the debates about them—have been especially prominent in histories of aquatic commodities. It is no mystery why this is so: the history of industrial fishing is littered with ineffectual attempts to restrain overharvesting to ensure the safe reproduction of the resource. Arthur McEvoy's seminal work on the 'fishermen's problem' in many ways set the terms of the debate. It depicts the collapse of California's once-mighty sardine fishery not as a matter of economic interest alone, but rather as a complicated process involving booming consumer markets (as much for fertilizer and animal feed as for human food), ethnic tensions over the control of stocks, and natural fluctuations in ocean ecology. Nonetheless, the root of the 'problem', as he saw it, was the open-access nature of the resource. Although any rational scheme of exploitation should prevent overharvesting that might jeopardize future stocks, California's fishermen had little inbuilt incentive to exercise restraint since any fish that one might leave in the water would simply land in the net of someone else.[18]

Other historians have been more critical of the idea that such 'tragedies' are the result of resource users failing to control their own behaviour. Joseph Taylor, for instance, has emphasized how the salmon fisheries of the American Northwest were by no means fully 'open' but were shaped by social, racial, and ethnic barriers and were therefore suffused with hierarchies of power.[19] More recently, Carmel Finley has shown how a focus on resource users alone obscures the crucial role of governments in undermining effective cross-border regulation and in subsidizing a massively overbloated fishing industry for any number of political or geostrategic reasons. Although the perverse incentives of open-access regimes are generally recognized as a problem, overfishing and resource depletion have in many ways been the direct result of wider political decisions, and historians may therefore do better to focus their attention here.[20]

If overexploitation was a common outcome of commodification, it was not something that everyone passively accepted. Indeed, historians have examined a whole range of efforts to conserve resources that were threatened by the raw power of market forces.

From the United States to India, vast state forest reserves were established to ensure a continual supply of valuable timber such as teak or cedar.[21] Ever since the late nineteenth century, protecting elephants or rare birds from the ravages of the ivory or millenary trades was a major impetus behind conservation efforts from Africa to Southeast Asia.[22] Some such interventions were primarily motivated by a desire to preserve natural landscapes or creatures for their own sake (especially with respect to charismatic animal species), though in large part they were designed to place production on a more sustainable footing.[23]

By and large, the pattern that emerges from this literature is that conservation is easiest with resources that can recover quickly, that can be enclosed in particular spaces, and that are not subjected to a multiplicity of different interests. This helps to explain why oceanic resources have often fared particularly poorly when it came to regulation and protection. As Kurkpatrick Dorsey has shown, the problem is epitomized by the history of whaling. The industry boomed during the early twentieth century due to high demand for natural oils and fats, the principal commodity derived from whales. The largest species—blue whales and humpbacks—bore the initial brunt until they became scarce in the 1930s. The focus then shifted to fin whales, which were severely depleted by the late 1950s, and then on to yet other species that became targeted in an expanding cetaceous frontier. Altogether, it is estimated that some 1.5 million whales were killed in the Southern Ocean from 1904 to 1985, reducing their overall biomass from forty-three million tons to around six million tons, and altering the ecology of the Southern Ocean perhaps permanently.[24]

In effect, the hunt for whale-derived commodities radically depleted the very resource on which it depended, but the outcome could conceivably have been even worse. Conservation efforts began as early as the 1920s, and the International Whaling Commission was established in 1946 to introduce and enforce quotas, but its inability to enforce limits on recalcitrant nations critically undermined protective measures. In practice, whales largely remained an open-access resource for most of the twentieth century. The critical problem was that their slow reproduction and growth rates were completely out of sync with the demand for their blubber and oil. Under the circumstances, the preservation of whales as a resource was always far less economically rewarding than cashing in quickly and investing the proceeds elsewhere.[25]

No single commodity better encapsulates the economics of depletion than the history of gutta percha. A little-known natural plastic with extraordinary properties, gutta percha was in high demand in the late nineteenth and twentieth centuries. It was derived from the sap of *Palaquium* trees found only in the British, Dutch, Spanish, and French colonies of Southeast Asia. The best source was *Palaquium gutta*, a tropical evergreen that could reach up to thirty metres in height and that grew in dispersed stands throughout the forest. Unlike 'India rubber', the latex derived from these trees was a hard substance that could be worked only after heating and that re-hardened when it cooled. Long used by locals for making certain implements, Europeans employed it for a variety of industrial and domestic applications from the mid-nineteenth century onwards.

But what made gutta percha such a prized commodity was its indispensability as insulation for the growing network of submarine telegraph cables. Although other natural coatings were available, none were suitable for underwater use; ordinary rubbers such as those derived from the *Hevea brasiliensis* tree quickly deteriorated in salt water. As a result, gutta percha quickly became a first-order strategic resource for the European colonial powers. Indeed, by facilitating the exchange of information across oceans it also became a key ingredient for assembling the increasingly international market for other commodities.[26]

As John Tully has shown, the main problem for the gutta percha trade was the stark incongruity between industrial-scale demand and primitive methods of supply. In 1857, the first transatlantic cable was 1,852 miles long and was coated with around 250 tons of gutta percha. By 1875, Britain alone annually imported over one million pounds of the substance, and by the turn of the century there were nearly two hundred thousand miles of submarine cable spanning the globe. Yet methods of extracting the resin were essentially unchanged. Although a small portion of world supplies came from plantations, most was produced by axe-gangs of local or Chinese collectors who would fan out into the forest, chop down resin-bearing trees, and cut open the hardwood to drain the latex into bowls or small holes in the ground. It was an extremely wasteful operation that extracted only a small portion of the latex contained in the trunks, which were simply left to rot on the ground. The average yield from an entire tree was no more than about 300 grams, which meant that a phenomenal number of trees were destroyed for the expanding telegraph network. To give a sense of scale, it is estimated that the 7.25 million kg of gutta percha that were exported from Singapore in 1899 alone must have claimed some twenty-three million trees, and this figure does not include exports from Indochina, the Netherlands Indies or the Philippines.

Slowly but surely, the hunt for gutta percha turned into a 'Victorian ecological disaster'.[27] According to official reports, the once-plentiful *Palaquium gutta* tree had all but disappeared from Singapore Island, Malacca, and Selangor by the 1870s. It had also vanished from Perak by 1884, and from the Netherlands Indies (at least its 'explored' regions) by 1902. Despite various initiatives to halt the destruction, by the turn of the century complete exhaustion was a real prospect.[28] Scientists in Europe scrambled to develop chemical substitutes, but none proved adequate for the demanding specifications of deep-ocean electrical insulation.[29] Attempts to establish plantations were marginally more successful, especially on Java and Sumatra, though their output remained modest and their attraction for investors limited. The main problem, once again, was time, for the slow growth rates of *Palaquium gutta* trees meant that it took many years—far more than the five to seven years required for rubber trees—to get a return on investment. The solution only came decades later with the spread of wireless technology and the development of synthetic polymers after World War II. As John Tully concludes, it was a 'sad irony that the telegraph industry destroyed the very trees that made its existence possible'.[30]

Frontiers and Sacrifice Zones

Stories such as those of gutta percha, bison hides, or whaling highlight the ecological damage that is caused when the metabolism of industry takes precedence over that of nature. But the environmental implications of commodification had a spatial dimension as well. For hunters, fishers, or loggers selling goods on commercial markets, there often seemed little reason to worry about the depletion of fur-bearing animals, fish, or trees in any given place as long as there were more to be found elsewhere. For commercial farmers and ranchers, there was likewise little incentive to practise careful husbandry of the land if it was more profitable to overgraze pastures or 'mine' the fertility of the soil and then move on. Indeed, the ability to move around in search of resource 'windfalls' has been one of the prime motive forces behind the expansion of commodity frontiers.[31] It has also frequently proven to be a recipe for ecological degradation, because the ability to escape the consequences of overexploitation generally tended to incentivize rapacity over prudence. In this sense, a commodity frontier can be understood not only as a transitory boundary of settlement, trade, investment, or technology but also as a set of conditions that encourages short-term, extractive behaviour.[32]

As historians have increasingly come to recognize, the ecological costs of these expanding frontiers were not evenly spread, and nor were the resources and profits that flowed back from them. Ever since the 1970s and 1980s, histories drawing on dependency theory or Wallerstein's 'world systems theory' have highlighted the ways in which commodity markets loaded the economic deck in favour of rich regions areas over poor ones.[33] Since the 1990s, historians have explicitly sought to tease out the ecological dynamics of long-distance commodity exchange. William Cronon was among the first to recognize that 'among the many human actions that produce environmental change, few are more important than trade'.[34] For one thing, trade detached production from consumption, and consumption from its costs. As long as the supply of goods continued, it was easy for governments, manufacturers, and consumers in the main importing countries to turn a blind eye to the damage that was caused. Moreover, commodity markets served to concentrate the spatially diffuse demand for a particular good onto limited areas of supply. This not only encouraged a concentration of investment and expertise, but also greatly amplified economic pressures on local ecosystems. Furthermore, the resulting flow of resources and profits were likewise concentrated through the mechanisms of unequal exchange, by and large favouring the metropoles of industry and imperial power over producer areas.[35] To borrow from Marx, commodity frontiers generated 'metabolic rifts' on both an economic and ecological level by funnelling resource wealth to centres of consumption while depleting the natural capital of the places that produced it.[36]

Scholars offered glimpses of these processes well before the twenty-first century boom of environmental history. Sidney Mintz's *Sweetness and Power* was a landmark in many respects. It not only showed how commodities connected together metropoles

and colonies, it also demonstrated how Europeans' or Americans' consumption of something as commonplace as sugar was inextricably linked to dispossession, slavery, and soil exhaustion elsewhere.[37] Over the following years many researchers followed Mintz's lead to examine the spatial relationships created by a multitude of different trade goods: cotton, rubber, tobacco, coffee, tea, cocoa, silver, aluminum, pearls, palm oil, cod, even cocaine.[38] As they did so, some sought to achieve a more systematic integration of the ecological and social aspects of long-distance trade. Richard Tucker showed how the burgeoning appetites of American consumers for bananas, coffee, and sugar—and the determination of American corporations to supply them profitably—degraded tropical landscapes from Latin America to Hawaii to Indonesia.[39] Greg Cushman and Edward Melillo traced how the booming market for guano upended ecosystems and labour regimes in Peru, Chile, and other parts of the Pacific World.[40] John Soluri's superb study on bananas addressed similar issues for Central America, while my own work on the heyday of European imperialism in the tropics examined in detail how commodity chains forged a multitude of global ecological connections between and across empires, generally to the detriment of producer areas.[41]

All these studies show how the magic of markets tended to concentrate the environmental costs of commodity production in specific places. Yet the degree of concentration, and the effects that flowed from it, were not universal or inevitable. Rather, they depended on the nature of the commodity and the specific techniques used to produce it. Mining areas were especially prone to such pressures. Unlike commercial crops—which were often transplanted from continent to continent in an attempt to capitalize on land and labour supplies[42]—workable metal ores were tied to certain places. The fact that they had to be extracted in situ gave a spatial fixedness to the ecological fallout of modern mining, even as the resources themselves were transported to industrial centres thousands of miles away.

There are many different minerals to choose from,[43] but the history of tin mining is a particularly telling case. Like many other metals, tin was in high demand from the mid-nineteenth century onwards. Few minerals, however, were so vital for industrial economies—mainly for metallurgy, chemicals, and canned goods—yet so reliant on supplies from a handful of areas, in particular the western foothills of the Malay Peninsula and the nearby 'tin isles' of the Dutch East Indies (Bangka, Belitung, Singkep). Together, this archipelago of tin deposits dominated world production from the late nineteenth century through most of the twentieth.

The growth of tin mining in the region exhibited all the hallmarks of an expanding commodity frontier: it tapped a series of windfalls, showed a general disregard for the damage caused by production, and continually moved around as techniques evolved and as particular deposits were successively depleted.[44] The initial pioneers were Malay miners who dug shallow open-cast pits or diverted streams for ground sluicing in hilly terrain. Starting around the mid-nineteenth century Chinese commercial syndicates expanded the frontier by opening larger pits through the massive deployment of 'coolie' labour and reaching deeper strata via the introduction of water-driven bucket-chains to remove groundwater. For both the Malay and Chinese miners, the basic modus

operandi was to target the richest and most easily accessible deposits before quickly moving on, leaving extensive areas of eroded moonscape in their wake. But such high-grade and shallow deposits were limited, and once it was clear that all of the tin fields of the region had been discovered (if not yet worked), it was imperative to expand the tin frontier yet further, above all into lower grades of ore that could not turn a profit via current methods.[45]

By the 1890s, the emphasis shifted towards 'modernizing' the industry, which for the governing colonial authorities was synonymous with the application of Western technology.[46] As it turned out, however, the early attempts of Western firms to introduce modern mining techniques were abject failures. Although the highly capitalized systems they brought from Australia or California were generally regarded as superior to prevailing 'Asian' work methods, they could not compete with the Chinese syndicates on cost. Since these capital-intensive techniques failed to dislodge the labour-intensive Chinese pits, the only alternative for European enterprises was to deploy more resource-intensive methods. The solution was hydraulic mining, which opened up low-grade deposits that other techniques could not profitably work. The introduction of hydraulicking and gravel-pumping vastly expanded the tin frontier in Southeast Asia, making it possible to exploit ore grades five or six times lower than before. In a sense, they literally created new 'deposits': what had hitherto been a 'hill' containing a small amount of tin oxide ore suddenly became a workable mining site. But the environmental drawbacks were enormous: for every kilogram of tin produced, five or six times more waste soil was washed away. Soon the disposal of all of this tailings waste clogged local rivers with millions of tons of silt, causing extensive flood damage to fields, plantations, and towns miles downstream. Even today, many of the affected areas have never fully recovered.[47]

The wrecked rivers and floodplains of Peninsular Malaysia numbered among the world's many 'sacrifice zones', forgotten places whose degradation was deemed acceptable by those in charge of extraction and trade, and that tended to be inhabited by people less powerful than those who were making the mess.[48] Wealthy countries have their own versions of such zones: poor neighbourhoods that breathe industrial fumes or drink tainted water from nearby factories. At an international level they are likewise concentrated in poor regions: those that recycle the waste of wealthy countries, or that live with the toxic side effects of producing the enormous flows of consumer goods that circulate around the globe. In all these places, people are left to live with or clean up the noxious leftovers of economic activities that primarily benefit others.

The concept of sacrifice zones grew mainly out of contemporary work on environmental justice and the socio-spatial distribution of industrial pollution, but its relevance to the history of commodity chains (including tin) is readily apparent. For Europeans and North Americans, Southeast Asian tin was a crucial trade good that underpinned a range of industries and that ended up in countless consumer goods—above all the humble tin can, the principle means of preserving perishable foodstuffs until the late twentieth century. Though few consumers knew it, the magic of commodity markets

tied their well-stocked cupboards to the human-made badlands and silted rivers of Southeast Asia. They were the unwitting beneficiaries of unequal ecological exchange.

Comparative Advantages, and Their Disadvantages

One of the central tenets of free trade is the doctrine of 'comparative advantage'. Usually attributed to English political economist David Ricardo, it is based on the notion that individual countries are more or less efficient at producing certain things depending on their different factor endowments (land, labour, capital, technological prowess). The concept can be applied not only to countries but also to much smaller units of economic activity. The basic logic is that if two states or firms trade with each other on the open market, both will increase their overall wealth by producing and selling those goods for which they have a comparative advantage (i.e., those which they are most efficient at producing), while buying in other goods from entities that possess different but complementary sets of advantages. Though inevitably problematic in various ways, the doctrine of comparative advantage remains a foundational concept of economic theory.[49]

Of course, commercial planters and manufacturers recognized the economic benefits of specialization long before Ricardo theorized them, but with the advent of railways, steamships, and increasingly integrated global markets, both the scope and degree of such specialization took on new dimensions. The idea that a high degree of specialization is desirable—that firms or countries should produce only what they are best at producing—not only had far-reaching economic implications; it also had profound ecological consequences.

From an environmental perspective, the principal upshot was a drive to simplify ecosystems in order to maximize the output of a single commodity or small number of commodities. In addition, it meant rendering biophysical environments more predictable as a basis for attracting investment, even as it entailed a readiness to increase one's exposure to market downturns. Rather than producing a range of goods in order to spread risk, a strategy of specialization encouraged a more precarious but potentially lucrative way to make a living from the land. And these risks were not just economic; they were also ecological.

Scholars were aware of the biological hazards of specialization long before environmental history became a distinct subfield in the 1970s and 1980s. Growing the same crop in the same place for extended periods depletes soil nutrients, and planting a large block of a single crop offers a huge supply of food or habitat for any pests or pathogens that happen to like it. Histories of plantation economies routinely featured the dreaded problems of soil exhaustion, disease outbreaks, and pest attacks. In the US South, the ravages of the boll weevil were conventionally regarded as a key factor behind the dramatic transformation of the region in the late nineteenth and early twentieth centuries.

Arriving from Mexico in the early 1890s, for the next thirty years the weevil munched its way across the uniform fields of the cotton belt, triggering huge crop losses as it advanced and nourishing global fears of an impending 'cotton famine'. Even if, as James Giesen has convincingly argued, the weevil was less important as an actual cause of social upheaval than as a useful means by which contemporaries sought to make sense of it, the pest nonetheless upended the cotton economy of the South and, for a time at least, helped stimulate efforts at agricultural diversification.[50]

Time and again, case studies from around the world have shown that the uniformity of monocultural fields presented a veritable smorgasbord for unwanted guests. Cocoa growers in the Americas lived in constant fear of witches' broom, a fungus endemic to the Amazon basin, which posed a mortal threat to large cocoa stands.[51] Sereh disease, a virus that afflicts the tops of sugar cane plants, swept across Java's sugar districts in the late nineteenth century and nearly destroyed the industry before the development of sereh-resistant cane varieties.[52] Stock-rearing operations faced analogous problems as they became larger, more intensive, and more specialized. Even in the seas, the proliferation of salmon farms has led to repeated outbreaks of infectious salmon anaemia, a highly contagious virus that has caused havoc for intensive aquaculturists from Norway to Canada to Chile.[53]

The worldwide movement of pests and pathogens has been a core theme of environmental history ever since Alfred Crosby's pioneering *The Columbian Exchange* charted the transfer of biota across the Atlantic after 1492.[54] Since the turn of the twenty-first century, a growing body of literature has examined how the economic integration of commodity markets and the spatial advance of commodity frontiers served to 'globalize' plant and animal diseases, sometimes leading to major shifts in markets and economic geography. A prime example was the so-called coffee rust, a fungal pathogen (*Hemileia vastatrix*) that tore through Asia's coffee plantations in the late nineteenth century before moving to the Pacific, then to West Africa, and finally crossing the Atlantic in the 1960s. As Stuart McCook has shown, the spread of the coffee rust not only spurred a turn towards different commercial crops in Asia (e.g. cocoa and especially rubber), it also unleashed a wave of coffee breeding and bioprospecting, altered consumer tastes through the marketing of new rust-resistant strains (especially robusta coffee), and continued to shape coffee markets for decades as it circulated throughout producer areas.[55]

Yet the effects of commodity diseases were not evenly spread, either geographically or socially. In the case of coffee rust, some areas (mainly in Asia) suffered devastating losses while others (e.g., Central America) lost only a fraction of yields to the fungus. Environmental conditions played a role, but equally important were local cultivation practices and the varying capacity of states and institutions to respond to the problem (through testing, quarantining, and the like). Often the economic fallout of commodity diseases fell hardest on small-scale producers unable to afford the labour- or capital-intensive control systems that were deployed on large corporate plantations. In turn, the effects of these very control systems also generally fell hardest on the poor wage labourers who were regularly exposed to hazardous agrochemicals that caused acute or chronic health problems.[56] But smallholders were sometimes remarkably effective

at dealing with pests and pathogens. The phenomenal success of African cocoa farmers in the Gold Coast/Ghana—the very epitome of a smallholder-dominated industry—was based not only on sound commercial practices but also on highly appropriate cultivation practices informed by local ecological knowledge. Although their method for dealing with insect pests—namely, to let affected areas lie fallow for three years—was initially ridiculed by colonial officials, it proved far more effective than the invasive measures advocated by agriculture departments.[57]

Altogether, one of the most valuable contributions that environmental historians have made to commodity history is to show how disease and pest outbreaks were not solely 'natural' phenomena, but were rather shaped by a range of social, political, and cultural factors. Hierarchies of wealth and power or cultural attachments to certain production techniques always influenced the effects of such crises, but so too could factors as seemingly unrelated as consumer tastes. As John Soluri has shown, the chronic problems of disease on Central America's banana plantations were to a significant extent the result of companies' fears that consumers would accept only the familiar Gros Michel banana variety (the market standard in the early twentieth century), which was highly prone to Panama disease. Although the soil-inhabiting fungus that causes the malady forced the major fruit companies regularly to abandon diseased plantations in search of fresh land—creating a system of what Soluri calls 'shifting plantation agriculture'—it took nearly half a century before they finally adopted the more resistant Cavendish variety as the market standard. Not that this brought an end to the problems: the switch to the new variety stabilized production, but the huge blocks of uniform Cavendish bananas were still plagued by an endless succession of disease outbreaks that could only be controlled through an increasingly intensive regime of agrochemical spraying. Here, as on monocultural production systems the world over, there was no miracle remedy for the problems of specialization, only a perennial series of improvisations to keep the systems working.[58]

In all these respects, the history of the natural rubber industry furnishes an object lesson in the ecological hazards of specialization. Before the 1910s, most latex was collected from a variety of wild plants scattered across the world's tropical lowlands. Among all these candidates *Hevea brasiliensis* yielded not only the most latex but also the highest-grade rubber, labelled Pará rubber (the standard on international commodity markets) after the Brazilian state that dominated its production. With the ensuing automobile boom, 'wild' collection by gangs of tappers could no longer keep up with skyrocketing demand, not least because their methods of draining the sap often killed the trees that yielded it. In response, many observers pinned their hopes on single-species plantations as a more 'rational' basis of production, and tried to establish concentrated *Hevea* estates in the areas of Amazonia where the tree grew naturally. It was a seemingly obvious solution—one rooted in the logic of comparative advantage—yet in the event it was an abject failure. Would-be estates faced an array of obstacles, but the main problem was ecological: namely, the existence of South American leaf blight (*Microcyclus ulei*), an endemic Amazonian fungus that kills or severely weakens stricken *Hevea* trees. Whereas the *Hevea*'s natural defence against this mortal enemy

was a reproductive strategy of thin dispersal among a host of other tree species, the attempt to cultivate a dense monocrop of trees presented a veritable feast for the leaf blight fungus. As Warren Dean documented, all efforts to create *Hevea* plantations as part of Brazil's 'struggle for rubber' resulted in failure. Even Henry Ford's multi-million-dollar 'Fordlandia' plantation quickly succumbed to the humble leaf blight fungus and was eventually converted into a cattle ranch.[59]

But rather than renouncing the idea of uniform *Hevea* plantations, entrepreneurs sought to establish them elsewhere, above all in the British, Dutch, and French colonies of Southeast Asia. From the 1900s onwards, rubber acreage in Southeast Asia rose sharply, from around half a million hectares in 1910, to 1.6 million hectares in 1920, to 3.7 million hectares by 1940, most of it in Peninsular Malaysia and Sumatra.[60] The absence of fungal leaf blight was crucial. It was the fundamental precondition that allowed planters to create vast new monocultural estates characterized by orderly, clean-weeded rows of trees and methodical systems of production and maintenance. As one contemporary observer remarked, 'everything went with the simplicity of well-oiled machinery'.[61]

But despite the appeal of the machine analogy, the rubber estates were not simply 'machines in the garden'. Their dependence on a multitude of biological and physical processes also placed an element of the 'garden in the machine'.[62] The result was a series of unanticipated consequences that continually threatened to destabilize the inherently unstable ecologies of the rubber plantations. Root fungus, ants, and various forms of bark and stem canker posed serious challenges to production—albeit never on the same scale as leaf blight did in Amazonia. Although some agronomists had predicted disease trouble for the monocultural estates, their warnings were ignored.[63] Soil degradation presented perhaps an even greater threat. Clean weeding was an old habit for European planters, but in local conditions it caused severe erosion problems that reduced latex yields and could even kill afflicted stands.[64]

While estate managers looked to modern agronomic science to keep their stricken monocultural estates working, the growing number of indigenous rubber cultivators followed a very different technique. Instead of maximizing a comparative advantage through strict specialization, they planted *Hevea* in smaller, denser stands, usually alongside a range of subsistence crops in order to reduce their exposure to falling prices. Over the course of five to seven years, the rubber trees would form the main successor species in their temporary agricultural clearings, after which little if any weeding or maintenance was practised. The result was spindlier trees and co-existence with many other plant species, but the technique proved to be remarkably effective. These supposedly disorderly and 'primitive' methods not only yielded good-quality latex at a fraction of the cost, they also reduced the incidence of disease, minimized erosion by retaining ground cover, and even aided humus formation.[65]

The advantages of such methods—both economic and ecological—were driven home when the Depression hit the industry in the early 1930s. As plummeting prices forced plantation managers to curtail their operations, smallholders simply devoted less time to latex tapping and temporarily got on with other pursuits. The problem for estate

managers was not that they could no longer make their plantations work; it was that they could no longer make them pay. To solve this problem, colonial agronomists themselves encouraged the adoption of 'forestry methods' that were similar to the supposedly 'primitive' smallholder techniques. In essence, the message was that it was better to work with nature than against it.[66]

Nonetheless, such methods still met widespread scepticism within the planter community. For many planters, they seemed nothing short of a capitulation to the smallholder competition, the agronomic equivalent of 'going native'.[67] The fact that the plantation sector continued to privilege capital-intensive methods of production over the simpler techniques of smallholders is revealing, for it highlights the powerful hold of ideological assumptions about the benefits of economic specialization, and about the need to create uniformly engineered growing environments for this purpose. Instead, estate owners continued to put their faith in modern agronomic science to keep them profitable, mainly through the development of new high-yielding varieties. Although this helped them regain their competitive edge in the 1950s and 1960s, the new varieties gradually leaked into the smallholder sector, often with the help of agriculture departments in post-colonial states. By 1980 smallholders accounted for a full two thirds of the rubber acreage in Malaysia and 80 per cent in Indonesia.[68]

The natural rubber industry is nowadays more productive than ever, but the ecological risks of specialization remain high. So far, the dreaded leaf blight has failed to spread to the main producer countries in Southeast Asia, even as it continues to prevent large-scale *Hevea* cultivation in the Americas. Ensuring that this remains the case has required an ongoing effort to screen freight traffic between the two regions and to develop new blight-resistant strains. As agricultural agencies are all too aware, the fate of the natural rubber industry largely hinges on this containment exercise. The fact that the UN has included the South American leaf blight on its list of biological weapons vividly illustrates just how actively the biophysical environment can shape commodity markets.[69]

Conclusion: The Ecological Life of Things

Over the past few decades, the history of commodities has become a large and vibrant field of research. Works on a wide range of different trade goods have given us a detailed understanding of what Arjun Appadurai famously called 'the social life of things': how commodities become objects of desire, how they move from producers to consumers, and how they connect people and places across vast distances.[70] Yet the biophysical environment that underpins all of this human activity has often been overlooked or relegated to the margins of the story. As this chapter has sought to show, we gain a richer and more contextualized understanding of the history of commodities if we also

enquire into the 'ecological life of things': how their production and consumption is not only a matter of human activity but is also embedded in a web of biophysical processes that makes production and consumption possible in the first place.

These ecological interconnections can be approached in many different ways, but the overarching themes highlighted here—depletion, dislocation, and the pitfalls of specialization—crop up wherever we might look. Collectively, they help us get a grasp on the fundamental entwinement of commodity history and environmental change. Even as commodity markets collapsed space and time, they simultaneously generated mental distance. By separating consumers from areas of production, commodity chains shielded consumers from the ecological consequences of their own behaviour. In turn, by obscuring the damage caused to other people and places they also helped conceal the accumulation of consequences over time. The ecological fallout of deforestation, erosion, pollution, or overhunting often reverberated long after production moved to other places, sometimes even long after the particular commodity disappeared from the market altogether. Ultimately, the transformation of more and more natural things into salable goods was an exercise in spatial and temporal displacement. It not only created a network of material subsidies from distant places, it also projected the ecological costs far into the future. Environmental history provides a powerful tool for uncovering the hidden connections of commodities to their natural origins and their wider socio-ecological effects.

Bringing the biophysical world into the frame thus offers the prospect of a literally more down-to-earth history of commodities. A voluminous literature on the history of consumption has shown us how markets were culturally constructed and how the goods that circulated through them were charged with symbolic value.[71] Likewise, a burgeoning number of studies on commodity chains has greatly refined our understanding of the multiple socio-economic linkages that bridge sites of production and consumption.[72] In this context, perhaps the essential contribution of environmental history is to expand these analytical linkages yet further, to encompass an even wider range of factors—or 'actants', to borrow from Bruno Latour—that were involved in creating the world of commodities that we know today.[73] Doing so is in no way to overlook what we already know about the importance of political and institutional arrangements for determining how commodities are produced and exchanged. Nor is it to obscure the obvious economic significance of market regulations, investment, trade flows, and labour mobilization for shaping the outcome of the historical 'commodity lottery'.[74] It is more a matter of expanding the lens of historical enquiry rather than moving it elsewhere. After all, the past is littered with examples of commodities that boomed, failed, adapted, or disappeared not just as a result of policy changes or economic shocks but also due to shifting weather patterns, collapsing fertility, diseases, or pest attacks. The biophysical world was not merely a picturesque backdrop for human activities but was an essential part of the story. As we reconstruct the past in the current age of the so-called Anthropocene—the era of Earth's history shaped primarily by human activity—historians are understandably hesitant to concede a defining role to non-human actors such as soils, climate, animals, or microbes. As a whole generation of scholarship has shown, however, there are good reasons to grant them an integral place in our narratives of the history of commodities.

Notes

1. The examples are legion. For discussion of some of the significant issues, see Noel Castree, 'Commodifying What Nature?', *Progress in Human Geography,* 27 (2003), 273–297; Jennifer L. Anderson, 'Nature's Currency: The Atlantic Mahogany Trade and the Commodification of Nature in the Eighteenth Century', *Early American Studies,* 2 (2004), 47–80; James Fairhead, Melissa Leach, and Ian Scoones, 'Green Grabbing: A New Appropriation of Nature?', *Journal of Peasant Studies,* 39 (2012), 237–261; Kemi Fuentes-George, 'Neoliberalism, Environmental Justice, and the Convention on Biological Diversity: How Problematizing the Commodification of Nature Affects Regime Effectiveness', *Global Environmental Politics,* 13 (2013), 144–163.
2. For general works on the ecological implications of commodification, see Jason Moore, *Capitalism and the Web of Life: Ecology and the Accumulation of Capital* (London: Verso, 2015); John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift: Capitalism's War on the Earth* (New York: Monthly Review Press, 2010); Alf Hornborg, John R. McNeill, and Joan Martinez-Alier (eds.), *Rethinking Environmental History: World-System History and Global Environmental Change* (Lanham, MD: AltaMira, 2007); Nancy Lee Peluso, 'What's Nature Got to Do with It? A Situated Historical Perspective on Socio-Natural Commodities', *Development and Change,* 43 (2012), 79–104; on commodity frontiers, see Sven Beckert et al., 'Commodity Frontiers and the Transformation of the Global Countryside: A Research Agenda', *Journal of Global History,* 16 (2021), 435–450; and, with an emphasis on energy demands, Andreas Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (London: Verso, 2016).
3. George Kenwood, *The Growth of the International Economy, 1820–2000* (London: Routledge, 1999), 24; Steven C. Topik and Allen Wells, 'Commodity Chains in a Global Economy', in Emily S. Rosenberg (ed.), *A World Connecting, 1870–1945* (Cambridge, MA: The Belknap Press of Harvard University, 2012), 593, 618–19.
4. Nils-Gustav Lundgren, 'Bulk Trade and Maritime Transport Costs: The Evolution of Global Markets', *Resources Policy,* 22 (1996), 5–32.
5. UNCTAD, *Review of Maritime Transport*, https://unctad.org/en/PublicationChapters/rmt2018ch1_en.pdf.
6. John R. McNeill, 'Cheap Energy and Ecological Teleconnections of the Industrial Revolution, 1780–1920', *Environmental History,* 24 (2019), 492–503.
7. On the history of ecological ideas, see Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1994).
8. Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (Oxford: Oxford University Press, 1979); William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983).
9. William Cronon, *Nature's Metropolis: Chicago and the Great* West (New York: Norton, 1991).
10. Fernand Braudel, *The Structures of Everyday Life: The Limits of the Possible* (London: Collins, 1981), 70–92; Robert Marks, *The Origins of the Modern World* (Lanham, MD: Rowman & Littlefield, 2007), 22–32, 101–108.
11. These points are emphasized in, for example, Sven Beckert, *Empire of Cotton: A New History of Global Capitalism* (London: Allen Lane, 2014); Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2011).
12. Among these older works, see Paul C. Philips, *The Fur Trade* (Norman: University of Oklahoma Press, 1961); Harold Adams Innis, *Fur Trade in Canada: An Introduction to*

Canadian Economic History (Toronto, Ontario, Canada: University of Toronto Press, 1956); Calvin Martin, *Keepers of the Game: Indian-Animal Relationships and the Fur Trade* (Berkeley: University of California Press, 1978).

13. See John F. Richards, *The World Hunt: An Environmental History of the Commodification of Animals* (Berkeley: University of California Press, 2014), 23–92.
14. On the 'new materialism' and history, see especially Timothy J. LeCain, *The Matter of History: How Things Create the Past* (Cambridge: Cambridge University Press, 2017); also Hans Schouwenberg, 'Back to the Future? History, Material Culture and New Materialism', *International Journal for History, Culture and Modernity,* 3/1 (2015), 59–72; Timothy J. LeCain, 'Against the Anthropocene: A Neo-Materialist Perspective', *International Journal for History, Culture and Modernity,* 3/1 (2015), 1–28; Kate Smith, 'Amidst Things: New Histories of Commodities, Capital, and Consumption', *The Historical Journal,* 61 (2018), 841–861. These debates owe much to the work of Bruno Latour; see especially Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy* (Cambridge, MA: Harvard University Press, 2004).
15. Andrew C. Isenberg, *The Destruction of the Bison: An Environmental History, 1750–1920* (Cambridge: Cambridge University Press, 2000).
16. Garrett Hardin, 'The Tragedy of the Commons', *Science,* 162/3859 (1968), 1243–1248.
17. For a discussion, see Fabien Locher, 'Les pâturages de la Guerre froide: Garrett Hardin et la "Tragédie des communs"', *Revue d'histoire moderne & contemporaine,* 60/1 (2013), 7–36; David Harvey, 'The Future of the Commons', *Radical History Review,* 109 (2011), 101–107.
18. Arthur F. McEvoy, *The Fisherman's Problem: Ecology and the Law in the California Fisheries, 1850–1980* (Cambridge: Cambridge University Press, 1986).
19. Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999); see also Connie Y. Chiang, *Shaping the Shoreline: Fisheries and Tourism on the Monterey Coast* (Seattle: University of Washington Press, 2008); and, for an earlier period, W. Jeffrey Bolster, *The Mortal Sea: Fishing the Atlantic in the Age of Sail* (Cambridge, MA: The Belknap Press of Harvard University, 2012).
20. Carmel Finley, *All the Fish in the Sea: Maximum Sustainable Yield and the Failure of Fisheries Management (*Chicago: University of Chicago Press, 2011); *All the Boats on the Ocean: How Government Subsidies Led to Global Overfishing* (Chicago: University of Chicago Press, 2017) on the links between overfishing and post-war environmentalism, see Fabien Locher, 'Neo-Malthusian Environmentalism, World Fisheries Crisis, and the Global Commons', *Historical Journal,* 63 (2020), 187–207.
21. There is a large literature on the subject. For a useful inroad that emphasizes the global interconnections of forest conservation, see Gregory Barton, *Empire Forestry and the Origins of Environmentalism* (Cambridge: Cambridge University Press, 2002).
22. John M. MacKenzie, *Empire of Nature: Hunting, Conservation and British Imperialism* (Manchester, UK: Manchester University Press, 1988); John Frederick Walker, *Ivory's Ghosts: The White Gold of History and the Fate of Elephants* (New York: Atlantic Monthly Press, 2009); Pamela Swadling, *Plumes from Paradise: Trade Cycles in Outer Southeast Asia and Their Impact on New Guinea and Nearby Islands until 1920* (Boroko: Papua New Guinea National Museum, 1996); Robin W. Doughty, *Feather Fashions and Bird Preservation* (Berkeley: University of California Press, 1975); Bernhard Gißibl, 'Paradiesvögel. Kolonialer Naturschutz und die Mode der deutschen Frau am Anfang des 20. Jahrhunderts', in Johannes Paulmann, Daniel Leese, and Philippa Söldenwagner

(eds.), *Ritual-Macht-Natur. Europäisch-ozeanische Beziehungswelten in der Neuzeit* (Bremen, Germany: Überseemuseum, 2005), 131–54; Stuart Kirsch, 'History and the Birds of Paradise: Surprising Connections from New Guinea', Expedition, 48/1 (2008), 15–21.

23. A classic work on the subject, still relevant today, is Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890–1920* (Cambridge, MA: Harvard University Press, 1959).
24. See Kurkpatrick Dorsey, *Whales and Nations: Environmental Diplomacy on the High Seas* (Seattle: University of Washington Press, 2013); J. N. Tønnessen, A. O. Johnsen, *The History of Modern Whaling* (London: Hurst, 1982); on ecosystem changes: Bruno David and Thomas Saucède, *Biodiversity of the Southern Ocean* (London: ISTE, 2015); George Knox, *The Biology of the Southern Ocean* (Cambridge: Cambridge University Press, 1994).
25. A point rightly emphasized by John R. McNeill, *Something New Under the Sun* (London: Penguin, 2000), 243; on international conservation efforts, see Dorsey, *Whales and Nations*.
26. This paragraph and the following discussion is drawn from John Tully, 'A Victorian Ecological Disaster: Imperialism, the Telegraph, and Gutta-Percha', *Journal of World History,* 20/4 (2009), 559–579; John Tully, *The Devil's Milk: A Social History of Rubber* (New York: Monthly Review Press, 2011), 123–132.
27. Tully, 'Victorian Ecological Disaster', esp. 571–572.
28. Ibid., 572–576.
29. The difficulty of finding suitable substitutes for natural substances is a recurring theme not only for plant-based commodities but also many insect-based substances: see Edward Melillo, 'Global Entomologies: Insects, Empires, and the 'Synthetic Age' in World History', *Past & Present,* 223 (2014), 233–270; Edward Melillo, *The Butterfly Effect: Insects and the Making of the Modern World* (New York: Knopf, 2020).
30. Tully, 'Victorian Ecological Disaster', 578–579.
31. The centrality of windfalls features prominently in the classic study by Walter Prescott Webb, *The Great Frontier* (London: Secker & Warburg, 1953), esp. 180–202.
32. On the history of commodity frontiers and environmental change: McNeill, *Something New*, 319–323; Corey Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017); Beckert et al., 'Commodity Frontiers and the Transformation of the Global Countryside'; Jason W. Moore, 'Sugar and the Expansion of the Early Modern World-Economy: Commodity Frontiers, Ecological Transformation, and Industrialization', *Review,* 23 (2000), 409–433; John F. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley: University of California Press, 2003); the best overview of the historical literature on commodity chains in general is Topik and Wells, 'Commodity Chains in a Global Economy'.
33. For a summary and analysis, see Jason W. Moore, 'The Modern World-System as Environmental History? Ecology and the Rise of Capitalism', *Theory and Society,* 32 (2003), 307–377.
34. William Cronon, 'Kennecott Journey: The Paths out of Town', in William Cronon, George Miles, and Jay Gitlin (eds.), *Under an Open Sky: Rethinking America's Western Past* (New York: Norton, 1992), 37.
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CHAPTER 21

COMMODITIES, CARBON, AND CLIMATE

JOHN L. BROOKE, ERIC HERSCHTHAL, AND JED O. KAPLAN

The histories of climate and commodities are deeply entangled, part of the dynamic push and pull between human economies and nature that is the subject of a wider environmental history. Natural forces shape the circumstances of the human condition, but humanity also, and increasingly powerfully, reshapes nature. At the centre of this push and pull, directly connected to the issue of commodities, is the innate biological metabolism of energy. Ultimately energy is fixed in carbon by photosynthesis, and it is here that commodities are directly linked to climate, through the earth's carbon cycle.

These abstractions may seem out of place, but they are central to framing any approach to climate and commodities. From an environmental perspective, the economies in which commodities circulate are essentially metabolic structures consuming energy-as-carbon and emitting wastes. In essence, energy is the critical commodity circulating in economic systems, and its formation rests on the sun and organic photosynthesis, whether it be annual production of wheat, sugar, and timber or the geological metamorphosis of ancient plants into coal, oil, and natural gas. Each involves a dynamic relationship with the carbon content of the atmosphere, since carbon fixed by photosynthesis rests in 'carbon sinks' until it is released as a 'source' of atmospheric carbon.[1] The combustion of fossil fuels comprises a dramatic shift from sink to source, taking an ancient, inert, and massive stock of carbon and suddenly injecting it into the atmosphere. The emissions from agriculture are more subtle and complicated, involving a sudden sink to source CO_2 shift in which forests are cleared and burned, a low-level emission of CO_2 from ploughing and tillage, the ongoing emission of methane from wet rice fields and cattle, moderated by the powerful sink of abandonment and forest regrowth. And since the 1990s, another increasingly viable reservoir of energy has emerged, bypassing both the carbon cycle and the flow of commodities. Renewable solar and wind power derive from the climate system, rather than impact it, and their supply is essentially free. Here

climate-change mitigation also may involve a new form of commodity: cap-and-trade proposals would institute trading rights to emit for mitigating carbon offsets, typically payments that would fund the replanting of temperate and tropical forests.[2]

Of course, the wider relationship between climate and commodities is a two-way street. Changing climates over the last several million years, including the onset and course of the Pleistocene Ice Ages, the sudden transition into a warm Holocene round 9,600 BCE, and erratic jolts in that climatic regime over the last twelve thousand years comprise one axis of climate history.[3] Climatic conditions—regulating heat and moisture—have determined the productivity of these systems for thousands of years. But economic activity itself has always generated greenhouse-gas wastes that reshape the atmosphere and alter climatic conditions.[4]

The impact of economic activity on the earth's atmospheric envelope is a fundamental dimension of the concept of the Anthropocene. Long before Paul Crutzen and Eugene Stoermer put the term before the public in 2000, scientists were examining the problem of how and when human economic action began to fundamentally alter the shape and trajectory of the earth system.[5] The seemingly obvious answer—that Crutzen and Stoermer advanced—is that the Anthropocene began with the onset of the fossil-fuel powered industrial revolution, which they dated to 1784. But this is not the consensus date, if there is one, since fossil-fuel emissions had a negligible impact on the global atmosphere until the 1880s at the earliest (see Fig. 21.1).

One school of thought, best articulated among historians by John McNeill, is that the true break to the Anthropocene came with the explosive expansion of global economies after World War II—what is known as the 'Great Acceleration'. The Great Acceleration approach rests with considerable justification on the enormous carbon impact of fossil-fuel emissions, and the indelible geochemical marker left by the detonation of nuclear

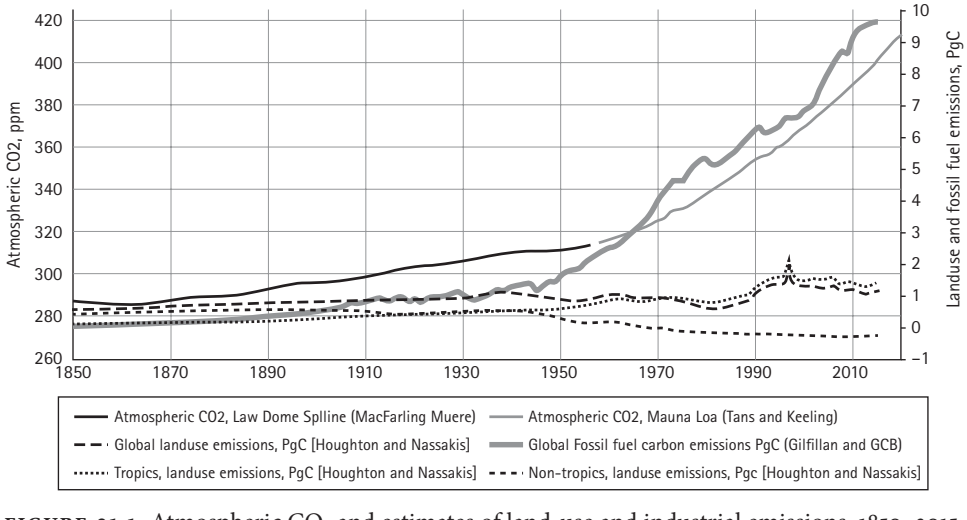


FIGURE 21.1 Atmospheric CO_2 and estimates of land-use and industrial emissions, 1850–2015. Chart constructed by J. Brooke. See Appendix for sources.

weapons, both since 1945.[6] A second school points to the slower, more subtle influence of land-use emissions of CO_2 and methane rising over thousands of years from deforestation and ongoing agricultural production. Climate scientist William Ruddiman has described the paradox of these two anthropogenic pressures on the atmosphere as a land-use tortoise and an industrial hare, both hypothetically producing similar volumes of greenhouses gases—land-use emissions stretched over thousands of years, industrial fossil fuel emissions suddenly in a century and a half.[7] Indeed the tip-over point occurred in the very recent past. By the consensus estimate used here, land-use emissions exceeded industrial emissions until at least 1910 and remained close to their level for another thirty years, until the Great Acceleration started in 1945.[8] However, estimating land-use emissions is a difficult process, with other studies suggesting they may have exceeded industrial until as late as 1960.[9] By any of these three measures, organic emissions exceeded industrial until the relatively recent past.

A third school of thought focuses on the early-modern period, beginning in the fifteenth and sixteenth centuries, when the medieval structure of commodity systems began to be dramatically altered. Indeed, this school challenges the framework of the 'Anthropocene', since the term presumes that all of the 'Anthropos' (humanity) is responsible for altering the natural dynamics of the earth system. With many others, Jason Moore argues that capitalism took shape in the early-modern period and was therefore built on the seizure of Native American lands and the birth of racial slavery. Both processes—colonization and slavery—fuelled a rethinking of European relationship to nature. Europeans cast themselves as 'outside' nature and deemed any resource that was closer to nature—land, indigenous people, Africans—as cheap and inexhaustible, the raw material from which profitable commodities could be produced. To conflate the Anthropocene with the industrial revolution alone obscures the ways capitalism restructured the social relationships between human beings and the natural world. Thus, rather than the 'Anthropocene', there are strong arguments being advanced for labelling this process the 'Capitalocene' or the 'Plantationocene'.[10]

In a similar vein, Jeremy Davies argues that the early-modern period—in which Europeans began to expropriate distant territories for commodity production—was the beginning of an 'end-Holocene event'.[11] Davies's suggestion comports with Kenneth Pomeranz's account of the economic advantage of distant 'ghost acres' in the national accounts of colonizing Europeans.[12] Pomeranz's concept can be extended to analogous 'ghost emissions'—derived from the production of colonial commodities on those distant 'ghost acres', directly benefitting European colonizers. In light of this third Anthropocene-origins story, the entire early-modern period (1450–1850) might be seen as a critical rearranging—and externalizing—of land-use emissions, a pattern still very much in evidence as peoples of the developed world consume beef from cattle grazing on vast expanses of former Brazilian tropical forest.

This chapter provides an overview of some of the literatures bearing on the historical relationship between climate and commodities. It focuses less on the impact of climate on commodities, and more on the question of how the production and circulation of commodities might have influenced the carbon cycle, and thus the conditions

of anthropogenic climate change. We will look briefly at the premodern past, then at the question of an early-modern re-alignment of production, carbon, and climate, presenting a brief case study of the carbon impact of sugar production in the Caribbean before 1800. We will then look in more detail at the last century or two, as dramatically expanded production of industrial and agricultural commodities has contributed to the structuring of global atmosphere and climate.

Commodities and Carbon Climate: Ancient and Early-Modern Origins

The Anthropocene may have ancient roots in early agriculture. The prehistoric theory of the Anthropocene was first advanced by William Ruddiman in 2003, and later quantified and tested by a range of researchers, including one of the present authors, Jed Kaplan. Kaplan has argued that the resource frontier exploited by Neolithic farmers drove pervasive and semi-permanent deforestation first in Eurasia, and later in Africa and the Americas, drastically reducing the carbon-sequestering capacity of post-Ice-Age landscapes.[13] Ruddiman highlights the transition to early state societies as being especially important for greenhouse-gas emissions. Starting as early as the late Neolithic and early Bronze Age, expanding areas of complex agricultural systems accelerated deforestation and permanently transferred carbon from land to atmosphere, while wet-rice paddy production and rising numbers of domesticated animals led to increasing atmospheric methane concentrations.[14] Ruddiman and colleagues argue that these slow but persistent anthropogenic perturbations to atmospheric greenhouse gas concentrations pre-empted an inevitable return to glacial conditions.

These arguments have been hotly debated and the issue is not yet settled. But one of the teams most strongly critical of the Ruddiman-Kaplan thesis recently has given some ground, painting a variable picture, with some late Neolithic human impact on atmospheric CO_2 between 5000 and 3000 BCE, minimal impacts for the next two thousand years, and then suggesting that from 1000 BCE 'humans emerged as a driver with dominant C[arbon]-cycle impacts'.[15] The evidence for methane from 800 BCE to 1600 CE, based on comparisons of Greenland and Antarctic ice-core data, is particularly strong. Given the limited area of wetlands in the northern hemisphere, methane should have had declining values relative to the southern hemisphere. But it had rising values, suggesting that there was a non-natural methane source somewhere north of the equator. The emerging consensus is that this source was expanding wet-rice paddy agriculture and animal husbandry; excess methane is detectable in northern ice-core data by the first millennium BCE, and in more general global measures by the third millennium BCE.[16] Another team has demonstrated that global burning and deforestation rose and fell with the Roman-Han peak and collapse, and with ensuing medieval expansions.[17]

The critical turn toward intensified agriculture and town-to-city settlements unfolded between 4000 and 2000 BCE, in late Neolithic, Copper Age, and early Bronze Age Mesopotamia, India, and China. The elaboration of trading systems moving commodities locally and in increasingly far-flung networks was a fundamental part of these developments.[18] However local economies need to be distinguished from long-distance trade. Both certainly involved the metabolism of stratified and 'urbanizing' societies: middling and elite town dwellers lived off the surplus generated in the countryside, but they also were the consumers of the exotic products coming from distant places. Commodification involves a geography of relative scarcity and plenty, in which profits are to be made in the movement of things across this differential. Certainly, the most basic geography of scarcity was that between ancient cities and their agricultural hinterlands, in which the distances that food and fibre needed to be moved were not all that great. But the bulk commodities feeding emerging cities were inherently local and regional. Transportation cost limited its movement, and pre-industrial economies required water to keep these costs down: rivers and the Persian Gulf in early Mesopotamia, the Nile and the sea in Egypt, the empires and city states growing around the Mediterranean, and rivers and canals in ancient and medieval China. The long-distance trade connecting China, India, Africa, and the Mediterranean involved a lacework of local shipping as well as the caravans operating along the southern Asian trade routes as early as 2000 BCE. This long-distance trade was in low volumes of dense, valuable luxuries, not in commodities that necessarily consumed land and forests. Certainly, early trade built a powerful cultural impetus for the subsequent development of trade-dependent economies. But it was agricultural production in what Fernand Braudel called self-contained 'world-economies'—contained domains of production and circulation, only lightly penetrated by high-value long-distance commodities, which may have impacted climate.[19]

The first great age of global trade in bulk commodities was launched in the sixteenth century, following Portuguese and Spanish voyages along the African coast and west to Brazil and the Caribbean. Immanuel Wallerstein described this process as the opening of the 'modern world-system'. Jason Moore has extended this analysis, describing Wallerstein's world system as the first 'world-ecology', insisting that this new economic, political, and racial order cannot be disentangled from its environmental consequences. On the other hand, no matter their regional expanse, Braudel's ancient and medieval 'world economies' had linked adjacent but broadly similar ecologies in distinct isolated 'worlds' linked by exotic high-value trade. But the modern world-system, Moore's world-ecology, brought together the commodities of tropical, temperate, and boreal ecosystems in unprecedented volumes, moved by new maritime technologies. Moore puts the concept of 'commodity frontiers' at the centre of his analysis of 'cheap nature': extractive entrepreneurs sought out successive frontiers of virgin soil and forest to strip and plant to exhaustion. Keeping their costs down by consuming organic soil carbon deposited over millennia, the merchants and planter capitalists skimmed value from nature—and coerced labour. This early-modern capitalist transformation of nature into commodities is described by Jeremy Davies as the 'end-Holocene event' leading into the

modern Anthropocene. One of the as yet unanswered questions is whether the wider early-modern globalization of commodities influenced anthropogenic greenhouse emissions.[20]

Beginning to answer this question must start with deforestation and land use on the commodity frontiers between the sixteenth and early nineteenth centuries. These frontiers of deforestation were launched virtually simultaneously in Bolivia and the Baltics. Silver dug at Potosí and refined in small smelters, *guayras*, consumed the timber in the surrounding regions by the 1560s, and at the mercury mining centre of Huancavelica by the 1570s, before wood was replaced by the *ichu* grass.[21] In the same decades lands in Poland were being cleared for a new trade in grains going to the Mediterranean. Financed by Spanish silver, the Baltic grain trade was managed by the Dutch, who developed a massive timber industry in Poland and Scandinavia, using new portable water-powered sawmills, to build the new ships for this and the merging Atlantic trade, closely followed by the English.[22] And in these same decades first the Portuguese and then the Dutch expanded the medieval trade in luxury crops: pepper and spices in South East Asia, sugar on a trajectory that led out of the Mediterranean into the Atlantic islands, the African and Brazilian coasts, and then the Caribbean. Southeast Asian spices had a dual market, flowing north to China as much as west to Europe.[23] From the greater Caribbean tobacco cultivation spread in the early seventeenth century to coastal North America, followed by growing export trades in rice, wheat, and maize.[24] This wider imperial expansion also rested on a direct destruction of forests to build ships and to make iron and steel, impacting Scandinavia, the Russia Urals, South Indian coasts, the British iron districts, and the North American colonies.[25] Here the Little Ice Age played a critical role, driving both technical innovation and anomalously strong easterly winds, manifestations of an intensified winter Siberian High, sweeping ships through the Baltic and down the Channel into the Atlantic. The Dutch, and then the English, rode this climatic shotgun to global power.[26]

Early-modern commodity deforestation has been explored by historians, most importantly by Michael Williams and John F. Richards, but its impact on the carbon content of the atmosphere has not yet been explored in any detail.[27] The climate impact of early-modern deforestation is complicated by reforestation—some of these lands were permanently deforested, some regrew in secondary forest, recovering CO_2 from the atmosphere following episodes of deforestation. Imperial managers, concerned about the loss of forest cover, launched campaigns to reforest colonial regions, though these efforts really did not start in earnest until the nineteenth century.[28] The primary productivity of secondary forest and even scrub and grassland acts as a carbon sink, if not as powerful as growing and mature primary forests.[29] This carbon assessment is also complicated by both the impact of the Little Ice Age and the massive pandemic deaths of American Indian peoples.

The causes, course, and impact of the Little Ice Age has been a matter of considerable debate, but its basic outlines are reasonably clear. The Little Ice Age was a global period of cooler climates beginning in the late thirteenth century and ending sometime in the nineteenth century, with peak intensity between the 1560s and the 1710s. The Little Ice

Age was contemporaneous with a period of weaker solar output and a long series of volcanic eruptions, both of which may have led to cooler conditions that were further amplified by complex ocean-atmospheric systems.[30] The Little Ice Age is also marked by a period of slightly reduced atmospheric CO_2 concentrations, which may have further amplified cooling. Across the Northern Hemisphere in particular, societies were impacted by Little Ice Age climate, which is marked by cold wet summers in Europe, increased precipitation in Central Asia, failing summer monsoons in Asia, erratic El Niño impacts along the American Pacific coasts, and extremely cold winters at the Little Ice Age peak.[31] Ironically the stresses of the Little Ice Age may have slowed the growth of empires just as it helped to create the demand for new commodities—sugar, tea, coffee, and cocoa—the stimulants that came to replace some of the caloric intake in European diets.[32]

The causes of the intriguing drop in atmospheric CO_2 concentrations during the Little Ice Age are themselves strongly debated but may have some root in the origins of the globalized world in the seventeenth century. CO_2 concentrations measured in dated bubbles in Antarctic ice cores reveal a general drop in atmospheric CO_2 from 285 ppm (parts per million) around 1510 to 278 ppm around 1700, bottoming out at the low 270s between 1600 and 1625.[33] Some scientists argue that this decline was a simple function of the cold and dry conditions.[34] William Ruddiman and a growing school argue, however, that the drop in atmospheric CO_2 is an early indicator of human impact on the global environment. The arrival of Europeans in the Americas led to the death of potentially millions of indigenous peoples. Mass death in this scenario led to massive reforestation. The most recent estimate argues that total population numbers dropped between 80 and 90 per cent between 1492 and the mid-seventeenth century. Under these conditions, they argue, regrowing American forests—particularly in lowland tropical rainforest—would have functioned as a huge carbon sink.[35] The drop in atmospheric CO_2 in the age of conquest pandemics may have been an important amplifier of the Little Ice Age itself (see Fig. 21.2).

The worst of the Little Ice Age ended in the early eighteenth century, when a solar rebound and the temporary fading of volcanic eruptions contributed to warming global temperatures. If the extraction of commodities had any possible impact of atmospheric CO_2 in the sixteenth and seventeenth centuries, estimating them is complicated by the carbon impacts of the Little Ice Age or post-epidemic reforestation in the Americas. But with the return to warmer global temperatures in the eighteenth century, the rough dimensions of commodity land-use impacts may be clearer. Estimates of global deforestation suggest that between 1700 and 1850 global forest cover could have fallen from 52.7 to 49.9 million square kilometres.[36]

This does not look like much of a drop, but as forest cover declined, atmospheric CO_2 rose. There are two major records, and they are in some conflict: the numbers from eastern Antarctica are lower than they are for western Antarctica.[37] But atmospheric CO_2 moves in the same direction in both records. After oscillating around an average of 279 parts per million (ppm) for at least 1,800 years, once CO_2 rose above 280 ppm, either in the 1720s or the 1790s, it never reverted to its ancient norm. By 1850 it had reached

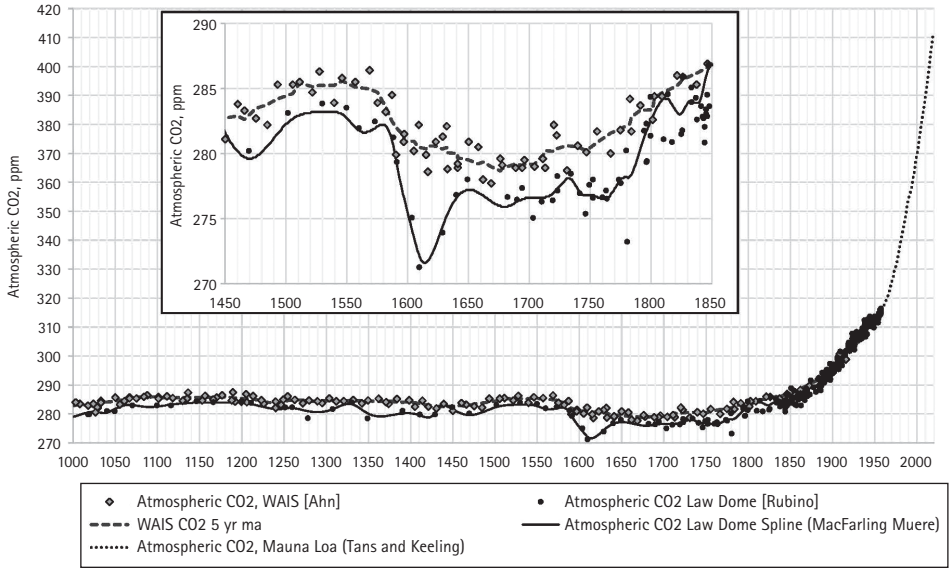


FIGURE 21.2 Atmospheric CO_2, 1000–2020 CE (inset, 1450–1850 CE). Chart constructed by J. Brooke. See Appendix for sources.

roughly 285 ppm in both records, and from that point has moved inexorably upwards beyond Holocene norms, towards its 2021 measured annual value of 416 ppm. Since industrial emissions only began to register in the atmosphere in the late nineteenth century, the slow, steady, if moderate, rise in atmospheric CO_2 before 1850 has to have been shaped in some part by rising land-use emissions. One large-scale climate simulation has found that 'anthropogenic forcing has a significant effect [on global climate] by the early nineteenth century'.[38] The simplest and most dramatic confirmation of this assessment lies in the fact that atmospheric CO_2 has never once dropped below 280ppm in at least two centuries—a measure unprecedented in the Holocene.

The Caribbean Sugar Frontier, 1645–1800

The Caribbean was among the first points of European empire building in the Americas, and sugar provides an interesting opportunity to test the impact of extractive colonial agriculture on the carbon cycle. The Portuguese had started sugar cultivation on the Brazilian coast in the 1550s, but Brazilian sugar would peak in the 1670s and decline thereafter, until a nineteenth-century recovery. Brazil was overwhelmed by the Caribbean sugar juggernaut, which grew slowly in the seventeenth century and exploded in the eighteenth, generating prodigious wealth for European entrepreneurs,

particularly the English and the French.[39] Since the 1940s there has been a heated debate as to whether profits from Caribbean sugar funded the British industrial revolution.[40]

Sugar production involved the clearing of forested land to plant cane, taking advantage of the rich organic soils, and cropped productively for perhaps twenty years, before they were abandoned for new land, spreading to new islands. Sugar required fuel for boiling: the harvested cane lasted only a few days and had to be crushed in mills and the cane juice boiled in huge pots to reduce to molasses and eventually sugar. Thus, sugar involved cropping and industrial refining, and in the latter was not that dissimilar to iron making, in which blast furnaces were fed enormous volumes of charcoal.

Deforestation in the Caribbean had a distinct historical geography, starting in the 1640s in the small islands of the Lesser Antilles and moving to the large islands of the Greater Antilles. Sugar burned through the Lesser Antilles: much of Barbados was described in 1710 as already 'barren, rocky gullies, runaway [eroded] land, waste land, and all the rest much worn out and not so fertile as it was . . . one third . . . now lies waste'.[41] The big islands of the Greater Antilles to the north, Jamaica and Haiti/St Domingue, offered far more space for sugar: plantations in lowland Jamaica were still practising shifting agriculture in 1740.[42] Cuba, making up around half the land area of the Caribbean, would be the final frontier for sugar production—and of massive deforestation—from the 1840s to the 1920s.[43]

Caribbean sugar deforestation was possibly by far the largest anthropogenic force in the early-modern commodity frontiers. Before 1800, it accounted for more than seven million hectares of forest clearance. Together Swedish and Russian iron production and agriculture and northeast European lumbering account for another six million hectares, while pepper production in Southeast Asia, sugar in Brazil, and export crops in North America only 600,000 hectares.[44] The Caribbean was indeed the hub of empire.

By the best estimate Cuba was around 90 per cent forested in 1492, and the Caribbean as a whole was still 87 per cent forested in 1700, reflecting the focus of the sugar economy in the smaller islands of the Lesser Antilles. But deforestation accelerated as sugar spread north into the Great Antilles in the eighteenth century, dropping to 57 per cent forested in 1800, 46 per cent in 1900, and as low as 20 per cent by 1990.[45] What was the carbon impact of this clearance, and how do we estimate it?

Assuming that these forests contained 120.5 tons of carbon stock per hectare, the carbon released to the atmosphere amounted 60 Teragrams (TgC, millions of metric tons of carbon) in the seventeenth century and 779 TgC for the eighteenth century (see Table 21.1) But it was also an organic process: carbon consumed and emitted in canefield clearance and fuel consumption was inevitably replaced with regrowth. Assuming that these forests were replaced with grasslands and croplands produces a rough estimate of a loss of a hundred tons of carbon stock per hectare. On this rough assumption, the estimate of total released carbon comes to 50 TgC for the seventeenth century and 646 TgC for the eighteenth century.

What do these numbers mean? The most authoritative estimates for fossil-fuel emissions start in 1751.[46] Since these estimates are dominated by British coal consumption, and can be extrapolated back from 1750 to 1500 using estimates of British coal production.

Table 21.1 Estimated emissions from Caribbean and global deforestation, 1601–1800

	Caribbean: estimated emissions from deforestation						
	Per cent forested	Cleared forest hectares	Deforestation emissions [TgC] at 120.5 tons carbon per hectare	Deforestation emissions [TgC] at 100 tons C per hectare assuming ~20 tons per hectare sequestration	kk10 land use emissions estimate TgC for Caribbean	Hyde land use emissions estimate TgC for caribbean	British Fossil fuel emissions [TgC]
1061–1700	89%–87%	504,017	60.8	50.4	5.0	51.0	86.9
1701–1800	87%–57%	6,467,400*	779.3	646.7	675.0	152.0	298.0
	Global: estimated emissions from deforestation						
		Cleared forest hectares for export commodities [Caribbean Russia, North/east Europe, southeast Asia, Brazil, North America]	Commodity deforestation emissions (Tgc) at 89 tons carbon per hectare	Commodity deforestation emissions (TgC) at 75 tons carbon per hectare, assuming ~14 tons per hectare sequestration	KK10 global land-use emissions estimate TgC	Hyde global land-use emission estimate TgC	British Fossil-fuel emission [TgC]
1601–1700		3,000,000	267.0	225.0	5,900.0	10,100.0	86.9
1701–1800		11,000,000	979.0	825.0	35,400.0	30,800.0	298.0

Sources: Caribbean forested area is estimated from Monzote 2008; Lugo 1981; World Development data. Tons of Carbon per hectare from Prentice et al. 2001, 192. Global deforestation from Ramankutty and Foley 1999, modulated with data in Strassmann et al. 2008. British fossil-fuel emissions, from Gilfillan, et al. 2019. KK10 and HYDE from Kaplan, et al. 2011. See Appendix for full citations.

Caribbean deforestation land-use emissions, mostly driven by sugar agriculture, was somewhat less than British fossil-fuel emissions in the seventeenth century (50 TgC vs. 87 TgC), but at least twice that in the eighteenth century (646 TgC vs. 298 TgC). These calculations are made with reference to above ground vegetation only; calculating loss of soil carbon would increase this carbon loss somewhat. So, the Caribbean carbon loss for both centuries—twice British fossil-fuel emissions—seems like a substantial figure.

A similar set of numbers emerges from a tentative accounting of global export-commodity deforestation of roughly fourteen million hectares across the Caribbean, Brazil, North America, Southeast Asia, Russia, and Scandinavia in the seventeenth and eighteenth centuries. These numbers come to 225 TgC for the seventeenth century and 825 TgC for the eighteenth, and are dominated by the numbers coming from the Caribbean. This rough guess suggests that estimated global deforestation emissions were almost triple British industrial emission. Interestingly, the deforestation estimate for Caribbean land-use emissions roughly matches those of two influential global estimates of land-use emissions (KK10 and Hyde), which are driven by an ecosystem analysis and simple estimates of population. But our global commodity deforestation estimate of 1–1.2 PgC (billions of metric tons of carbon) is dwarfed by the 40 PgC estimated by KK10 and Hyde for these two centuries. Clearly Caribbean emissions, and direct commodity land-use emissions in general, estimated by deforestation, were only one part of what can be called the 'organic Anthropocene'. But the global databases identify a few particular regions driving a majority of global land-use emissions. All are in strategic early-modern hotspots, in North America, the Caribbean and Latin America, Congo-Angola, rapidly growing Chinese provinces, and greater colonial Russia. Just looking at the eighteenth century, these regions emitted almost two thirds of estimated global land-use emissions.[47]

Commodity carbon impacts were thus one dimension of a wider churning of land-use carbon in the early-modern organic Anthropocene. The early-modern flow of carbon from land to atmosphere is difficult to distinguish from the Little Ice Age recovery, and it was certainly driven by population growth, particularly in China. But it was also a function of a general exploitation of conversion of untapped resources on global commodity frontiers. It was a catalytic focal point in a wider process, exerting a low but inexorable pressure, building an atmospheric baseline for what was to come. By the 1780s, atmospheric CO_2 had permanently settled into an upward trajectory beyond natural variation. Jeremy Davies's early-modern 'end-of-Holocene event' thus did launch anthropogenic forcing in the atmospheric system—the definition of the Anthropocene.

Agricultural Commodities and Carbon since 1800

There are a variety of ways to periodize the century and three quarters between the onset of the American Revolution and the end of the World War II. From the perspective of

climate history, however, the significant dates are the 1870s, the 1910s, and the late 1940s. Despite the British origins of fossil-fuel technology in an early-eighteenth-century 'industrial revolution', fossil-fuel emissions were inconsequential on a global scale before the steel-coal transition of the 1870s, launched in the United States and Germany. Emissions from deforestation and other forms of land-use change exceeded fossil-fuel emissions until around 1910, and it was not until the late 1940s that these industrial emissions decisively surged, and land-use emissions levelled off. In climate-history terms, the nineteenth century ended in 1910, and the twenty-first century began in 1945, in what environmental historians call the 'Great Acceleration'.[48] In this chronology, 1914 to 1945 is a very short twentieth century of war and depression and stalled industrial emissions. Throughout, the accelerating extraction and flow of commodities have been the fundamental drivers, pumping carbon and other greenhouse gases out of the earth and into the atmosphere.

Clearly, these commodities have shifted in weight from annual-organic to fossil-mineralized. Broadly, two ages of empire extracted and transferred organic biomass for the benefit of the peoples in the North Atlantic core of Wallerstein's modern world-system. The old early-modern empires of the organic age of sail, running through the middle of the nineteenth century, must be distinguished from the new fossil fuel-driven empires that developed in a mad rush in the 1860s to 1880s. Powered by steam and steel, these new late-nineteenth-century empires also were shaped by a last gasp of the Little Ice Age, in the bursts of El Niño that brought droughts and famines to the global south from China to Africa between 1878 and 1910.[49]

It is unlikely that anthropogenic climate change shaped these El Niño droughts, but anthropogenic CO_2 was present in the atmosphere in 1875, when atmospheric CO_2 reached 289 ppm, well above the Holocene norm. It rose 11 points to 300 ppm by 1914, and another 10 points by 1945. While it had risen 21 points in the seven decades before 1945, atmospheric CO_2 shot up more than 90 points in the next seven decades, reaching more than 418 ppm in 2022. These anthropogenic greenhouses gases are reshaping climate and weather, as they force the subtle but inexorable heating of the planet, and they derive from paleo-organic commodities—coal and oil—extracted from geologically ancient forests and sea beds.

Over the nineteenth century there were several basic realities bearing on the relationship of humanity and the atmosphere. First, the greatest and oldest pressure on the atmosphere probably continued to be methane rising from Chinese wet-rice agriculture, a pressure that is complicated to measure and that does not enter into the carbon budget per se.[50] The second point has already been stressed—that land-use carbon emissions far exceeded industrial emissions until at least 1910. Richard Houghton and Alexander Nassikas estimate that total global carbon emissions from land use to have been 43.7 Pg between 1850 and 1910. Providing land-use data by country, their estimate is that more than 42 per cent of that total came from one country, the United States, at 18.7 Pg. The United States would emit 45 per cent or more of global land-use emissions annually between 1863 and 1896, peaking at 48 per cent in 1887.[51]

This enormous volume of land use emissions was not driven by population alone, because the United States also produced among the highest per-capita emission rates,

estimated at nine tons per capita in 1850, declining to about six tons around 1890. By contrast, the rest of the world was producing less than a third of a ton per capita annually in these decades.[52] US land-use emissions were led by land clearance for export-commodity production, most importantly cotton, wheat, and meat. Cotton and wheat cropland covered about a half million hectares in 1790, five million in 1850, and roughly forty-five million hectares at its peak between 1910 and 1920.[53] Corn acreage roughly tracked these combined numbers, part of the supply for feeding the pigs and cattle, which doubled and tripled on US farms from 1850 to 1900.[54] These animal numbers doubled in twenty years between 1870 and 1890, when refrigerated railroad cars and steamship lockers opened up an interregional and international trade in meat.[55]

The United States, in its massive land clearance, led the world in land-use emissions in the second half of the nineteenth and early twentieth centuries, and collectively the temperate regions—despite the tropical focus of empire—also led global emissions. Houghton and Nassikas estimate that between 1850 and 1920 the temperate extra-tropics produced 36.6 PgC in land-use carbon emissions, while the tropics produced 15.5 PgC.[56] Specifically, the settler societies of the United States, Canada, Argentina, Uruguay, Australia, and New Zealand—Alfred Crosby's 'NeoEuropes'—were conspicuous leaders in both total land-use emissions and emissions per capita.[57] The United States emitted the highest volume of land-use emissions but was the world's fifth highest emitter per capita, surpassed by four other temperate-zone settler societies in 1850. These were the result of the enormous land clearances—following indigenous expropriations—that flooded European and particularly British markets with grain and meat from the 1880s, and which have been credited with helping to win the struggle over food lying at the heart of the two world wars. But these settler nations were also plundering what had been lightly touched forest and soils.[58]

Over the twentieth century, this pattern would be reversed. The extra-tropics and the tropics produced a roughly similar volume of land-use emissions between 1918 and 1945 (roughly 0.4–0.5 PgC annually), and then diverged sharply. Rising crop productivity and the switch from animal traction to internal combustion engines led to a drop in land-use emissions in the temperate north. Abandoned cropland reverted to forest across the Global North, in what is known as the 'forest transition'. Declining from the turn of the century, Europe reached a net carbon land drawdown in 1923, the United States in 1952, and the former Soviet Union in 1992.[59] Rising land use in the Global South certainly has tracked its population explosion after World War II, and the spreading impact of small farm and shifting farms feeding this growing population.[60] But it also reflected the reach of the world-system, extracting commodities for distant markets.

This carbon impact of imperial commodification and global markets was evident from the 1850s and 1860s, notably in Southeast Asia. Indonesia, Burma/Myanmar, Philippines, and Malaysia, joined by Thailand by 1890, all had relatively high land-use emissions per capita by 1850 and into the early twentieth century, the result of massively expanded demands for rice, coffee, pepper, sugar, rubber, and palm oil.[61] In a measure of the shifting weight of commodities on the carbon cycle, South and Southeast Asia superseded North America as the region with the highest land-use emissions in 1947.

The role of commodities in this mid-nineteenth- to twentieth-century-surge in land-use emissions was also evident in the high per-capita emissions in Central America, in Cuba, where sugar planting stripped the last of the Caribbean forests, and particularly Brazil, where the nineteenth-century expansion of coffee planting and the revitalization of sugar set the stage for expanding commodity-driven land-use emissions.[62] Tropical emissions grew significantly from the late 1940s to the 1960s, then levelled through the 1980s, before again surging upwards. Brazil and Indonesia, with massively expanding cattle ranching and soybean and palm-oil production, have been the world leaders since the 1950s. Clearing for agriculture has been compounded by ensuing wildfires. The 1980s/1990s surge in land-use emissions culminated in a great spike in 1997, caused by out-of-control fires across Indonesia, driven primarily by massive logging operations and swamp-peat drainage campaigns, and a severe El Niño drought. In 2015, Indonesia and Brazil produced 413 and 212 Tg of carbon emissions respectively, 55 per cent of the net global land-use emissions, and massive fires on lands cleared for cattle ranching in the Amazon between 2002 and 2010 and starting again in June 2019 have raised alarms throughout the world.[63] Clearly, a nineteenth-century model of land exploitation and carbon emissions is very much with us in the twenty-first.

Land-use emissions, driven by population growth and global commodity flows, thus have risen in particular global regions in sequence over the past several centuries. The Caribbean, North America, and the Brazilian and Indonesian rainforests produced these emissions, but these were—following Pomeranz's 'ghost acres'—'ghost emissions'. Since the sixteenth century, first Europe and then the United States and the wider global North have been the net importers of global commodities, effectively exporting their land-use emissions.

Fossil Fuels as Commodities

Since the mid-nineteenth century, the surging of commodity frontiers and emissions has been fundamentally entangled with the second of three phases of the fossil-fuel energy revolution. The first phase was local in its impacts: between 1700 and the 1840s coal burned mostly in Great Britain for domestic heat, primitive steam power, and early industrial applications in iron, glass, and even sugar production might have produced 1.5 Pg of carbon emissions. But the second phase, the transition in the 1840s and 1850s to new high-pressure steam engines, led to the eruption of industrial and transportation applications for coal-fired steam power from the 1840s to the 1860s, followed by American and German adoption of the coke-fired Bessemer steel production, and then coal-fired electrical generation. The coal-powered railroads and steamships developed from mid-century were essential to the delivery of the grain, meat, and tropical commodities to North Atlantic consumers. In the decades between 1850 and 1914, fossil fuel emissions totalled 21 PgC, and then rose to a total of 32 PgC during the era of depression and global war between 1915 and 1945. With the third phase, the 'Great Acceleration'

since 1945, the global economy has driven an enormous 386 PgC in emissions.[64] This massive expansion of fossil-fuel emissions since World War II has been clearly altering global climates.

Until the emergence of coal as a domestic fuel in England in the sixteenth century, there was one principal form of energy commodity: biofuels, most importantly wood, whether from cleared forests or from coppiced regrowth. The origins of the fossil-fuel revolution—apart from the remarkable record of Song China—started with the supply of coal from northeast England to London for heating.[65] In the United States, with its massive forests, wood provided more energy than coal until around 1880, when the first coal-fired electrical generating stations were being built. In a few mountainous countries like Norway and Switzerland, water-powered hydroelectric systems bypassed fossil-fuel commodities in the early twentieth century. But in the rest of the developed world coal fuelled the electrical power that fundamentally defines the modern economy. Very broadly, while coal developed systems of supply for the generation of electricity, oil developed as a complementary fuel, first in the United States, powering transportation starting around 1910 and then domestic heating from the 1950s. The United States clearly led global fossil-fuel energy consumption after the middle of the nineteenth century. Where Americans were producing between four and six tons of industrial emissions per capita throughout the twentieth century, Europeans were producing on the order of two tons, and the world at large about a ton or less.[66]

In great measure, the trinity of fossil-fuel commodities—coal, oil, and natural gas—have developed sequentially across the industrial and industrializing world, as technologies improved, and economies shifted. Thus, each country has tended to have a peak and decline in carbon intensity, as they shifted away from coal towards cleaner oil and gas: the British peak of carbon per unit GDP (gross domestic product) was in the 1880s, the United States around 1918, Belgium around 1930. Germany had a double peak in 1918 and the late 1940s. France and Japan both had historically lower carbon intensity, shaped by their shift to nuclear energy in the 1980s. Russia had a long plateau in carbon intensity running from the 1920 to the early 1990s; China had two peaks, in the late 1950s and the late 1980s. But improved carbon intensity is not exactly the same as carbon volume. The United States led the world at 1.5 Pg emissions per year until 2005, when it tapered off and was surpassed by China, which in 2016 was emitting 2.69 Pg per year. Behind these numbers lie fossil-fuel shifts: 26 per cent of US emissions in 2016 came from coal, as against 70 per cent of China's.[67]

These anthropogenic carbon emissions, unbalanced by uptake in the terrestrial and oceanic reservoirs, manifest themselves in the atmosphere as CO_2. Along with smaller contributions from other greenhouse gases these accelerating concentrations are the root cause of global warming. But there are certain complexities, indeed ironies, involved. First, without mitigation, coal combustion releases not only CO_2, which warms the earth by enhancing the greenhouse effect, but also sulphate aerosols, which cool the earth by reflecting solar radiation. While CO_2 stays in the atmosphere for as much as a century, sulphate aerosols precipitate out in weeks and months. Thus, there has been something of a CO_2-sulphate struggle in the atmosphere, for almost a century. There

actually may have been some slight warming during the 1930s and early 1940s when declining emissions led to enhanced sulphate precipitation, unmasking the warming force of the CO_2. On the other hand, the massively growing coal emissions between 1945 and the early 1970s seem to have sent up an offsetting balance of CO_2 and sulphate, with warming blocked until economic slowdowns and acid-rain mitigation limited sulphur emissions from the 1970s.[68]

A second complexity involves the biological effects of increasing volume of CO_2, and its potential to enhance plant growth, effectively 'fertilizing' photosynthesis. The tentative consensus is now that since the 1960s the regrowth of temperate forests in the northern hemisphere has been enhanced by higher levels of CO_2, thus enhancing a carbon sink at least partially offsetting both industrial emissions and land-use emissions from the tropical south. How long this fertilization effect will work into the future, and what the effect of enhanced CO_2 will be on crop productivity, is a matter of considerable concern.[69]

The fossil fuels that drive these massive industrial emissions are a new kind of commodity. Agricultural commodities certainly are dependent on capital markets, but they are fundamentally organic, grounded essentially in ongoing processes of photosynthesis of earthly carbon with solar energy. Fossil-fuel commodities are also photosynthetic and organic in origin, but this is paleo-photosynthesis, hundreds of millions of years old, mineralized into coal, oil, and natural gas. Coal, oil, and natural gas are essentially inert, and their industrial-scale extraction requires a fixed investment in the infrastructure of mines, railroads, pipelines, ocean-going tankers, and delivery systems. Fossil fuels are a commodity, subject to supply and demand, competition, price variation, and catastrophic interruptions. But in the long term (and how long has been much debated), fossil fuels are a limited, non-renewable entity, subject to planetary limits. In that long term, scarcity will drive prices up, though technological innovations like deep-water drilling and chemical fracking seem to have for the time being set back that eventuality.

In the short term, however, the essential qualities of fossil fuels are stacking up against them. Fossil fuels interfere with the carbon cycle at an accelerated rate. Both agricultural and fossil-fuel commodities transfer carbon from forests, living and fossilized, to the atmosphere, but while detecting the impact of land use on climate change requires close analysis, the impact of fossil fuels is obvious. Over the past decade their status as a commodity, as an expensive cost in the essential supply of energy, has become a problem for industrial-scale investors. In the supply of energy as a commodity, technological innovation has put fossil fuels at a distinct disadvantage. For the past century, the assumption of the energy industry has been that a capital investment in infrastructure was the first step, followed by the constant flow of coal, oil, or natural gas into the system at an additional cost. But renewable technologies, wind power and especially solar power, mean that energy can be decarbonized, and in an important sense de-commodified. Wind and solar radiation are free non-commodities: they are not material in the traditional sense and require no continuing financial costs for their extraction and transportation, as there are for fossil-fuel commodities. Thus, if the initial infrastructural investments can be equalized, then renewable energy is much cheaper.

Renewables are carbon-neutral and hold the promise of separating the economy from the carbon cycle. This point of transition has already begun, with the cost of photovoltaic cells dropping 90 per cent since 2009. Solar systems produce only 2 per cent of the world's total electricity but are growing more rapidly than any other system and are projected to reach 20 per cent by 2040. In the spring of 2020, the COVID-19 pandemic lockdowns brought a dramatic collapse of energy demand and thus fuel prices, and a general uneasiness regarding prospects for the moment towards a global conversion to renewable energy. But by late summer and autumn, the tide had turned and investment in renewables surged, leading the International Energy Agency to project that electrical production from renewables will surpass that of natural gas in 2023 and coal by 2025. A bold but widely supported June 2020 report argued that renewables can feasibly generate 90 per cent of US electricity by 2035. Massive increases in fuel prices driven by the war in Ukraine have complicated this energy future.[70]

The rise of renewables promises to eventually de-commodify the ultimate sources of energy. Energy itself will be a commodity to be bought and sold, but it will not involve an earthly commodity constantly moving through a supply chain. The economy will be decoupled from carbon commodities. If climate initiatives were to be implemented, carbon would become a different kind of commodity. Specifically, cap-and-trade and carbon-tax proposals would monetize human intervention in the sources and sinks of the carbon cycle. Emissions of carbon into the atmosphere would be penalized; sequestration of carbon into the earth would be rewarded.[71] At the moment, the marketplace is slowly working in this direction, but governmental action would accelerate the transition, if it can stand up against entrenched fossil-fuel interests. Coal, oil, and gas corporations, a paleo-technology, will fight a grim last-ditch struggle to maximize profits from 'stranded assets' in global carbon reserves and delivery systems.

Some of the paths towards this recommodification of the carbon cycle may be a part of the recent historical record. Between 1998 and 2012 global warming slowed somewhat. Its causes have been under some considerable debate, but there is an emerging consensus that during this warming hiatus some sort of natural carbon sink was operating particularly strongly. Land-use scientists are increasingly certain that this was a land sink, and that the combination of regrowing temperate forests with temporarily reduced deforestation in the tropical south was just enough to flatten the rise of atmospheric CO_2 in these years.[72] No one is claiming yet that the hiatus was caused by a slowdown in tropical deforestation. But if it did have a role, then politics obviously matters: efforts to slow and reverse deforestation take on a new urgency.

Conclusion

The production of commodities has thus contributed to growing and now large-scale greenhouse-gas emissions throughout world history, culminating in the current era of anthropogenic climate change. Long before fossil fuels became the main driver of

anthropogenic climate change in the twentieth century, human societies were emitting greenhouse gases into the atmosphere, largely through agriculture and pastoralism. Because agriculture drives deforestation and the loss of carbon from plants and soil, many climate scientists argue that the origins of anthropogenic greenhouse-gas emissions, the root cause of climate change today, can be traced to the rise of agriculture-based civilizations, at least as far back as 1000 BCE. While these ancient agricultural goods were themselves commodities—essentially foodstuffs like rice and wheat—they only circulated locally, from hinterland to city, not globally.

It was only in the early-modern era, when Europeans began to colonize the Americas and parts of Southeast Asia, that *global* commodities began to play a role in greenhouse-gas emissions. Whether it was the spices and tea grown for the Dutch empire in what is today Indonesia, or the sugar, tobacco, rice, and indigo grown on the slave plantations of the Americas, the production of these bulk luxury commodities led to accelerated deforestation and increased atmospheric greenhouse-gas concentrations. The earliest of such early-modern-era global commodity greenhouse-gas emissions might have been mitigated, ironically, by the collapse of the indigenous populations of the Americans in the sixteenth and seventeenth centuries—itself a by-product of colonization. Cooler temperatures during the Little Ice Age, which coincided with the early-modern period, may have also offset the emissions from plantation agriculture by slowing the rate of natural microbial decomposition of organic matter. Nonetheless, as our case study of slave plantations in the early-modern Caribbean illustrates, sugar production—the quintessential early-modern global commodity—released more than twice the amount of CO_2 than coal in the eighteenth century. Sugar plantations thus highlight the significance of land-use emissions, rather than fossil fuels, to greenhouse-gas emissions.

In the nineteenth century, commodities grown in the United States—primarily slave-grown cotton, but also meat, corn, and wheat—and to a lesser extent the foodstuff commodities of other 'Neo-Europe' regions, like Australia, Canada, Argentina, and Uruguay, became key drivers of greenhouse-gas emissions. But it was not until 1910 and then 1950 that fossil fuels—first coal, then oil and natural gas—matched and clearly surpassed land-use emissions as the dominant emitter of greenhouse gases. In the twentieth century, fossil fuels themselves became global commodities, exchanged on global markets and fuelling the industrial economies of the Global North. Yet fossil fuels only added to, rather than replaced, the agricultural commodities—and thus, land-use emissions—of the previous four centuries. The post-colonial Global South supplanted early-modern slave plantations as important producers of agricultural commodities, whether in the form of meat produced in Brazil, cotton in Indonesia, or rubber and palm oil in West Africa. Meanwhile, China's rapid modernization in the late twentieth century resulted in China, in 2005, surpassing the United States as the largest annual emitter of greenhouse gases, driven mostly by burning coal.

The effects of these commodities—ancient and modern, agricultural and fossil fuels—on climate change today are undeniable. Since the late eighteenth century, the amount of CO_2 in the atmosphere has not dipped below 280 ppm. By 1958, land-use and

fossil-fuel emissions had increased the amount of CO_2 in the atmosphere to 315 ppm. In the past six decades it has skyrocketed, reaching 416 ppm in 2021. The effects of climate change are everywhere apparent, from the increasing intensity and number of extreme weather events around the globe to the bleaching of coral reefs, the gradual melting of polar icecaps, the melting of permafrost, and the reduction in Arctic sea ice. The conditions for future commodity production, food in particular, are predicted to degrade significantly. The tropics and sub-tropics are predicted to be especially impacted by drought, soil erosion, and water scarcity, and it is not clear that the poleward expansion of croplands in the temperate regions can compensate, especially given projections of global population growth. One of the wildcards is how critical food crops will respond to significantly elevated levels of CO_2.[73] At the moment, however, the most positive sign for the future lies in an accelerating shift from fossil-fuel commodities to renewable—and non-commodifiable—sources of energy.

APPENDIX

Sources for Charts and Tables

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PART VI

COMMODITIES AND CONSUMPTION

CHAPTER 22

ANIMALS AS COMMODITIES

The Case of the Pacific Fur Seal

HELEN COWIE

Animal commodities have been central to human existence for millennia. As well as supplying human dietary needs in the form of meat, milk, and eggs, they have been used for clothing, for ornamentation, for medicine, for fertilizer, for fuel, and as domestic companions. Animal power has also been harnessed to harvest, transport, and process other major global commodities, from silver to teak.

Before 1500, most animal products were local rather than global. People raised and ate their own cattle, sheep, and chickens or traded them in regional markets. Some animal commodities travelled over longer distances, but still mostly within a single country or empire; Aztec merchants, called *pochteca*, sourced jaguar skins and quetzal feathers from across Mesoamerica, while Inca elites procured spondylus shells from the Pacific coast.[1] In the early modern period the range of goods traded globally increased, with beaver pelts, furs, and vicuña wool traded between continents. High prices and sumptuary legislation, however, confined their use to a privileged elite; Philip II of Spain used vicuña wool for his bed in the Escorial,[2] while Henry VIII possessed a 'gown of damask and velvet embellished with 80 sable pelts and another of black satin with 350 sable pelts'.[3] Only in the nineteenth century did industrialization and imperial expansion bring global animal products within reach of a mass market, as feathers, fur, shell, and meat were traded across continents and oceans for the first time on a large scale and pianos with ivory keys became a staple of the bourgeois home and a marker of civilization.[4] The expansion of the trade in animal commodities has continued into the twentieth century, with exponential growth in the number of animals farmed for their meat, continued use of leather and fur and growing demand for animal-based medicines in the Far East.

Historians have charted the exploitation of animals from a variety of perspectives. Economic historians have focused on production methods, trade statistics, and supply chains, showing how animal commodities were procured, conveyed, and consumed. Cultural and social historians have traced the different uses of animals among different

cultures and societies, while historians of animals have put the animals themselves at the centre of analysis, addressing issues such as animal sentience and animal agency. Environmental historians have studied the impact of commercial hunting on individual species and, more recently, upon the wider ecosystems from which they are extracted. Drawing on the burgeoning scholarship on animal commodities, this chapter provides a historiographical overview of the commodification of animals and explores their changing role within global trade. It examines how the type and quantity of animal commodities shifted as a result of faster transportation, new markets, and technological innovations, and emphasizes the ecological and ethical issues posed by the commoditization of animals. The chapter concludes with a case study of the Pacific fur seal (*Callorhinus ursinus*), which was hunted almost to extinction in the nineteenth century for its thick fur coat.

Uses

Animals have been exploited by humans for a wide range of purposes. They have been ingested, worn, exhibited, ridden, and burned. They have also played a vital role in the production of other global commodities, from silver to sugar. This has put them at the centre of historical debates about global trade, resource exploitation, and cultural change.

First and foremost, animals have been exploited as sources of food. Pigs, sheep, cows, chickens, turkeys, llamas, and guinea pigs have been reared or hunted for their meat. Cows, goats, sheep, and camels have been farmed for their milk, used, in turn, to make butter, cheese, and yoghurt. Chickens, ducks and quails have provided humans with eggs, while bees have furnished us with honey – the main sweetener available before the globalisation of sugar in the sixteenth century. Fish of many different species have been consumed by humans across the globe and are a mainstay in the diets of coastal peoples like the Inuit. In the pre-modern era, animal foodstuffs were mostly traded on a local or regional basis. By the end of the nineteenth century, however, food production had expanded exponentially and—thanks to mechanized slaughter, steam shipping, tinning, and refrigeration—was taking place over much greater distances. Beef reared on the pampas of Argentina and the plains of the United States fed workers in Paris and New York, while New Zealand lamb was eaten in London.[5] Efforts were also made to improve the quantity and quality of meat by selective breeding.[6] Today, the meat industry is even more globalized, as cattle on feedlots in the United States rely increasingly on grain grown on cleared forest in countries like Brazil, fuelling deforestation. Factory farming has also facilitated the creation of breeds tailored specifically for use as meat or dairy, enabling farmers to rear animals more quickly on less food; industrially produced broiler chickens are slaughtered after just forty-two days.[7] Historians of food and agriculture have charted the evolution of global meat production from the Neolithic era to the present day, asking how and why different species were domesticated, how new

technologies facilitated their exploitation, and how the advent of factory farming has reshaped our relationship with the animals we consume.

In addition to serving as a source of protein, animals have been widely consumed for medicinal reasons. Bezoar stones found in the intestines of ruminants (cashmere goats in Asia, vicuñas in America) were believed to neutralize poison.[8] Elk hooves and tapir toenails were employed as a cure for epilepsy.[9] In colonial Spanish America, the flesh from the left arm of a sloth was thought to relieve a bad heart.[10] Though some of these cures had a purely local or regional circulation, historians of medicine have shown how others circulated on a global basis, giving rise to extensive transcontinental trades; several thousand bezoar stones were shipped from Peru to Spain in the first decades of the seventeenth century.[11] In the twenty-first century, bear bile, rhino horn, and pangolin scales are all consumed in Chinese medicine, putting many species at severe risk of extinction and raising questions about interspecies disease transmission.[12]

As well as being ingested, animals have long provided humans with clothing for their bodies and decoration for their homes. Wool, leather, fur, and feathers all served as bodily adornment, while horns, teeth, and shells could be carved, moulded, and sculpted into art, jewellery, or musical instruments. Animal substances also functioned as dyes, perfumes, and lotions, giving colour to fabrics and scent to the body; the red dye, cochineal, was (and still is) extracted from a Central American beetle, while the scents musk, civet, and ambergris all had animal origins. In the eighteenth century barbers used bear's grease as a restorative for the hair.[13] Historians of fashion have traced the rise and fall in demand for specific animal substances and reconstructed the complex supply chains along which animal fibres travelled. Alpaca wool, for instance, was collected by Peruvian shepherds, passed to British merchants in the city of Arequipa, and transported by sea and rail to Bradford, where it was manufactured into aprons, waistcoats, and umbrellas.[14]

Animals have also been exploited for entertainment and companionship, bringing them within the purview of historians of leisure and domestic life. In the medieval and early modern periods many monarchs kept menageries, featuring lions, elephants, and the occasional giraffe.[15] Members of the elite also kept exotic pets like parrots and monkeys for their personal pleasure, often including them in family portraits as symbols of affluence and taste (Fig. 22.1).[16] The nineteenth century witnessed a significant expansion of the trade in exotic beasts, bringing rare animals within reach of a much wider swathe of the population. Animal dealers like William Cross (Liverpool), Charles Jamrach (London), and Karl Hagenbeck (Hamburg) operated large businesses in port cities across Europe, while zoos and travelling menageries brought lions, tigers, and elephants to the paying public.[17] Exotic pets also become more accessible, appearing in the homes of middle- and even working-class people; in 1878 C. Freeman, a grocer from Stockport, advertised a 'Monkey, Topsy, splendid animal, sensible as a human being, quite tame . . . with cage, chain, brass collar and lock, new clothes and small fiddle'.[18] Exotic animals thus went from being luxuries of the elite to participants in a thriving global trade. Cross was importing eighty thousand African grey parrots per year by 1883.[19]



FIGURE 22.1 Detail from Gabriel Metsu, 'Portrait of Jan Jacobsz Hinlopen and his Family', 1662. (photo by author).

Perhaps less visibly, animal products have served as fuel and fertilizers for humans, facilitating other human activities. Llama dung was used by the Incas to fertilize potatoes and was burned by the Spanish in the seventeenth century to power the silver-smelting works at Potosí.[20] Another South American product, guano, collected on islands off the coast of Peru, fertilized agricultural land across the globe in the nineteenth century, enabling humans to (temporarily) overcome the natural limits on population growth.[21] Whale, seal, walrus, and even penguin oil, meanwhile, were used widely as fuel before the advent of petroleum, facilitating the use of gas lighting in Victorian cities.[22] Between 1890 and 1919, New Zealand merchant Joseph Hatch harvested around three million king and royal penguins on Macquarie Island, boiling four thousand birds a day in an on-site refinery.[23] Animal excrement and fat provided humans with food, heat, and light, forming the basis of global supply chains.

Finally, animal power has been used across the world to facilitate the harvest and processing and transportation of other global commodities. Camels conveyed salt and gold across the Sahara and silk across Asia.[24] Llamas and mules carried silver and mercury to and from Potosí.[25] Pit ponies hauled coal in the mines of Wales and northern England, while elephants transported and stacked logs in Burmese teak plantations.[26] Sugar, perhaps the world's first truly global commodity, could not have been processed without horses and oxen to power the sugar mills and carry the processed cane to the wharf.[27] Though less intensively studied than human and carbon-based sources of energy,

animal labour has thus been crucial to the production of some of the most important global commodities, providing motive power for mills, mines, and factories. Histories of commodities must therefore factor animal labourers into their analysis, together with the miners, slaves, and farmers who worked alongside them.

Commodification

Historians have studied the commodification of animals from a variety of angles, posing questions about their extraction, transportation, manufacture, and consumption. They have documented the quantities of animal products traded, detailed the supply chains that brought them across continents and oceans, assessed the ways in which they were marketed to consumers, and evaluated the environmental impact of commercial hunting.

First, historians have studied animal commodities from a socio-economic perspective. They have reconstructed the trade routes that brought animal products over land and across oceans and traced the rise and fall of key entrepôts as the demand for particular items waxed and waned. They have also emphasized the ways in which the quest for coveted animal goods encouraged human settlement, reshaped political frontiers, and framed social interactions in different regions of the world. Janet Martin, for instance, charts the rise of the fur trade in medieval Russia, showing how its centre shifted from Kiev to Novgorod and, by the sixteenth century, Moscow.[28] Abdul Sheriff offers a comparable analysis of the trade in elephant ivory in nineteenth-century East Africa, describing how this valuable commodity was sourced from indigenous elephant hunters in East Africa, transported to trading hubs such as Zanzibar by Swahili and Omani merchants, and sold at auction in London for making piano keys, billiard balls, and knife handles.[29] Sarah Abreyava Stein chronicles the rise and fall of ostrich feathers as a fashion accessory and reconstructs the networks of (mostly Jewish) merchants, labourers, and financiers who facilitated the trade.[30] Shifting over time from a macro-level analysis of supply chains to a more detailed assessment of networks and social relationships, economic histories present the trade in animal products as an essential force in shaping regional interactions and power dynamics and relate procurement processes to changing patterns of consumption in distant locales.

More recently, historians of science and technology have complemented economic approaches by placing the consumption of animal commodities within a broader context of industrial growth and knowledge exchange. The exploitation of animals for their meat, skins, or blubber did not remain static but evolved in response to new technologies and farming techniques. Bradford wool magnate Titus Salt, for instance, patented new machines for spinning alpaca wool in the 1830s, increasing demand for the product and giving rise to a network of British wool traders in Arequipa (as well as efforts to acclimatize alpacas in Australia).[31] The importation of Chinese pigs into Britain sometime around 1700 permitted agricultural 'improvers' to cross-breed these more

rotund animals with the improved British stock, giving rise to faster-breeding, quicker maturing, and much fleshier pigs with a much higher fat-to-bone ratio.[32] Historians have explored the ways in which innovations in breeding, culling, manufacturing, and preserving facilitated or expanded the trade in global animal products, while also pointing to the failure of certain technologies or the non-transfer of vital forms of expertise.[33] Attempts to naturalize alpacas in New South Wales, for instance, ended in failure, in part because Peruvian experience with the species was ignored or not forthcoming; the flock of alpacas shipped to Sydney by British wool merchant Charles Ledger suffered severely from a disease called 'the scab' (or '*sarna*' in Spanish), which, according to Henry de Boos, was treated easily in Peru with an ointment of 'sulphur and lard well boiled . . . applied whilst warm with a piece of flannel'.[34]

While economic and social historians have focused on the logistics of procuring and transporting animal commodities, cultural historians have probed their value, meaning, and changing significance over time. Why did strong animal perfumes such as civet and musk appeal to Elizabethan consumers but fall out of favour in the Victorian era? Why was horse flesh consumed in nineteenth-century France, but rejected in Britain? To what extent was the consumption of animal products determined by cultural predilections, sumptuary laws, or religious beliefs? By analysing the reception, uses, and attitudes towards specific animal-based commodities, historians have shed new light on their shifting cultural status and illuminated changes over time and across cultures. Bezoar stones, for instance, were used by Andean peoples as talismans for ensuring the fertility of livestock but prized by Spanish colonists as an antidote to poison.[35] Tortoiseshell acquired new popularity in seventeenth-century Japan due, in part, to a change in women's hairstyles, which required tortoiseshell combs to hold them in place.[36] Elephants worked as beasts of burden in Asia, served as sources of ivory in Africa, and entertained zoo and menagerie visitors in Europe, giving rides to children and—from the late nineteenth century—providing exotic subjects for budding amateur photographers (Fig. 22.2).

The shifting cultural status of different animal commodities is perhaps best illustrated by in-depth commodity biographies, which take a single commodity and chronicle its uses over time. Mark Kurlansky's *Cod*, a pioneer in the field, charts the history of a fish whose consumption shaped communities on both sides of the Atlantic.[37] Anya King's *Scent from the Garden of Paradise* traces the uses of musk in the medieval Middle East, detailing its functions as a perfume for both sexes (especially men), as a medicine, as a symbol of kingship, and as a purifying substance held sacred within Islam.[38] Molly Warsh's *American Baroque* examines the transatlantic traffic in pearls in the sixteenth and seventeenth centuries, showing not only how they were extracted and circulated but also how they were classified, valued, and represented in art.[39] Taking into account the cultural dynamics behind a product can help us to better understand the reasons why it was exploited and can explain how and why particular properties came to be ascribed to certain animal substances. Irina Podgorny, for example, shows how tapir hooves emerged as a remedy for epilepsy in the sixteenth century due to the tapir's supposed

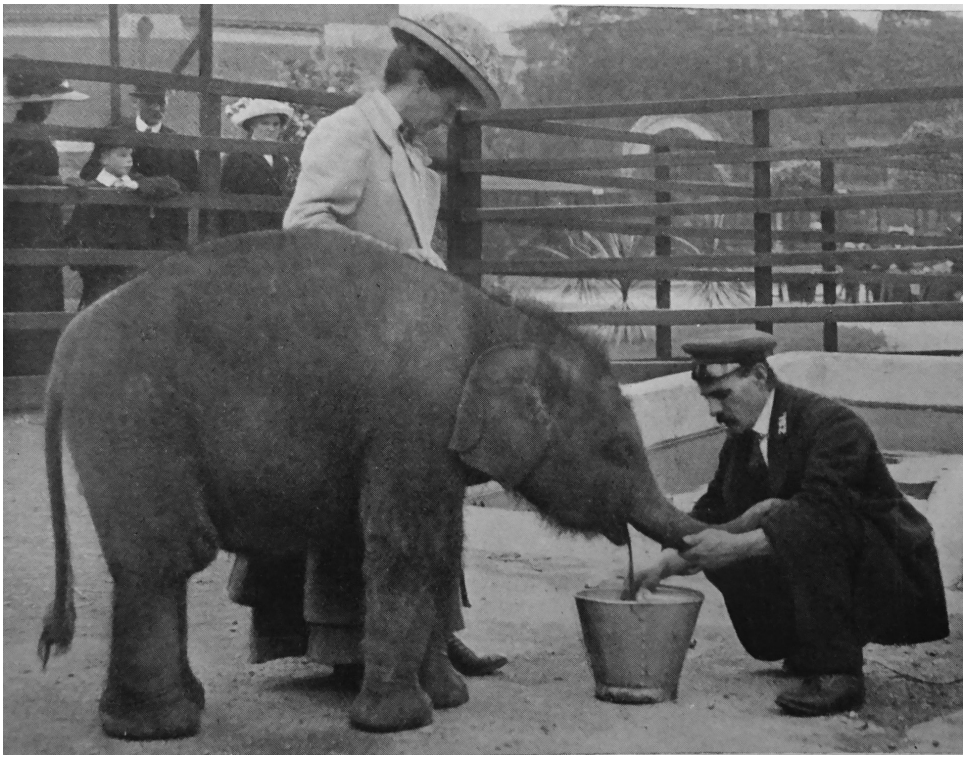


FIGURE 22.2 'Feeding the Baby'. Photographic Competition, *The Animal World*, March 1913, p. 57.

similarity to the Scandinavian great elk, whose hooves were already known in Europe for their curative properties.[40]

Two additional perspectives have gained ground in recent decades and have particular relevance to the study of animal commodities: environmental history and animal studies. The first of these focuses on humans' changing relationship with the natural world, and, in particular, the impact of human actions on other species. In the context of animal commodities, this has produced two lines of enquiry. First, environmental historians have charted the effects of resource extraction on the species most coveted as global goods, noting the (often severe) reduction in populations. African grey parrots, for instance, shipped by the thousand to buyers in Europe in the late nineteenth century, perished en masse from pulmonary disease (one commentator estimated the death rate at 90 percent).[41] So devastating was the trade in ivory to African elephant populations that an article in *The Review of Reviews* in 1899 could ask, 'Is the elephant following the dodo?'[42] Second, environmental historians have taken a more holistic approach to animal commodities, assessing both the collateral damage associated with their collection/production and the wider impact of their introduction/decline/extinction upon the ecosystems of which they form a part. Ryan Tucker Jones, for example, shows how

the decimation of sea otters in the Bering Sea led to a rise in their main food source, crustaceans and sea urchins, which, in turn led to a decrease in kelp and a fall in the number of fish.[43] Robert Paddle chronicles the tragic demise of the Tasmanian tiger, driven to extinction in the early twentieth century in large part due to its alleged predation on introduced sheep and poultry.[44] Alfred Crosby charts the global impact of the interchange of animals, plants, and microbes between the Old World and the New following Columbus's 'discovery' of America in 1492—a process he calls 'The Columbian Exchange'.[45] Approaching animal commodities from an environmental history perspective reveals both the direct impact of extraction on the target species and the wider ecological repercussions of decimating animal populations, relocating species, and killing 'vermin'. It has also sparked debates about the role of different societies in the exploitation of natural resources—especially indigenous groups, whose purported 'ecological' credentials have been challenged and nuanced as their relationship towards nature and global markets is reassessed.[46]

Andrew Isenberg's study, *The Destruction of the Bison*, offers a powerful example of the environmental history approach to animal commodification. Once present in vast numbers on the Great Plains, bison had for many years been hunted by First Nations peoples on a subsistence basis—a process that became easier, and more intensive, after the introduction of horses from the late seventeenth century. From the mid-nineteenth century, however, the level of exploitation expanded massively. Steamships and railways made the herds more accessible, while more accurate and powerful rifles allowed for larger kills. Demand also rocketed for bison robes (used as luxury clothing), bison hides (used to make leather belts for textile mills), and bison bones (used in sugar refining and as a fertilizer), giving new impetus to the slaughter. Isenberg charts the consequent collapse of the bison population and details the last-ditch effort to save them, championed by Smithsonian naturalist William Temple Hornaday. Taking a broader view of the bison's decline, he also emphasizes the indirect drivers of their destruction, which included drought, introduced diseases, and competition for forage from Old World cattle; 'The causes of the decline of the bison were inextricably anthropogenic and environmental'.[47]

Where environmental historians have focused on the ecological impact of harvesting animals as commodities, animal-studies scholars have devoted attention to the experience of individual animals, many of which suffered intensely in the name of global commerce. Bears, for instance, were reportedly poisoned with strychnine in the nineteenth century to make 'the fur glossy', leaving the animals 'doubled up' in 'agony'.[48] Turtles were hung alive over burning leaves to remove their precious shells and then, if they survived the ordeal, 'turned back into the sea to re-plate [themselves]'.[49] Millions of domesticated livestock were (and are) farmed, transported (often over long distances), and slaughtered for human consumption, suffering pain, bodily deformities, and severe psychological distress. Animal-studies scholars have charted the cruelty inherent in consuming animal products, placing animal sentience at the centre of their analyses. Often inspired by contemporary animal-rights activism, some of these studies criticize the whole premise of animal commodification, arguing that the domestication and

capitalistic consumption of other species—as products or as sources of labour—has had negative consequences for non-human animals and humans alike. Sociologist David Nibert, for example, denounces the multiple cruelties that have emanated from animal domestication (which he re-christens 'domesecration'), connecting the raising of domesticated animals (especially cattle) with slavery, animal cruelty, and the dispossession of indigenous peoples from Australia to Central America.[50] Other studies narrow their focus to the impact on the individual animal, personalizing the effects of commodification and according animal subjects a degree of agency often denied to them in more anthropocentric accounts. Kathryn Gillespie's *Cow with Ear Tag #1389* thus offers an empathetic account of the journey of one living cow from farm, to auction house, to slaughterhouse, exposing the suffering behind the twenty-first-century dairy industry.[51]

Historians of animals have also added a new dimension to the study of animal commodities by showing how some creatures—usually pets or zoo inmates—were commodified in a different way as celebrity beasts. Erik Ringmar recounts the history of a giraffe exhibited in Paris in 1827 whose exotic presence inspired songs, furniture design, gingerbread biscuits, textiles, wallpaper, and even female hairstyles.[52] Susan Nance has examined the still more famous case of Jumbo the elephant, whose sale to American showman P. T. Barnum, generated an outpouring of public sympathy and elephant-themed paraphernalia: 'Elephants appeared on note-paper, on wallpaper, on antimacassars, in ivory, in metal, in cakes, in butter, and, as a contemporary said, in jam.'[53] By turns commodified and anthropomorphized, celebrity animals have attracted media coverage, sparked fashion trends and—as Nance argues—deflected attention from the 'the unbridled destruction of wild animals and their habitat feeding the global trade in animals and their parts.'[54] Famous animals—and domestic pets—have also acted as consumers in their own right, fuelling demand for food, fashion accessories, and other more eclectic items; Jumbo received a wide array of unsolicited gifts, from snuff and cigars to 'oysters, wedding cake and champagne'.[55] While environmental historians have studied animals largely at the species or population level, therefore, historians of animals have granted them a degree of agency and individuality in the commodification process, presenting them as active historical subjects as well as passive objects of exploitation.

The Pacific Fur Seal

To illustrate these differing approaches more clearly, the remainder of this chapter will focus on a single species—the Pacific Fur Seal (*Callorhinus ursinus*), which was hunted to the point of extinction in the eighteenth and nineteenth centuries for its dense fur coat. Long exploited by indigenous peoples for their meat and skin, fur seals emerged as global animal commodities in the 1780s when the Russians first colonized Alaska. They continued to be heavily exploited until the late nineteenth century, when plummeting numbers prompted the introduction of culling quotas, calls for consumer boycotts, and,

in 1911, the first international agreement for the protection of marine animals. A closer look at the lucrative but fragile sealing industry illuminates both the global nature of the fur trade and the challenges of preserving a species that itself traversed geographical and classificatory boundaries. It also underlines the differing priorities of conservationists, who sought to save the seal from extinction, and humanitarians, who sought to protect individual seals from cruelty.

The fur seal belongs to the family *Otariidae*, or 'eared seals'. It inhabits the Pacific Ocean and differs from its North Atlantic cousins by having visible ear lobes, a longer neck, and limbs more distinct from the body (Fig. 22.3). While Atlantic seals were hunted for their oil, stored in the layer of fat beneath their skin, Pacific seals were prized primarily for their dense fur undercoat, 'distributed in delicate, short, fine hairs . . . all over the body'.[56] This coat was most plentiful in three- to four-year-old males ('bachelors'), from whom the best sealskins were obtained.

Fur seals once existed all around the Pacific and on the Atlantic coast of South America. By the late nineteenth century, however, most of these seal colonies had been wiped out by indiscriminate hunting, and the only remaining locations for sealing were a small island in the Rio de la Plata (owned by Uruguay), the Russian Commander Islands, and two islands in the Bering Sea named Saint George and Saint Paul. First discovered in 1786 by the Russian explorer, Gehrman Pribilof, the latter were sold by Russia to the United States in 1867 and leased by the US government to the Alaska Commercial Company. The Alaska Commercial Company enjoyed a monopoly over the islands, recruiting indigenous people from the Aleutian Islands to hunt the seals there and paying them forty cents for each skin collected.[57]

Sealing in the Bering Sea was conducted in two main ways, with differing ecological effects. First, the Alaska Commercial Company carried out what was known as a seal drive. This involved waiting for the seals to come ashore to breed, which typically happened in May or June, and descending upon the 'hauling ground' where the young males were congregated. The Company's employees would then drive the animals 'for a mile or more . . . up to the village', coerce them into a makeshift corral, and bludgeon them to death.[58]

The second method of catching seals was to hunt them at sea, a practice known as 'pelagic sealing'. Employed primarily by Canadian sealers from British Columbia, pelagic sealing entailed shooting or harpooning seals while they were swimming in the ocean. Less discriminate than the seal drive, it was considered to be more ecologically damaging because it affected female as well as male seals and reduced the potential for breeding. One critic estimated that '80 or 90 per cent of the skins taken by the marauders are females, the killing of which means the death of two seals and the loss of so many members of the breeding pack'.[59]

Once the seals had been caught, either on land or at sea, the skins were salted for preservation and sent to London via San Francisco. In the British capital, sealskins were auctioned off at quarterly sales and purchased by furriers, who subjected them to a complex manufacturing process. As an article in *The Leisure Hour* explained, 'The salt is first washed off; the fat is then removed, the skins are then washed and the grease and water

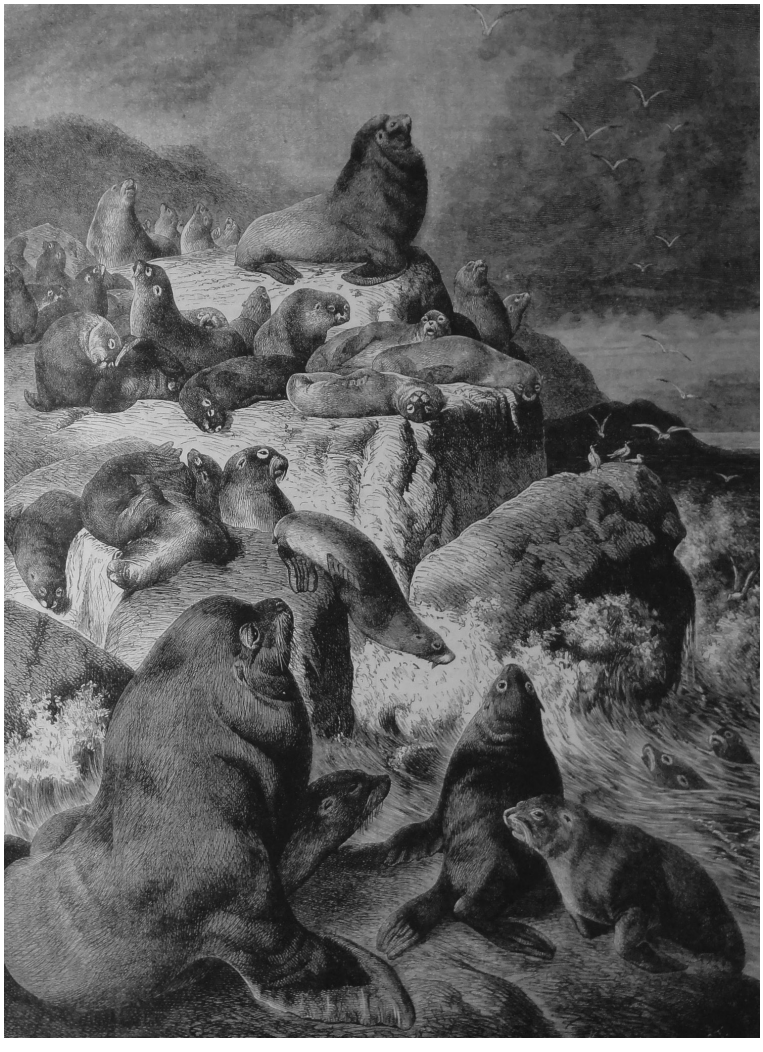


FIGURE 22.3 'Seals at Home'. *The Animal World*, September 1884, frontispiece.

removed by the knife; and then they are tacked on frames to keep them smooth, and are dried in a moderate heat'. The skins were then 'soaked in water and thoroughly cleansed with soap' before being, plucked, shaved, stretched, softened, and dyed.[60]

The method for separating the soft undercoat from the outer hair was invented in 1796, by London furrier Thomas Chapman.[61] Dyeing sealskins proved to be more of a challenge, however, and an effective method for colouring and softening the fur was only invented in the 1870s. After that, all manner of fashion accessories started to be made from sealskin, including 'cloaks, jackets, muffs, dainty little hats, collars, cuffs, bags [and] portemonnaies'. The sealskin cloak in particular became a mainstay in the

fashionable woman's winter wardrobe, prized for its 'exquisitely soft and downy texture'.[62] *The Times* even reported the bizarre case of a woman named Mrs Montgomery, who was 'hugged' by a caged polar bear at Liverpool station while wearing 'a sealskin jacket', the animal having supposedly mistaken her for a seal.[63]

While the sealskin industry was a thriving global business, its long-term survival was in doubt by the late 1880s. The growing demand for seal pelts was outstripping the supply of the animals, raising worrying questions about the possible extinction of the species. At the same time, a small but growing number of individuals were criticizing sealing from an ethical perspective, arguing that it was not only unsustainable but cruel and immoral. These two concerns coalesced to bring the seal business into question. Could the seal population be maintained and could the brutality of culling be mitigated?

The Alaskan seal crisis was not the first time that overhunting had threatened the fur-seal population. On the contrary, the dangers of uncontrolled sealing were amply demonstrated by the dismal record of earlier seal colonies. Seals had once existed in other areas of the Pacific, including Juan Fernández, the Falklands, Kerguelen, South Georgia, Australia, and the Pacific coast of South America. In all these locations, however, the animals had been virtually exterminated by excessive culling. The devastating impact of early sealing ventures was highlighted in contemporary reports, which told a bleak tale of indiscriminate killing, glutted markets, and culpable waste. One commentator recorded:

> [In the] two years 1814 and 1815 no less than 400,000 skins were obtained from Pentipod, or Antipodes Island alone, and necessarily collected in so hasty a manner that many of them were imperfectly cured. The ship 'Pegasus' took some 100,000 of these in bulk, and on her arrival in London, the skins having heated during the voyage, had to be dug out of the hold and were sold as manure—a sad and reckless waste of life.[64]

Even in the Pribilofs, the fur seal had been pushed to the brink of extinction by the turn of the nineteenth century, forcing the Russian authorities to institute a temporary ban (or *zapooska*) on sealing in 1806–18077, and a full-blown moratorium from 1834–1841.[65]

The lessons of this bleak history did not go unnoticed by the US authorities, who took measures to ensure that sealing in the Pribilofs was a sustainable industry. On inheriting the territory from the Russians, the American government established a quota for the number of seals that could be killed every year, limiting the catch to 75,000 skins on St Paul and 25,000 on the smaller island of St George. A close season was instituted from November to May each year to prevent the disturbance of female seals and pups in the rookeries and the use of firearms was prohibited anywhere on the islands to avoid frightening seals in the breeding grounds.

The problem in the 1880s was that tight terrestrial controls were being undermined by an increase in pelagic sealing. Practised predominantly by Canadians, pelagic sealing was considered by many to be a much more wasteful form of culling, as it killed females, pups, and unborn young indiscriminately and mortally wounded many seals

whose skins were not subsequently collected. One critic, Dr MacIntyre, reported that every year the employees of the Alaskan Commercial Company found 'embedded in the blubber of animals killed upon the islands large quantities of bullet, shot and buckshot', indicating that they had been injured at sea.[66] Another US citizen, Darius Ogden Mills, estimated that 'Every skin placed upon the market by [pelagic sealers] represents the destruction of six or eight seals—an utterly unjustifiable inroad into the vitality of the herds'.[67] Though only 'nominal from the year 1868 to 1880', pelagic sealing intensified significantly from 1881 onwards, causing a major depletion of the seal population. Ichthyologist David Starr Jordan, writing in 1896, estimated that since pelagic sealing began, '600,000 fur seals have been taken in the North Pacific and in the Bering Sea'. which meant 'the death of not less than 400,000 breeding females, the starvation of 300,000 pups and the destruction of 400,000 pups still unborn'.[68]

By the end of the century, the situation was becoming dire, and the numbers of seals arriving in the rookeries was visibly lower. The US government, determined to halt the decline, began sending naval cruisers to the Bering Sea to seize US and Canadian ships engaged in pelagic hunting. The Canadians, however, disputed the legitimacy of these seizures, triggering a diplomatic crisis between Britain and the United States. With armed conflict on the horizon, arbitration talks were held in Paris in 1893, and an agreement was reached prohibiting pelagic sealing in a sixty-mile closed zone around the Pribilof Islands and establishing an internationally recognized closed season from 1 May to 1 August each year.[69] This failed to reverse the decline in the seal population, however, and the Americans were forced to explore alternative solutions, including branding female pups to make their fur worthless to pelagic sealers and passing a law in 1897 banning the importation of any sealskin products made from animals caught at sea.[70] The Commissioner of Fisheries, George Bowers, even proposed raising motherless pups in a special 'orphan asylum' on the Pribilofs and transplanting live fur seals to freshwater lakes on the US mainland—a scheme inspired by the successful hand-rearing of two orphan fur seal pups, Bismarck and Mamie, and the pinnipeds' subsequent transfer to Washington, DC.[71]

Finally, in 1911, a further multinational treaty signed by the United States, Britain, Russia, and Japan successfully resolved the issue, banning pelagic sealing entirely, and imposing a five-year moratorium on the US seal drive for the years 1912–1917 to allow the seal population to recover.[72] In the wake of these measures, seal numbers began to increase, rising from a mere 215,738 in 1912 to 530,237 by 1917. Conservationist William Hornaday would later describe the preservation of the fur seal as 'the most practical and financially responsive wildlife conservation movement thus far consummated in the United States'.[73]

The sealskin controversy illuminates the negative impact of uncontrolled exploitation and highlights what could happen when demand for a particular commodity suddenly increased. It also illustrates several important new developments in the field of conservation, some of which continue to have relevance today.

First, there was the question of the seal's legal status. This was problematic because seals were amphibious mammals that spent part of their lives on land and part at sea,

in international waters—a source of some classificatory confusion. As one contemporary observed: '[The seal] is a victim of mixed metaphor at every period of his life. His father is a "bull", his mother is a "cow", he himself is a "pup", he is born in a "rookery" and killed in a "pod"—a truly strange Pilgrim's Progress: bovine, canine, corvine and cruciferous!'[74] The slippery status of the seal was a source of concern for US legislators, who wanted to lay claim to the animal, but found their ownership rights challenged at both national and international level. In 1906, for instance, when US agent Edwin Sims proposed attaching metal tags to the young seals on the Pribilof Islands, 'on which might be stamped the words "Property of the United States" ', he faced objections that no animal could be considered the property of a nation unless some efforts were made to domesticate and farm it.[75] Maurice Douglass Flattery, a lawyer from Kentucky, contended that 'a seal cannot be said to be a domestic animal by any stretch of the imagination', for the Aleuts 'never give them food of any kind, although the bulls, on whose vitality and virility the increase of the herd depends, remain on the Islands several months without food or drink'.[76]

A second problem faced by conservationists was that seals did not stay in one place but roamed widely across the Pacific Ocean. This meant that international cooperation was essential for their protection, for whatever US citizens did to manage the seal population while it was on the Pribilof Islands, their efforts would be futile if the animals were killed outside US waters. Such complications were not confined to seals but affected other threatened species like migratory birds and elephants. The sealing crisis thus reflected a wider move towards preservation in the late nineteenth and early twentieth centuries, and a growing recognition that wild animals did not confine themselves to artificial human borders. As the naturalist Henry Elliott reflected, there were limits to the protection that could be afforded a species 'entirely beyond our control, over which we have no knowledge of its coming or of its going . . . which we cannot confine to certain fields, or even protect from its natural enemies while at sea, where it is nearly half of the time of its existence'.[77]

A third and related issue concerned the seal's value and how this ought to be assessed. As Kurk Dorsey has shown, the success of the 1911 treaty negotiations was contingent on paying Canada and Japan compensation for the sealskins they would lose by abandoning pelagic sealing. Determining the correct level of compensation, however, was difficult for there was no clear agreement on the value of a seal. Should a male seal be accorded the same value as a female (given her reproductive role)? Would the value of a sealskin change if the population of fur seals increased or decreased? How could a price be put on a 'moving, eating, reproducing resource' that 'did not fit into any standard economic framework?'[78] Over and above the question of compensation, moreover, some contemporaries actually questioned whether it made economic sense to protect the fur seal at all, given the negative impact of preservation measures on other equally valuable animals. Writing in 1897, Douglass Flattery argued that seals were 'most voracious animals' that consumed huge quantities of fish during their migrations along the Pacific coast. Protecting them might therefore be a mistake from an economic perspective, since 'what the lessees and the United States Treasury would gain by the increase

of the seals would be at the expense of the fishing and canning industries, which would probably lose in proportion as the seals increased numerically'.[79] Debating the proposed moratorium on the land drive in 1912, meanwhile, Jordan and his colleague George Clark claimed that a complete cessation of the killing would decimate the introduced Arctic blue fox population on the Pribilofs, which depended on 'the carcasses of the seals' for their winter food. This was bad for the foxes, which, according to Jordan, 'were beginning to starve and eat one another', but it was also bad for the US government, which had extracted some 40,000 fox pelts from the Pribilofs over the past forty years.[80] The different measures proposed to protect the fur seal thus had consequences for the wider ecosystem of the North Pacific (a term not used by any of these commentators), and needed to be considered within that context. They also, of course, had consequences for the human labourers who depended on sealing for their livelihoods—though, as Robert Irwin has shown, First Nations sealers were exempted from the ban on pelagic sealing on condition that they hunted fur seals for subsistence, rather than as globalized commodities (a regulation many flouted).[81]

A fourth important aspect of the fur seal crisis was the close relationship between science and conservation. To understand how best to preserve the species, and to justify proposed conservation measures, governments relied on the expertise of scientists. The US government commissioned and funded several scientific surveys of the Pribilof Islands, all staffed by recognized experts in the field of zoology. A survey party dispatched in 1896 under the leadership of David Starr Jordan, for instance, featured two men from the United States Museum, Dr Leonard Stejneger, curator of reptiles, and Mr Frederic A. Lucas, curator of comparative anatomy.[82] A subsequent survey was carried out in 1910 by Harold Heath, professor of invertebrate zoology at Stanford University.[83] These individuals conducted careful fieldwork on the islands and used the latest technology to support their studies. The 1896 Jordan Commission carried out a census of the seals in the rookeries to ascertain the number of pups and breeding females; studied the nursing practices of cows, noting that orphaned pups were not fed by other nursing females; examined the stomach contents of dead seals to learn more about their diet and to determine whether pups of a certain age were capable of feeding themselves if deprived of their mothers' milk; sought to establish whether the seal herds of the Pribilof Islands and the Russian-owned Commander Islands intermingled (they did not); and assessed whether sealing on land or at sea had any impact on the distribution of seals within the rookeries and hauling grounds.[84]

Science did not necessarily provide definitive answers, however, for despite the supposedly impartial methodology, different naturalists often came to different conclusions. These were not mere technicalities, moreover, but could have a major bearing on proposed conservation measures. Take the contentious case of the seal drive. Jordan, who spent two years in the Pribiloffs studying the fur seal, recommended culling 'superfluous' male seals (i.e. non-breeding bachelors) to reduce instances of pup-trampling. Elliott, by contrast, advocated a moratorium on all land culling to allow the fur seal population to recover. He claimed that repeated driving caused 'internal injuries of greater or lesser degree that remain to work physical disability or death thereafter to

nearly every seal thus released, and certain destruction of its virility and courage necessary for a station on the rookery'.[85] He also objected to Jordan's proposal on evolutionary grounds, suggesting that the culling of 'bachelors' contravened natural selection.[86] Dorsey identified in this scientific dispute the beginnings of two distinct approaches to conservation—conservation to ensure the continued viability of the sealing industry (economic conservation) and conservation for its own sake (i.e. saving a species to ensure the continued existence of the animal).[87]

Finally, we see in the sealskin debate the emergence of a third approach towards wildlife management that focused on animal welfare. Scientists and conservationists were concerned primarily about the survival of the fur seal as a species, and were happy to let the killing of the animals continue as long as it was managed in a sustainable way. Indeed, scientists often killed animals in the name of research. Animal rights advocates, however, took a more uncompromising approach, arguing that all killing was cruel, whether sustainable or otherwise. They emphasized the suffering of the individual animal rather than the long-term survival of the population and stressed the ultimate responsibility of the consumer for the killing of animals in distant lands. As one article in *The Animal World* expressed it: 'The simple fact stands thus—that a sealskin jacket is made of sealskin; that to get the skin we must knock the seal on the nose, and that if the fur is to have a proper gloss on it the seal must be skinned as nearly as it may be alive'.[88]

With suffering at the heart of their opposition, humanitarians concentrated their efforts on mitigating the cruelty associated with sealing and demanded a complete boycott of sealskin products. Activist Joseph Collinson, author of a 1910 pamphlet on sealskin, compared the suffering of seals to that of animals in Chicago slaughterhouses, where 'there seems to be no doubt that pigs are scraped alive'.[89] Female subscribers to *The Animals' Friend*, meanwhile, expressed their determination to renounce sealskin and all other furs, and discussed suitable substitutes for the popular sealskin jacket. One commentator, F. Dismore, suggested using 'muffs made of crinkled chiffon, which appear 'dressy' even if made in black' and 'can be made in different colours to suit the costume'. Another, J. C. Brace, confessed that: 'Before my moral sense had evolved to the Humanitarian point, I wore fur and feathers with the complacency of a Red Indian adorned with his girdle of scalps'. Since switching to 'lace, silk, or the finest Shetland wool wraps', however, she had been 'much more comfortable than when wearing furs, which frequently made me unhealthily hot where the fur touched and bitterly cold by contrast where it did not'.[90]

Humanitarians also emphasized the suffering of human workers in the sealing industry, from the Aleuts who 'brutalised themselves lower than the shark to wrench [the seal's] coat from its rightful owner', to the (mainly female) fur-pullers employed to prepare the skins for manufacture, who often contracted 'consumption owing to the stoppage of the respiratory organs by the bits of fluff which fly off the skins they are handling and invade the nostrils and air passages, so entering the lungs'.[91] While scientists and politicians drafted laws to protect fur seals in the field, therefore, humanitarians worked to change consumer behaviour through education. Both approaches continue to inform present-day approaches to wildlife conservation.

Conclusion

Animals have been exploited by humans for millennia and commodified in multiple ways. They have been eaten, converted into clothing, adopted as pets, used for fuel, and conscripted as labour in the manufacture of other commodities. In the process, animal commodities have shaped human society, providing the impetus for cross-cultural interactions, triggering the opening up and settlement of previously uninhabited regions, and acting as an incentive to colonization.

Historians have studied the commodification of animals through a range of different lenses. Earlier examinations of the topic tended to focus largely on people—either as gatherers, manufacturers, or consumers—and to prioritize the impact of global commodities on human societies. More recently, the focus has shifted to the impact of commodification on animals themselves, as sentient individuals, as threatened species, or as part of a broader ecosystem temporarily or permanently altered by the introduction or removal of commercially prized species. From a quantitative approach, centred on trade statistics and supply chains, the study of animal commodities has moved towards a qualitative approach concerned with cultural change environmental degradation and animal suffering.

The case study of the Pacific fur seal highlights the multiple perspectives from which animal commodities can be analysed. An economic history approach reveals the localized labour systems and transoceanic supply chains by which sealskins were acquired. A history-of-science approach shows how technological advances facilitated the popularization of sealskins as fashionable attire for ladies. An emphasis on consumer culture reveals how the consumption of sealskin jackets, gloves, and purses reflected the shifting demands of fashion—a major influence upon animal commodification from the mid-nineteenth century—and an environmental history approach foregrounds the debates that arose over fur seal conservation measures when fur seal numbers collapsed under pressure from over-harvesting. Underlying all these analyses are considerations of value, issues of supply and demand, and recognition of the collateral damage likely to be inflicted on other species and human labourers if the different forms of sealing were (or were not) abolished or restricted. Also factored in (by historians, and in some instances by historical actors) are questions of animal suffering and animal agency, whether in relation to the challenges of protecting a mobile marine species, the role of the fur seal within a wider ecosystem, or the emotive qualities of individual seals exhibited in zoos and aquaria; the fur seal pups Bismarck and Mamie, for instance, were anthropomorphized with human names and treated as 'pets' by their carer, Lieutenant Judson Thurber, who hand-reared them on chopped fish and condensed milk.[92] A close focus on an specific animal commodity can thus combine a range of historiographical approaches, illuminating the different processes, consumption patterns, and ethical debates associated with animal commodification.

Future research is likely to push these perspectives further, paying closer attention to the ecological impact of commodity extraction. On the one hand, with the number of domesticated livestock on the rise, the challenges posed by intensive farming practices look set to receive more attention in both a historic and contemporary context. Greater emphasis will also likely be placed on the interspecies transmission of disease—a concern foregrounded by recent zoonoses, from SARS (linked to civets) to COVID-19 (linked to bats and pangolins). On the other hand, biographies of single commodities—and, in some cases, specific objects or live animals—are growing in number, offering another, more focused, take on the impact of globalized commodities. Individual animals have a low profile in commodity histories, but recent studies of named (or at least numbered) animals have provided new insights into the experiences of certain non-human animals as commodities, victims and—in some cases—consumers in their own right. By blending broader environmental approaches with commodity biographies, historians may gain a better understanding of the planetary and personal impacts of animal commodification.

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CHAPTER 23

PRODUCING DRUG HISTORIES

Conquest and Commerce, Culture and Control

JOYCE A. MADANCY

Drugs are among the most fraught of substances and have long been at the forefront of scholarly and more popular histories of commodities. They have generated and justified empires; served as agents of crime, control, and comfort; created wealth and despair; and contributed to perceptions of social constructions like race, class, gender, and nationality. Most were initially valued for their therapeutic qualities, and only became the targets of condemnation and restrictions when their use (and users) became associated with what was widely considered 'immoral' intent or slipped beyond social or legal control. The inexhaustible demand for psychoactive commodities has been driven by the fact that they constitute 'the opposite of 'durable goods'.[1] In some cases, their addictive nature means that demand blurs the distinction between need and desire. Feeding that demand has entailed the mobilization and labour of massive numbers of producers both large and small, the use and sometimes depletion of natural resources, and the creation and maintenance of complex networks to coordinate cultivation, production, processing, and distribution. But the production of drugs is not simply confined to the cultivation of psychoactive plants or the manufacture of psychoactive substances; the new history of drugs reveals that they are 'produced' by sociocultural attitudes and practices that ascribe meaning and that process of production shapes their legal status.

The literature on this topic is vast, and even the term 'drugs' is contentious, given that it can apply to recreational and medical substances. Rather than offering a comprehensive analysis, an assessment is made of some of the more important themes, trends, and debates in recent scholarship on psychoactive substances such as opium, alcohol, tobacco, cocaine, caffeine, and cannabis. This is followed by a case study on opium suppression in China and the rhetoric of opium consumption in India, Burma, and China, that delves into the defensive reactions of poppy farmers in India and China when confronted with attempts to uproot their lucrative opium economies. The chapter ends with reflections on possible avenues for future research in drug history.

Trends and Themes in Scholarship

The commodity history approach to drugs has been immensely fruitful because it enables scholars to cast their analytical nets both wide and deep. The overarching recent trend in the field has been a welcome shift toward interdisciplinarity, particularly (but not exclusively) the incorporation of anthropological and literary analysis, which allows scholars to look more deeply at the dynamic cultures of drug consumption and production. The tone is frequently revelatory, as historians seek to 'flip' the assumptions and narratives surrounding both 'soft' and 'hard' drugs in ways that relate to evolving attitudes today and highlight the central role of race, gender, class, and nation. Several historiographical avenues that have led to particularly productive insights and debates, discussed below, include the role of drugs in constructing trade networks and regimes of labour, shaping individual and national identity, and influencing notions of control and deviance, all of which were intertwined with the evolution of scientific/medical understanding.

Beginning with the big picture, global historians have reinforced the central role of drugs in promoting and sustaining commerce and conquest and identified the biological, cultural, and political factors that determine which drugs become global commodities and which are considered drugs at all. Historians tend to depict imperialism either as a vector of discovery that led to trade, profit, prosperity, and transformative cross-cultural encounters, or expose colonialism as an extractive process that forcibly reordered, mobilized, and controlled labour and resources to produce the drugs sought by their colonizers. The most effective histories do both.

Seeking to explain the cornucopia of drugs available in the modern world, David Courtwright acknowledged the long history of drug production, sale, consumption, and restrictions, but argues that a 'psychoactive revolution' began in the sixteenth century when traders from Spain, Portugal, the Netherlands, and Great Britain deliberately transformed (and sometimes literally transplanted) certain drugs into lucrative global commodities. Drugs that did not appeal to western European sensibilities were left to occupy a local/regional niche. He also identified a 'counterrevolution' that sought to restrict or prohibit some of those substances despite their medical and financial benefits, while leaving others legal, widely obtainable, and immensely profitable regardless of their undeniable physical and social harm. His theory is compelling, but the vast scope of his inquiry leaves considerable room for more in-depth studies that flesh out, branch out, or depart entirely from this broad theoretical and chronological framework.[2]

Other global histories highlight the central role of drugs in understanding the ways scientific knowledge and the use of drug commodities produced in colonial possessions presented both opportunities for and dangers to colonizers and colonial subjects. Blending botany and history, Londa Schiebinger argued that the desire to 'discover' and profit (commercially and medically) from new medical drugs was a key motivation for early modern exploration in the Atlantic world. Her particular focus on the

concealment by European physicians of New World abortifacients reveals the deeply gendered, racialized reality of colonial encounters.[3] Benjamin Breen also linked science and empire in the early modern era, but eschewed engagement with colonial labour regimes to focus on the ways that European cultural fears impacted colonial science (and vice versa), which then affected the ongoing process by which drugs were 'invented' and bifurcated into false dichotomies like legal and illicit, medical and recreational. At the same time, he described a 'reverse colonization in the world of drugs', with Europeans swiftly taking to New World substances like tobacco and chocolate, and then passing them along to colonies in places like Asia and Africa.[4] Marcy Norton investigated what it meant to Europeans to develop a taste for goods produced by 'the pagan 'savages' whom they had conquered'.[5]

Embedded in these global studies is an ongoing debate that has expanded the definition of drugs, broadened historical understanding of motivations to consume them, and thus led to bolder historical theorizing. Courtwright focused primarily on what he terms the Big Three (alcohol, tobacco, and caffeine), substances whose widespread use and acceptance make them relatively impervious to prohibition, and the Little Three (opium, cannabis, and coca), which became the target of numerous attempts at restriction and prohibition. But his latest work takes his analysis into the present, provocatively including processed snacks and digital technology in his definition of addictive substances and introducing his theory of 'limbic capitalism', which attributes increasing levels of addiction to the purposeful, profit-driven economics of pleasure or brain reward.[6] Breen expands the definition of drugs to include not only anything that altered the mind or body but also anything that was *believed* to do so, thus enabling a more in-depth examination of early modern scientific thinking. Both authors emphasize that their analytical eras (of addiction in one case and intoxication in the other) are ongoing, and both begin with the crucial caveat that taking drugs is a 'fundamental human impulse' free of stigma until contextualized by cultures and encouraged by profit seekers, important insights given the therapeutic origins of most substances we call 'drugs'.[7]

Two edited collections are illustrative of how the many works that examine those cultural contexts on a global scale can yield insights on local practices and prejudices, as well as global processes. The essays in Goodman, Lovejoy, and Sherratt's *Consuming Habits* posit that the only way to really understand drugs is to strip away the political meanings that enable their categorization and address them as commodities with different meanings acquired in different environments.[8] Mills and Barton's *Drugs and Empires* illustrates how and why psychoactive substances like opium, tobacco, cannabis, alcohol, and quinine shaped the ways that 'civilized' imperialist nations viewed and governed conquered peoples, facilitated the creation of both global drug markets and international drug control systems, and provided the economic motivation and fuel for empires in India, East and Southeast Asia, and Africa.[9]

In some cases, historians show how the qualities of specific drugs were used to validate colonialism and capitalism. Tea is a perfect example. Erika Rappaport argues that its sober, stimulating nature was responsible for perceptions of tea as a civilizing beverage that encouraged imperialism and the social and economy inequity that

imperialism generated.[10] It also specifically encouraged British efforts to produce tea in colonial India. Andrew Liu places the competition between Britain and China for the tea market at centre stage in the history of Asian capitalism and details the process by which British Indian tea production deliberately overtook the Chinese, altering the global and Chinese economies.[11]

Critiques of imperialism can sometimes conceal the reality that colonial systems of control were not entirely *under* control by colonial powers. Arguments that exploitative regimes could and did generate unanticipated sources of empowerment at all levels of production restore some agency to colonized peoples. For example, Heather Fowler-Salamini digs into the coffee export industry in Córdoba, Mexico, and argues that the largely female migrant labour force exercised considerable power to shape their working culture.[12] Jan Breman also documents producer agency as he traces the emergence of the Dutch East India Company's use of forced cultivation in Java to produce coffee for the expanding export market, and argues that peasant resistance was key in the eventual dissolution of the exploitative system.[13]

Taken together, these studies on drugs and imperial networks of commerce and labour craft a complex and sometimes contentious story of global drug trades that transcended geographical boundaries while shaping and imposing other political and cultural distinctions. At the same time, globalization (often but not always tied to imperialism) not only led to the 'discovery' and wider dissemination of drugs but also often initiated or reinforced a process of domesticating those substances among consumers and producers that contributed to the production of individual and national identity, the second major theme in recent historiography. Much of the scholarship represents a lively offshoot of the 'social life of things' approach pioneered by Kopytoff and Appadurai.[14] Here too, interdisciplinary approaches—primarily the incorporation of anthropological, sociological, and/or literary analyses—are crucial in illuminating the pervasive influence of drugs on culture-specific constructions of race, class, gender, and nationality. The academic dialogue on this theme of drugs and identity is less a debate than a conversation in which each new volume adds more analytical layers to our understanding of the socio-political roles and meanings of psychoactive substances by fleshing out the cultures of drugs.

One significant academic thread documents the ways in which colonialism was willingly incorporated into the identity of colonizers through drug consumption, even when consumers were geographically and culturally divorced from the regimes of production. The endurance of this phenomenon was brought home to me on a recent academic sojourn in York, England, where I was often encouraged to try the very popular 'local' brand of Yorkshire Tea. When I mentioned this to a British colleague, he asked, wryly, 'Did you not see the tea plantations on your way in from the airport?' Point well taken, and particularly well illustrated by Julie Fromer, who traces the process by which a beverage made from a plant grown in China and transplanted to India came to embody British national identity and middle-class character. The shift in the British palate preference from green to black teas was a deliberate strategy by British tea purveyors who claimed that tea produced under British auspices in a British colony

was safer and purer than the Chinese product. Tea produced by British colonial subjects nurtured British middle-class gender norms, as well as values of domesticity, moderation, and self-control, all while supporting the empire financially and ideologically.[15] Rebecca Corbett argues that in the tea-producing country of Japan, the beverage also linked domesticity and national identity, but this time as a way of reinforcing Japanese purity as the country sought to stave off Western imperialism and acquire an empire of its own. The tea ceremony, once a predominantly male practice, became part of the Meiji modernizing project that encouraged women to use and teach the ritual to establish harmony in the home, and by extension, throughout the nation.[16]

China was never colonized, but research on the domestication of foreign drugs like opium and tobacco—and the distinctly foreign practice of smoking—represents a striking deviation from earlier depictions of opium consumption as entirely destructive, nationally humiliating, and coerced by profit-hungry British traders. The shift has enabled historians to better understand why opium was so popular, what it meant to be a Chinese opium smoker, and how the foreign origins of opium complicated its impact on Chinese identity. It began with tobacco, an Amerindian practice that likely arrived in China in the sixteenth century on Dutch trading ships. Carol Benedict tells the story of Chinese domestication of global tobacco—a lengthy process that both fit into Chinese leisure practices and transformed them, in part through the gendered meanings of smoking.[17] Tobacco became a thriving cash crop in China and tobacco smoking also led to opium smoking. The globalized act of consuming opium through the imported practice of smoking not only set Chinese apart from other cultures that ingested the drug orally but also ironically inspired reformers to launch crusades against a very familiar drug that suddenly looked foreign and dangerous to them.

Opium meant many things to the Chinese, as recent histories reveal. Keith McMahon grapples with the ways that that opium sparked 'one of the first truly global crises of identity' by serving as financial prop for British imperialism and justification for Western reformist intervention, a luxury ritual with erotic connotations and a threat to social stability, and a symbol of Western domination.[18] For some Chinese smokers, however, it was precisely opium's foreign origins that made it appealing; even the Chinese word for opium (*yapian*) was a foreign loan word. Zheng Yangwen follows opium as it transformed from medicine to foreign article of leisure consumption that trickled down from elite connoisseurs to ordinary people, and acquired a stigma when it became embedded in China's popular material culture.[19] Alexander Des Forges argues that in cosmopolitan Shanghai, opium smoking meant pleasure, leisure, and danger.[20] Xavier Paulès takes readers inside Canton opium houses/dens, and provides much-needed context for understanding how and why public consumption of opium shaped patterns of sociability and created gendered spaces and rituals.[21] However, as anti-opium sentiment grew in the late nineteenth and early twentieth centuries, reformers condemned Chinese opium smoking as a traitorous practice that filled imperialist coffers, despite the fact that most of the opium consumed in China by then was domestically grown.[22]

Outside the framework of imperialist entanglements, recent scholarship teases out the ways in which drugs like alcohol and cocaine played a central role in shaping ethnicity,

gender, class, and national identity in producing cultures. Here again, we see how an interdisciplinary approach emphasizes the ways places and politics impact perspectives on drugs, and vice versa. David Carey's edited volume *Distilling the Influence of Alcohol* combines history and anthropology to look at the ways the production, consumption, distribution, and taxation of *aguardiente* (sugar cane spirits) promoted nation building and identity formation in Guatemala, where the commodity is produced, sold, and consumed.[23] Deborah Toner's *Alcohol and Nationhood in Nineteenth-Century Mexico* is an interdisciplinary analysis of the link between national progress and increasingly negative perspectives on drinking.[24] Collective drinking was initially celebrated as a quintessentially Mexican means of male bonding, but over time, drunkenness, particularly in public spaces that allowed the blurring of social boundaries, garnered government approbation and intervention. Marni Davis's fabulously titled *Jews and Booze* investigates the struggle of Jewish immigrants to the United States, especially those in the alcohol business, who found themselves up against a rising tide of Protestant temperance activism, despite the fact that (and probably because) Jews were expressly permitted to continue alcohol production and consumption for religious use during Prohibition. Antisemitism shaped American attitudes towards the complex involvement of the Jewish community in the legal and illegal alcohol trades and profoundly affected Jewish American identity.[25]

Coca and cocaine also constructed producer identity in the Americas, despite (and sometimes because of) cocaine's associations with cartels and crime. Thomas Grisaffi examines the ways in which the coca leaf symbolized indigenous identity through its long-standing cultural significance and more recent association with resistance to globalization and neoliberalism. That link with Andean identity created a dilemma for indigenous Bolivian President (and coca union leader) Evo Morales when faced with international pressure to comply with international agreements to control coca production.[26] In the Reagan era, crack cocaine was the most stigmatized drug in the United States, and David Farber takes an ethnohistorical look at not only unjust legislative consequences of the crack epidemic but also at the way illegal crack production and sales empowered some young Black men who would otherwise have been relegated to the economic sidelines, while stigmatizing female users.[27]

While seeking to extract the history of drugs from histories of the war *on* drugs has yielded extremely valuable insights about drug economies and cultures as noted above, many addictive, psychoactive substances are not considered ordinary commodities, and the politics of control constitutes the third important theme in recent drug histories discussed here. Research on the efforts to control those who produce, traffic, and consume dugs reveals a great deal about constructions of morality, social deviance, and frameworks of power, and thus has produced some contentious scholarly debates. Scholars who work on this topic use history to explain the evolution of attitudes and legal restrictions on particular psychoactive substances, such as opium, alcohol, cannabis, and cocaine, and most of the time the explanation rests less on the actual harm caused by a drug than on prejudices directed at certain users. At the forefront of efforts to control intoxicants in the nineteenth and twentieth centuries were religious reformers,

regularly supported by colonial administrators and medical professionals. Each of these often well-intentioned groups viewed habitual or excessive use of drugs as undermining their duty to regulate public morals or public health and straddling the thin line between disease and deviance.

Much of the newer history of drug control seeks to demonstrate the process by which the opprobrium attached to alcohol, tobacco, cannabis, cocaine, and opium—all admittedly addictive and potentially harmful—was socially constructed. Virginia Berridge looks at the evolution of British attitudes and takes direct at aim at the idea that legal restrictions reflect a rational assessment of which drugs pose the most risks to individuals and society, and at the very notion that drugs can be assessed rationally or ahistorically. She points out that although the medical uses of alcohol, tobacco, opium, and cocaine, and to a lesser extent, cannabis were all once socially accepted, production and consumption of the first two (despite their demonstrable harm) were permitted to continue with only mild restrictions while the other three became the objects of intense social concern and governmental control efforts. She also proves that attitudes are fluid, as social/legal approaches to all five substances have begun to converge once again.[28]

Sometimes, however, the qualities of a particular drug triggered regulatory responses. Alcohol's medicinal benefits have been embraced for millennia, as have its roles as social lubricant and ritual, but drunkenness—especially among marginalized groups—has long prompted moral condemnation, neuroscientific investigation, and legal controls, often in that order. James Nicholls emphasizes that 'drink has always existed both as an activity and as a set of questions' and reinforces the overarching theme of this chapter that drugs cannot be understood outside the broader cultural and historical context.[29] That context established what kind of alcohol people consumed, where it was produced, and how, when, where, and why they drank it. In England, domestic alcohol production was profitable and patriotic until the eighteenth-century gin craze inspired reformers to think of excessive alcohol consumption as a disease, albeit one that mainly affected the poor. That set in motion a rethinking of the links between drinking, morality, and madness that involved medicine, religion, and philosophy and eventually gave rise to the Victorian era temperance movement, which in turn gave way to a public health approach that supported the British pub while trying to encourage responsible drinking.

Historians also highlight how the deep social roots and addictive properties of some drugs made them the ideal tool of government control and corporate profit-making. Mark Shrad argued that for centuries the Russian government promoted and exploited (politically and financially) mass alcohol abuse in the general population.[30] The essays in William Jankowiak and Daniel Bradburd's *Drugs, Labor and Colonial Expansion* are global in scope but deal predominantly with the ways in which alcohol and tobacco in particular were used to control and reward the colonial labour forces that produced those substances. Historians like John F. Richards and Rolf Bauer debated whether or not Britain's opium monopoly in India empowered or impoverished peasant farmers, as discussed below.[31]

In contrast, Paul Gootenberg's sweeping *Andean Cocaine* is in some ways a story of producer initiative, albeit within a criminalized context. He used Peruvian history as

the 'glocal' lens through which he examined how a leaf with deep roots in indigenous Andean culture became valued for its medical properties and then globally condemned as the centre of a thriving illegal trade. Unlike so many other psychoactive commodities from the New World, cocaine 'is the one global drug culture based entirely on Latin American initiative, culture, and resources—hence, in many ways, all sensationalism about drugs aside, cocaine is now South America's most emblematic product'. Like other drugs, however, Gootenberg argued that it was race-based North American panic about Black cocaine use that began the attitudinal shift against cocaine.[32]

A growing consensus against certain intoxicants compelled governments all over the world, particularly after World War I, to stake their moral and legal authority on their ability to support international, global efforts to control trafficking, oftentimes despite their own profitable involvement in the drug trade. James Mills argued persuasively that colonial anxieties were largely responsible for anti-cannabis legislation in modern Britain. Cannabis use and abuse were uncommon in Britain, but widespread production and consumption of *ganja* in British India generated concern and debate among British physicians about the link between cannabis, crime, and insanity. Ironically, he also proved that British participation in a League of Nations anti-opium convention led to the banning of the drug, against British wishes, since the tax revenue from its cannabis monopoly in India was considerable.[33]

While many recent historians have moved beyond a focus on the war on drugs, only a few investigate the global history of war *and* drugs. They include Łukasz Kamieński and Peter Andreas, with the latter analysing how certain globalized drugs funded and sparked military conflicts, fuelled and calmed the soldiers who fought them, and eventually generated the need for militarized force to combat drug trafficking.[34] The links between war, drugs, and labour history (for example, Japanese conscription in East and Southeast Asia during the Second World War) have yet to be fully researched, although John Jennings' *The Opium Empire* and Norman Smith's *Intoxicating Manchuria* are a good start.[35]

Global drug-control efforts in the nineteenth and early twentieth centuries were first directed at the 'problem' of Chinese opium smoking but also, by extension, the Indian source of their supply—while at the same time there was also a thriving commerce in Middle Eastern opium from Anatolia and Persia, the higher morphine content of which fed demand in the West, but which was also extensively traded in Asia. The image of the passive, prone Chinese opium smoker was uniquely situated to appeal to the sympathies of predominantly Protestant and Quaker reformers, while simultaneously triggering Orientalist fears. Steffen Rimner argued 'the chief criticism [of the early anti-opium crusaders] was reserved for producers, not consumers'. Through transnational activism and dissemination of narratives and images of drug-related victimization in China, historians explore how anti-opium reformers provided the impetus for states to construct global drug control systems.[36] Lin Man-Houng asserted that British reformist rhetoric even altered Chinese attitudes towards the drug.[37]

The academic debate over why attitudes towards a drug as globally ubiquitous as opium changed, and what the most significant consequences of that change were, has

been especially acrimonious among historians of opium in China. Some have examined the form, efficacy, and impact of attempts to prohibit opium production and consumption, while others deny the existence of an opium 'problem' and thus any need for control. Most Chinese historians take the Opium War (1838–1842) as the beginning of China's long 'century of humiliation', condemning British attempts to reverse their trade deficit with China by smuggling opium and deliberately addicting a nation too weak to resist. In response, recent work outside China has sought to restore Chinese agency by documenting Chinese attempts to control opium production and consumption under different twentieth-century regimes. For example, the present author has documented the surprising progress of the late Qing/early Republican anti-opium campaign, spurred on by rising nationalism within the state and among nonofficial reform groups. Alan Baumler revealed the unsung success of the Nationalist Party's Six-Year plan (begun in 1935) in balancing the need for revenue and moral objections to opium use and distinguishing between casual and 'hard' drug use and users. Zhou Yongming provided the first English-language analysis of the Maoist anti-vice campaign in 1952. These works also reveal deep Chinese involvement in opium cultivation, distribution, and sale but accept the premise that opium constituted a serious problem in China.[38]

Dikötter, Laamann, and Zhou disagreed, condemning what they see as the sensationalizing of opium consumption and demonizing of consumers, many of whom smoked only socially or for medical reasons. They argued that the 'opium plague' that prompted Chinese and international intervention was a narcophobic myth, and they made the provocative assertion that the coercive, punitive prohibition of opium was worse than its widespread use.[39] Their work built on Newman's earlier argument that the subjective, moralistic perspective of Western missionaries resulted in gross exaggeration of the extent and harm of Chinese addiction. Newman asserted that moderate social and medical consumption was far more common than debilitating addiction.[40] These works constitute useful correctives to the assumption that all Chinese smokers were addicts and all addicts were dysfunctional, but opium consumption was not harmless and opium production came to be seen as the source of the problem.

Opium and the British, Indian, and Chinese Opium Trade

The shifts in global perceptions of and policies towards opium smoking in the late nineteenth and early twentieth centuries were complicated by the fact that opium poppies were cultivated in both India and China. This case study examines how different relationships between the state and poppy farmers produced different responses to disruptions or even potential disruptions in the flow or legal status of opium. In India, a British government commission sent to investigate the possibility of ending the colonial monopoly prompted intense efforts by colonial landowners and bureaucrats to defend

the trade, whereas in China, a national anti-opium campaign pushed some independent poppy farmers to violent resistance. The analysis that follows diverges from popular commodity history approaches stressing the 'social life' of goods and identity formation, or the creation of trade networks or regimes of control. Here, the focus shifts from the construction and sustaining of those networks to the consequences of uprooting the vested interests they fuelled. This is a story about the pains of withdrawal from a drug trade framed by British imperialism and carefully watched by the world, and it reveals a keen awareness of both the rhetorical and agricultural production of opium by everyone involved.

The British imperial enterprise in Asia initiated the lucrative India-China opium trade and promoted its expansion but also oversaw its eventual dismantling. Inspired by the British desire to satisfy their demand for Chinese tea and other products by satisfying Chinese desire for Indian opium, British traders infuriated the Qing Dynasty (1644–1912) by smuggling the Indian drug into China. When China pushed back, the Opium Wars of 1839–1842 and 1856–1860 proved catastrophic for China. The resulting triangular opium trade became so profitable that China eventually legalized (and taxed) poppy cultivation, and by the 1880s and 1890s, the resultant increase in Chinese opium production caused the dramatic reduction of exports from India and fear for the future of the trade among British and Indian colonial officials. Of particular concern was the massive, opium-producing and -consuming Indian labour force whose well-being theoretically embodied the ethical and economic rationale for empire. That rationale was challenged at home and abroad by a rising tide of anti-opium sentiment that coalesced in the formation of the Royal Commission on Opium (RCO) in 1893.

Prompted by the tireless lobbying of the Society for the Suppression of the Opium Trade (SSOT), which actively sought to end what it deemed an immoral trade[41], the ruling Liberal Party charged the RCO with investigating the impact of opium consumption in India and whether or not prohibition of opium exports, as well as of the cultivation and sale of opium for non-medical purposes, was advisable, affordable, and popular in British India and the so-called Native States.[42] The nine-man Commission conducted interviews in London, India, and Burma in 1893–1894 with over seven hundred witnesses, mostly non-Europeans. The testimony and report were published in 1895 and the RCO's conclusions revealed the British and Indian governments' deep concern about potential social and economic consequences of dismantling the opium monopoly, as well as the recognition that this was an important chance to shape public opinion. The RCO interviews immediately became a battleground on which anti-opium reformers and colonial opium growers and exporters fought to establish the primacy of their own narrative, although the playing field was not level. The Government of India took charge of recruiting witnesses, but left the soliciting of anti-opium witnesses to the SSOT,[43] and pro-opium witnesses far outnumbered those put forward by the SSOT.[44]

When the hearings began, reformers, mostly Protestant missionaries, highlighted the sinful consequences of the trade by testifying to the ravages of addiction in China, even though China was outside the purview of the RCO. Officials and landowners in India insisted that opium played important, positive roles in the domestic medical, social,

and economic arenas by enabling Indian cultivators to fulfil their familial, communal, and colonial responsibilities.[45] The reformers' relentless focus on morality resulted in arguments supporting the trade and the Indian bureaucracy that sustained it often being carefully couched in paternalistic language justifying India's opium economy. For example, the RCO concluded that prohibition 'would inflict a very heavy loss of public revenue on the Government and people of India', and likely result in 'punitive and inquisitorial measures'[46] to contain continued domestic demand.

The continuation of monopoly-regulated cultivation and sale of opium, felt pro-opium witnesses, would help ensure the orderly, hard-working, healthy labour force that was key to the production not only of opium poppies but also other crops that sustained the empire. Debates then and now raged over whether the monopoly was coercive and how profitable poppy cultivation really was for poor Indian peasants who farmed for the monopoly.[47] However, the substantial revenue the poppies generated unquestionably supported large landowners and the colonial opium bureaucracy. The British Empire was at its heart an extractive economic enterprise, and the RCO ultimately seemed far more convinced by testimony denying the notion that the popular use of opium by Indians was harmful than that which explored the exploitative nature of the colonial monopoly. Implicit in that calculus was the spectre of 1857, the fear of social outrage and unrest should prohibition be implemented.

India produced and exported two types of opium: Bengal (also known as 'Patna' and 'Benares'), the closely controlled product of the British colonial monopoly formalized in 1799, and Malwa, grown in the so-called independent Native States of western India and controlled only through taxation as it passed through British territory to Bombay for export. The cheaper Malwa drug had presented serious competition for the China market in early stages of the trade, but by the late 1870s increasing cultivation of the domestic Chinese product had reduced demand for Malwa.[48] The RCO concluded that British attempts to extend a policy of prohibition into the 'Native States' would constitute an unjustifiable degree of interference with local administration and social customs that could upset the delicate political balance.[49]

China dominated the export market for the Indian drug[50], and because Bengal opium remained the gold standard, highly prized by wealthy Chinese, many witnesses to the RCO explained that it was imperative that the quality and price of opium produced for the Bengal monopoly remain high. Thus, opium production was confined to about 500,000 acres in parts of the Punjab and Rajasthan, and prohibited without a license in other parts of British-controlled India. Approximately 1.2 million small cultivators sold their poppies to the monopoly in 1892–1893[51], although that number represented only the heads of households to whom a poppy-growing license was granted.[52] Every step in the opium cultivation and manufacturing process was strictly controlled and monitored by a multilayered bureaucracy called the Opium Department designed to regulate the quality, quantity, and price of a cash crop so lucrative that only the land and salt taxes brought more revenue to the colonial state.[53]

RCO witnesses debated the advantages of poppies as a crop, as well as the degree to which poppy cultivation was voluntary or coerced. Eighty-eight witnesses were

classified as landowners and tenants, with the latter vastly outnumbered by the former.[54] Most large landowners testified that they supported the opium trade because it allowed them to impose and collect higher rents from their poppy-growing tenants, which in turn enabled the landowners to pay their taxes to the colonial authorities. The distribution of well-timed, interest-free cash advances by monopoly agents to poor farmers who planted poppies facilitated that process. Maharaja Pratap Narain Singh offered a typical perspective when he testified, rather disingenuously given his *talukdar* (estate owner) status:

> We cannot overlook the advantages which the present system secures to the needy cultivators by way of advances made in a time when they are most in need of money to pay off their rents due to the *talukdars* and *zemindars* [landowners]. These advances secure to the *zemindars* the realization of rents without much difficulty, and as a matter of consequence, the Government revenue is as well safeguarded.[55]

Most Indian and British landowners also praised the ritual and medical benefits of moderate opium consumption, which they said prevented fatigue in labourers and was used to treat a variety of common ailments.[56]

Landowner worries about potential prohibition were generally couched in paternalistic concern for poor tenant farmers. Some anticipated that rural poverty would increase because subsistence crops like grains brought a lower price.[57] Many landowners warned that if opium became unavailable, poor Indians would turn to alcohol[58], a substance roundly condemned by Indians and British as having far more detrimental effects on body and soul. One British landowner made what we can assume to be a deliberately provocative prediction that, without monopoly oversight, more farmers would plant poppies, and 'there would be a possibility of the people of this country taking to opium in the same way as the Chinese'.[59]

The few *ryot* (peasant farmers) who testified indicated that they did not profit from poppies, that the crop was extremely labour intensive, and that they dared not refuse to plant it 'Because we are poor people, and it is the order of the Government that we should cultivate poppy'. One peasant witness complained that the *zilladar* (monopoly patrol officers) uprooted the wheat he had planted and forced him to grow poppies, and several other witnesses claimed to have seen *zilladar* uproot the crops of those who refused to plant poppies.[60] Most landowners insisted that peasants willingly cultivated poppies, but one *zemindar* confessed that he knew his *ryots* planted the crop at a loss, and blamed *zilladar* oppression. The RCO pushed back, noting, 'The *zilladars* are very petty officials, are they not?' to which the witness responded, 'Yes; but they are dreaded by the *ryots* much more than a Magistrate is dreaded in the town'. He claimed that he had received a letter pressuring him to compel poppy cultivation, which the RCO seemed to discount when he could not produce the document. He did present the RCO with a petition signed by 315 peasants from three of his villages, stating that they did not plant poppies voluntarily.[61] Pressure from landlords who might rent their land to more amenable peasants, fear of the *zilladars* who patrolled the villages for the government

monopoly, and a recognition of their own low socio-economic status all combined to create and sustain what Bauer argued was a coercive system.[62] Richards countered that 'any definitive answer [to the coercion allegation] is not possible', but asserts that there were advantages to poppy cultivators in the interest-free loans.[63]

The Commission ultimately concluded that the trade and monopoly system should continue because prohibition would destroy the lucrative trade with China, and asserted that testimony had been 'unanimous that the people of India would be unwilling to bear the cost of prohibitive measures'.[64] Anti-opium activists were stunned and irate, and accusations of whitewashing have dogged the RCO to the present day. Richards challenges those accusations, asserting that reformers (mirrored by modern historians) were practising 'cultural imperialism' by exaggerating the harms of opium consumption and did not wish to acknowledge that their desires and perceptions were not shared by the people of India.[65] It is worth noting that RCO member Henry J. Wilson filed a scathing Minute of Dissent that echoed the complaints of the *ryots* (and Bauer) described above.[66]

The composition of the RCO and the way its mission was framed precluded a full investigation into the ways in which domestic production rather than domestic consumption may have harmed the people of India.[67] At this particular moment in history, the economic imperatives of monopoly and paternalistic rhetoric of empire outweighed growing moral indignation over the opium trade and shaped the narrative that won over most members of the RCO. In conclusion, said the RCO, 'it would not be right or fair to the people of British India for the British Government to destroy, unasked by China, the Bengal opium trade'.[68]

Shortly thereafter, China did precisely that by launching a nationwide anti-opium campaign, and in 1907, Great Britain signed the Anglo-Chinese Opium Agreement committing to gradually reducing Indian opium exports to China over the ten years of the campaign until the trade concluded. When it did, Owen noted that 'Bengal growers . . . took to other crops with an alacrity that was almost embarrassing', and the Raj worked carefully to wean the 'Native States' from Malwa profits without social disruption.[69] Some Chinese opium farmers, however, were less cooperative, and the 1907 Agreement and its subsequent revision in 1911 contributed to violent resistance against government officials when small-scale poppy cultivators tried to defend their livelihood. And in China, as in India, British investigators brought those tensions to the surface.

By the last decade of Qing Dynasty rule, opium had become synonymous inside and outside China with Chinese decline and imperialist domination. Many histories of opium, Chinese and non-Chinese, stress the ways in which greedy British merchants ignored Chinese laws and profited from the spread of addiction. By the end of the nineteenth century, however, Chinese opium production had far outpaced Indian imports, and constituted the cornerstone of a thriving domestic opium economy that proved as addictive to government and cultivators as the drug itself. When China began taxing poppy cultivation a decade earlier, the rationale was that the revenue would bolster the Qing treasury and allow the state to gain enough control over the commodity that it

could eventually be eliminated.[70] That claim was tested in 1906, when the Qing launched the campaign that aimed to eliminate the cultivation, consumption, and sale of opium in ten years. The ambitious policy reflected progressive, nationalist reform sentiment within the state and elicited considerable support from local officials and non-official elites. However, active resistance on the part of many Chinese poppy farmers revealed the depth of popular anger at government intrusion through the increased taxes and coercive measures that accompanied this and other noble-sounding post-Boxer Rebellion reforms.[71]

The campaign was complicated by the involvement of the British government and the 1911 Revolution. British cooperation was imperative because Chinese authorities did not want the elimination of home-grown opium to be undercut by increased imports from India. The British proved much more receptive to Chinese overtures in 1906, when the combination of a Liberal government in Britain, growing international anti-opium sentiment, and a steady decline in imports to China, led to the 1907 Agreement. But the British were sceptical about Chinese sincerity and competence and insisted that the status of the campaign be assessed in 1911. By that point, Chinese progress was so striking that the renegotiated agreement included the proviso that Indian opium imports would be prohibited from entering any province declared free of poppy cultivation by teams of British and Chinese inspectors.[72] Surprisingly, the campaign survived the shift from dynasty to short-lived Republic in 1911–1912, but many Chinese farmers took advantage of the transitional chaos to plant poppies.

The renegotiated agreement meant that preventing the legal importation of Indian opium into a province hinged on convincing the roving inspection teams that poppy cultivation had been eliminated, and many Chinese officials shifted their focus accordingly. They tended to view eradicating poppy cultivation as the most challenging component of the campaign because it often involved the (literal) trampling of vested agricultural interests in remote areas. Shutting down opium dens in the towns and cities and publicly burning opium pipes were not the same as uprooting the lucrative crop and confronting farmers and villages whose livelihoods depended on it. 'The destruction of plants, homes, and fields was not an occasion for public celebrations' like the parades and rallies that often took place in urban areas.[73] Without a monopoly like the one in British India that fixed production quotas and prices, many peasant farmers in China chose to grow poppies as a cash crop, and they were not pleased to have their investment of money and labour threatened.

Lucien Bianco uncovered at least seventy-six incidents of peasant resistance to opium suppression in the decade 1907–1916, which coincided with the anti-opium campaign,[74] and Lin Man-houng also documented numerous cases of peasants who rioted and attacked government soldiers and officials.[75] Most took place in the major poppy-growing provinces, where violence was preceded by passive resistance strategies like concealing poppies or diverting inspectors with bribes. Peasants only reacted with violence, argued Bianco, when local policies changed unexpectedly, when uprooting took place just as the labour-intensive crop was about to be harvested, when bribes were taken and ignored, or when the official response seemed heavy-handed. During the 1906–1915

campaign, Bianco concluded, 'resisters were more upset by the attack on opium as their livelihood than by abuses and exactions'.[76]

Those provincial and local Chinese leaders who managed to wipe out production with minimal resistance before 1911 adopted approaches that included taking peasant concerns seriously. By 1904, Sichuan province—China's largest opium producer and consumer—was producing 'four times the amount [of opium] imported from India',[77] and the drug was deeply entrenched in the provincial economy and society. Judith Wyman detailed Governor General Zhao Erxun's plan to achieve eradication *and* address peasant needs. He proposed distributing grain seeds to farmers to encourage food crops, publicizing campaign policies, bringing the sale and distribution of the drug under government control, and establishing 'a strict system of rewards and punishments'.[78] Rather than destroy crops on the verge of harvest, he ordered that no new poppies be planted and dispatched teams of officials to supervise. Local officials administered both carrots and sticks (actually, bamboo rods). But by June 1911, Chinese and foreign reports agreed that poppies had largely been eradicated in Sichuan with minimal violence, although officials suspected that many farmers were hoarding poppy seeds.[79]

Poppy farmers in the coastal province of Fujian did precisely that immediately following the Revolution of 1911, sparking China's most destructive opium-related uprising. Fujian's poppy crop was quite small compared to that of Sichuan, but the farmers had a reputation for belligerence, and, like many Chinese peasants, they felt that the officially celebrated New Policy Reforms (including the anti-opium campaign) were more about government attempts to increase taxation, state intervention, and the power of local elites, than improving ordinary people's lives.[80] By 1908 or 1909, villagers in Tongan county were resisting their local magistrate's efforts to enforce the ban on cultivation, and he cracked down hard, sometimes burning entire villages for violations.[81] The most violent revolt erupted in nearby Xinghua prefecture; led by a charismatic local named Huang Lian, it claimed hundreds of lives and represented peasant disillusionment with a revolution they had hoped would end the costly, unpopular reforms.[82] In 1912, Huang Lian promised to protect local poppy fields for a fee and to end taxation of those fields. He also allegedly invited a local addict to consume the drug publicly to assuage public doubt.[83] Provincial troops sent to engage the rebels unleashed so much violence that popular anger turned against Chinese Christians and the foreign missionaries who were blamed for summoning the soldiers.[84] British and Chinese investigators declared the province free of poppies in 1914, although the increasingly unstable political situation in China discouraged a rigorous inspection. The inspectors simply took the word of local missionaries in some areas, and at one point, they ran into the head of Fujian's Anti-Opium Bureau working frantically to uproot poppies before the inspectors arrived.[85]

The fear of popular resistance to prohibition that pervaded much of the testimony offered to the RCO in 1893–1894 came to pass in China during the 1906–1915 anti-opium campaign. The rapid collapse of the Republic in 1916 effectively ended prohibition efforts, and opium poppies flourished once again. Ironically, China's descent into decades of warlordism and warfare (1916–1949) meant that many farmers were forced

to plant poppies against their will to afford exorbitant taxes imposed by local power holders, and these farmers also sometimes reacted with violence. And 'as imperial Britain extricated itself from the nineteenth-century opium regime it had operated in China, imperial Japan began to assemble its own', using its colonial and extraterritorial strongholds, first in Taiwan, Tianjin, Kwantung, and Korea, and later in the puppet regimes of Manchuguo and Mengjiang.[86] Not until another national campaign under the new Communist regime in 1952 was Chinese opium cultivation halted.[87]

This case study of producer resistance to the prohibition of opium, envisioned in British India and experienced in China, emphasizes the deep roots of each country's opium economy and the complications stemming from those economies' origins in a colonial trade network. Methods of production often reveal important strengths or weaknesses in the political, social, and economic structure of the producing societies. Drug production can entail both exploitation and economic opportunity, which adds needed nuance to overly moralistic or deceptively naïve discussions of the impact of psychoactive substances.

Conclusions and Directions for Future Research

This chapter has explored some of the most compelling new approaches to the history of drugs, but there are always topics that would benefit from further research. For example, work on the relationship between drugs and diasporas on a global scale and investigations into the environmental consequences of drug production could be especially relevant. Scholars might further conceptualize drug production as representative of the divide between Global South and North, and far too little work has traced the symbiotic links between pairs or combinations of drugs (coffee and tea, smokable drugs and alcohol, etc.) that promoted their own particular patterns of production, consumption, and control. There will always be new drugs and new waves of excitement, panic, judgement, and profit-mongering to contextualize; and, although the current opioid crisis remains largely the subject of journalistic exposés, historians will (and should) soon turn their analytical lens on the corporate-medical construction of pain.

Work on global trade and colonialism generally focuses on the making of the modern Western world, beginning with the Columbian Exchange and later the Dutch, British, and (to a lesser extent) Japanese empires, which tends to erase or obscure the role of earlier trade networks and empires in the spread of psychoactive substances. For example, the flow of goods over the Silk Roads, prior to but especially during the Ottoman and Mongol empires, facilitated the spread of many drugs from east to west and vice versa, including many forms of alcohol and myriad pharmaceuticals. In addition, China's tribute system—largely analyzed in the context of its symbolic value, especially in the post-Mongol era—would also benefit from further study of the ways in which

it facilitated trade in spices and other medicinal/psychoactive substances in the Indian Ocean region. More recently, the French colonial legacy that contributed to making Vietnam the second largest coffee-exporting country in the world, generating economic and cultural consequences, is ripe for historical analysis.

Additionally, as long as wars on drugs continue, so must scholarly debates as to their costs and utility, as well as the ongoing consequences of the cultural production of drugs and addiction. Brutal wars against drugs are being waged in Cambodia, the Philippines, Afghanistan, and the Americas. At the same time, the fear of widespread addiction and crime has resulted in the withholding of painkillers in South Asia and much of Africa, to the detriment of many people in the throes of terminal illness.

Historians of drugs know that the topic is as diverse and addictive as the substances themselves. The evolving history of drugs as commodities has allowed drug history, long focused on the impact and morality of addiction and its causes, to travel more fruitful paths that illuminate and the ways that the production of various psychoactive substances have been linked to the spread of global capitalism and the establishment and endurance of extractive colonial regimes, as well as how diverse social and political contexts 'produce' drugs and drug problems.

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CHAPTER 24

CULINARY COMMODITIES

Global Foods, People, and Cuisines

ELIZABETH ZANONI

A commodity-history perspective produces global food histories, histories inextricably linked to the often simultaneous processes of voluntary and forced migration, trade, empire- and nation-building, industrialization, and capitalism. Recent research has challenged popular global food histories that tend to downplay the time- and place-specific political, legal, economic, and cultural contexts that have permitted or inhibited the mobility of food, as well as food producers and consumers.[1] Rather than simply disperse throughout the world, foods move within and through on-the-ground complex and often unequal social relations, labour and political regimes, technologies, and infrastructures. Because the processes underpinning our modern food system are inherently global, histories of food commodities cannot be written from solely nation-centred perspectives. Indeed, the global nature of foodstuff, historians have shown, reveals tensions between the various geographical scales (local, regional, national, and global) and frustrates claims of culinary authenticity—claims often used to exclude or include people legally, socially, and culturally.[2]

This chapter provides an historical and historiographical overview of food histories that have explicitly or implicitly engaged with a commodity-history perspective. These food scholars have historicized modern food systems by detailing the commodity chains that moved, and continue to move, food from 'farm to fork'.[3] The best of this historical research embeds food commodities in their broader economic, political, social, and cultural milieu to uncover and analyse connections between the local and the global and to reveal the varied and often uneven consequences of food production and consumption on labourers, consumers, and the environment. Since much of this research has emerged out of a recognition that commodities follow the paths of moving people, the first section focuses especially on the interconnected movements of food items and migrants that drive global commodity chains. Historical research has also highlighted the power dynamics—racial, class, nationality, and gender—underpinning commodity circulations. These dynamics, often controlled by elite political and cultural

gatekeepers, have produced just as many physical and social barriers to the movements of food and people as they have opportunities for mobility. The chapter then turns to the Pini family—migrants from Italy who arrived in Buenos Aires, Argentina, in the mid-nineteenth century—opened what would become one of the largest wine and spirits establishments in South America. This case study reflects on principal historical and historiographical themes in food-commodity scholarship and suggests how a commodity-history perspective situates food and beverage producers and consumers at the crossroad of overlapping global forces such as transnational migration, international trade, and geopolitical shifts. Finally, a short conclusion reflects on future directions in the field of commodity history.

Human Mobility and Food History

Food commodities come into existence and circulate around the world due to the actions, desires, expertise, and exchanges of mobile people, reminding us that global commodities are often rooted in histories of migration. During what historians call the Age of Mass Migration, from about 1850 to World War I, millions of people left major sending areas like India, Southern China, Northeastern Asia, Russia, and Europe for labour-hungry receiving destinations in the Americas, Southeast and Central Asia, Manchuria, and Siberia.[4] Preceding and simultaneous to these well-studied late nineteenth- and early twentieth-century movements of mainly voluntary labourers were short- and long-distance migrants of many other kinds—hunter-gatherers, empire builders, enslaved people, labour migrants, merchants, sailors, and tourists—all of whom served as protagonists in global food histories as producers, sellers, and consumers and as carriers of ingredients, knowledge, and eating customs.[5]

Mobile people exerted different levels of agency over the foods they produced and ate, with enslaved people and imperial subjects exercising the least control over the very food systems that their labour sustained. Still, as Judith Carney, Frederick Douglass Opie, and others have argued, even enslaved Africans transmitted cultivation techniques for crops such as rice to the Western Hemisphere; the 'soul food' they pioneered—a cuisine combining African and European food traditions with those from the Caribbean and Southern United States—evidences control, albeit limited, over their evolving foodways.[6] As historians of the early Atlantic and Pacific worlds have shown, some of the first global foods—sugar, wheat, and tea—rested on a global division of labour in which exploited, usually involuntary labourers produced agricultural goods that were transported, processed, and consumed in imperial metropoles far away.[7] Food commodities, however, also travelled in the other direction, especially as European elites in colonial outposts, from Singapore to Belize City to Calcutta to Mexico City, used imported foods from home like European wine and wheat flour to maintain racial and class divisions between colonizer and colonized and as civilizing agents.[8]

The food exchanges brought on by the Columbian Exchange that so radically altered the diets and nutrition of people worldwide built on earlier trade in spices and other foodstuff between Europe, the Middle East, Asia, and Africa during the Medieval Period.[9] However, the global food networks inaugurated during the Middle Ages and early-modern period intensified over the eighteenth and nineteenth centuries with the maturation of industrial capitalism. Technological advances in agricultural production, manufacturing, transportation, and refrigeration; new sources of power like electricity; increased access to capital leading to the growth of trusts and corporations; revolutions in management, distribution, and advertising; and a growing market of consumers for processed foods meant that by the early nineteenth century, increasing numbers of eaters around the world were interacting with the same or similar industrialized food commodities. Food historians have employed a commodity perspective to historicize our modern food system in ways that situate comestibles in their larger economic, political, and cultural context; make links between multiple geographical scales; and render visible the wide-ranging and usually asymmetrical effects of food production and consumption on producers, consumers, and the natural world.

Some have accomplished this by focusing on single food commodities such as pineapples, beef, bananas, tomatoes, or cod.[10] Tracing the travels of a single commodity can lead readers to geographically and temporally expansive world histories, as Gary Okihiro does in his study of the pineapple. Okihiro employs the fruit to explore the material and discursive underpinnings of empire, an empire that produced knowledges about tropical and temperate places and people that were used to justify imperial exploitation in the form of discovery, conquest, and labour management.[11] Similarly, geographer Susanne Freidberg embeds the green-bean industry in Africa and Europe today in histories of colonial domination. She shows how French and British importers and European cultural expectations about food 'goodness' and civilized agricultural practices, rather than African bean producers, dictated the production and regulation of beans in Burkina Faso and Zambia.[12] A similar neo-colonial relationship guided the development of commodity chains in bananas from Honduras to the United States in the nineteenth and twentieth centuries. John Soluri combines an agro-ecology and 'commodity web' approach to uncover the multiple, interconnected factors and agents that shaped the banana industry, notably politically and financially powerful foreign-owned companies like United Fruit Company, Honduran growers, and US-based consumers, retailers, and supermarkets. American demand for particular banana varieties led to unsustainable mono-cropping and widespread use of fungicides, which had a deleterious effect on workers' health and the environment. Heidi Tinsman also connects producers and consumers in her study of the transnational grape industry in Chile. However, the largely female Chilean grape growers she studies emerge as labourers as well as consumers in ways that granted them some influence over Chilean dictator Augusto Pinochet's regime and US-Chile economic and political relationships.[13] As these scholars have illustrated, food commodities—on their path from production and consumption—do not travel the world divorced from geopolitical inequalities and changing cultural norms.

Other scholars have considered food commodity chains through the medium of a single city to disclose how urban food systems shape and are shaped by global and local flows, processes, and dynamics. Richard Graham, for example, turns his focus to the city of Salvador in the Northeastern Brazilian providence of Bahia, detailing the vital role played by enslaved men and women, poor whites, and colonial elites as labourers, traders, entrepreneurs, sailors, and cattle drivers in provisioning the city with foodstuff amidst malleable class divisions, changing regulatory regimes, and the Brazilian independence movement. The makers and vendors of street food depended on small-scale, locally based vegetable and fruit production as well as on far-flung regional networks in staples such as manioc and beef.[14] Micro-level analyses of cities and markets remind us that global food commodities depend on local hubs embedded in and guided by particular economic, social, and cultural systems. Anthropologist Theodore Bestor characterized the Tsukiji fish market in Tokyo, Japan as 'the fish market at the center of the world', the largest wholesale fish and seafood market until its relocation in 2018. Tsukiji, lodged firmly in Tokyo's built environment and in Japanese culinary traditions and techniques, depended on an international web of auctioneers, fisherman, dock workers, sushi chefs, and fish eaters.[15]

Privileging linkages between movements of people and commodities allow for food histories of singular global cities but also of national cuisines that extend beyond the nation state to be shaped by overlapping local, regional, and global foods, traditions, and historical processes. They also raise interesting questions about when, how, and under what conditions food commodities become part of a cuisine—a system of cooking methods and dishes that employ a repertoire of particular ingredients to create tastes linked to place, identity, and belonging. While constantly in flux, cuisines connote more than simply the foods themselves or cooking. Instead they involve making foodstuff edible in meaningful ways that link to histories, and to collective identities based on ethnicity, gender, religion, region, and nation.[16] Scholars writing histories of national cuisines have identified the cultural, political, and social consequences of food commodity chains by following agricultural goods like yams, corn, and chili pepper and industrialized foods like canned tomatoes, soy sauce, noodles, and jarred curry paste from the fields and factories where they are produced to the kitchens, homes, restaurants, and street markets where they are manipulated into something that is palatable and symbolic. They have also described national cuisines that have been altered equally by local and national food staples and traditions as they were by global transmissions of products, migrants, and ideologies.

Jeffrey Pilcher's research on Mexican foodways, for example, shows how dishes understood to be distinctly Mexican today—mole, tamales, tortillas, tacos—are the result of long-standing contestations over class, race, and gender brought on by Spanish and European colonization, national modernization campaigns, and the movement across oceans and borders, especially the US-Mexico border, of commodities, labourers, and tourists.[17] George Solt shows that ramen, so representative of Japanese cuisine, has its roots in the wheat noodles brought to Japan by Chinese migrant port workers in the nineteenth century but that became popular nationwide only after World War II and

during food shortages under US occupation.[18] Migrants of all kinds—Europeans during the colonial era, enslaved Africans before and after independence, and working-class migrants from all over the world—are also central to Donna Gabaccia's history of US foodways: American cuisine, characterized sometimes as a multi-cultural smorgasbord and other times as processed factory foods, reflects centuries of (often inequitable) food exchanges between indigenous communities and foreign-born people, as well as the rapid industrialization of food sectors.[19] Outmigration and tourism have also moulded national cuisines, as anthropologist Richard Wilk argues in his extensive study of the five hundred years of globalizing influences that produced a Belizean food culture highly dependent on imported foods like wheat, pork, and white rice. Starting in the 1970s, the Belizean independence movement, the rise of black nationalism, Belizean emigration and return migration, and tourism to the Caribbean all inspired a pride in and nostalgia for a uniquely Belizean cuisine that served as a patriotic symbol for Belizeans at home and abroad, as well as a lucrative market for culinary tourists.[20]

Histories of national cuisines that employ a commodity-history framework, therefore, hold the potential to write histories of 'nations unbound'—narratives that highlight connections and commonalities brought on by mobilities as much as they do distinctiveness.[21] The attention to global and regional exchanges of foods and culinary traditions in South Asia and in the South Asian diaspora by contributors to the edited collection *Curried Cultures*, for instance, illuminates affinities in the food cultures of India, Pakistan, Bangladesh, and other nearby nations, while revealing how class, religion, region, and histories of colonization, migration, and nationalist movements produced variations in these foodways.[22] Tracing the historic travels of commodities both before and after the age of nation states discloses the challenges of defining dishes and cuisine exclusively by national labels. After all, the tomato and chili pepper, so integral to Italian and Chinese cooking today, are indigenous to the Americas, and only became integrated into these nations' regional foodways in the late eighteenth and early nineteenth centuries.[23] Indeed, historians' reluctance to engage with popular and sometimes heated debates over the origins and authenticity of particular dishes and foods reflects the longue-durée perspective that acknowledges these historic movements of ingredients and the ever-evolving quality of cuisines. Whether noodles and noodle culture originated in Asia or the Mediterranean is a question perhaps less interesting to food historians than are the ways in which the various grain-and-water doughs transformed diets, agriculture, societies, and cuisines.[24]

A focus on commodity flows of foodstuff demonstrates interactions and tensions between the local and the global in discussions of both national cuisines and food globalization. Place matters in experiences and sensations of taste, as scholars such as Amy Trubek have argued. *Terroir*, the taste of place, a concept that illustrates how environmental and cultural characteristics particular to certain locations—wines made from grapes grown in specific soils, altitudes, and climates and enjoyed by particular eating communities, for example—shapes taste.[25] And yet those same wines scatter across the globe through international trade networks; in the glasses of consumers worldwide, such wines have the capacity to replicate the local flavour characteristics of the wine region

from which they originated *and* change meaning and taste as they are enjoyed with different foods and adapt to diverse culinary traditions. Comparative research on singular products also reveals commonalities as well as local particularities. Anthropologist Andrea S. Wiley's comparative study of milk production and consumption in India and the United States illustrates how the same global commodity—milk—enters into different socio-economic, religious, and political environments. These environments produce different 'cultures of milk' that in turn affect commodity chains and meanings around milk, making, for example, cow milk common in the United States but buffalo milk popular in India, where cows hold a sacred place in Hinduism.[26] The recent history of place-based labelling movements to link traditional foods to specific geographies, peoples, and traditions, guarded by the European Union and Slow Food Presidio and through intellectual property right laws in the United States, are intended to preserve and protect artisanal producers and traditional production methods from competition on the global market. At the same time, however, these products profit from globalization through trade, culinary tourism, and their elite gustatory status. The move towards geographical indicators on wines, spirits, cheeses, and other products, as with certification systems such as 'organic' and 'fair trade' on commodities like coffee and chocolate, evidence constant connections and discord between the local and global and between the producer and consumer that have defined and continue to define modern food systems.[27]

Commodity histories that focus on the joined movements of food commodities and people provide opportunities to write transnational and global histories. But equally important to histories of food globalization are barriers to the mobilities upon which food-supply chains and global and national cuisines depend. These roadblocks remind us of the real power that empires and nation states have exerted over their physical and cultural borders, and through them flows and exchanges of foodstuff and people. Even before the advent of the modern nation state, elites in Europe, Asia, and the Middle East from the ancient world through the early-modern era enacted sumptuary laws on food to prevent those of low social rank or of rival religious groups from muddying class and religious hierarchies by consuming luxury foods.[28] And yet even as late as the nineteenth and early twentieth centuries, political elites believed the right to trade internationally hinged on the freedom of migrants to move across national borders without restraints; migration and trade were considered inextricably linked facets of diplomacy, and because of this immigration policy was determined through commercial treaties with other countries rather than through laws enacted by parliament or congress.[29] This began to change as the Great Depression, war, and rising nationalists produced a 'globalization backlash' that lasted until the end of the Cold War. By the early twentieth century, then, impediments to the movements of food and people—food safety legislation, import/export laws, taxes and tariffs, and immigration policy—became essential governmental mechanisms of border control and nation-building, mechanisms that influenced which food commodities were welcomed and which rejected.

Official, state-sanctioned barriers to trade and migratory flows are critical to food-commodity histories. But so too are more informal exclusionary methods in the hands

of both state and non-state actors, at nations' borders and internally. An overlooked but integral part of the history of empire- and nation-building involved attempts to define who counted as citizens or potential citizens through the foods people produced, sold, and ate.[30] Elites and the middle classes have responded to the perceived threats of an increasingly integrated world by gastronomically 'othering' the food practices of those considered racially and socially undesirable or unfit for inclusion into the national fabric.[31] Race-making through food commodities overlaps with categories of religion, class, gender, and nationality as was the case with the San Antonio 'Chili Queens'—Mexican and Mexican American female producers and street vendors of *chile con carne* stew in the early twentieth century. The popularity of the food they sold could not withstand public health campaigns, largely run by elite Mexican Americans, that depicted the women as oversexualized, morally dangerous temptresses selling unhygienic foods to objectionable working-class labourers.[32] The production and consumption of food commodities were often used as part of larger nationalist movements, as Yael Raviv shows in her study of Zionists' 'products of the land' campaign in Palestine during the 1920s, when foods grown or produced by Jewish labourers, such as bananas labelled 'Hebrew bananas', became important political projects.[33]

Furthermore, studies of national cuisines evidence long histories of culinary gatekeepers who have attempted to co-opt foods selectively, accepting some foreign edibles and the people with whom they are associated, while dismissing others. Middle-class White women reformers involved in the burgeoning field of home economics in the early twentieth-century United States accepted the simple European wheat breads, meat-based stews, baked beans, and milk identified with European settlers to New England during the colonial era as genuine and patriotic 'American' food. They condemned the foods imported, consumed, and enjoyed by people of colour and migrants from Asia and Southern and Eastern Europe as unhealthy, unsanitary, and unpalatable.[34] And yet the power of state authorities and non-state elites to discipline its residents' foodways faced challenges in the very global quality of migration itself. Histories of Chinese, Indian, and Malay migration to Southeast Asia resulted in the fusion foods these migrations created that are so ubiquitous in the hawker courts, halal mamak stalls, and coffee shops of Singapore, Kuala Lumpur, and Penang today. These mixed noodle, tofu, meat, and spice dishes reflect hybridized identities that challenge Malaysian state ideologies focused on ethnic purity and the official Singaporean policy of multiculturalism, which rejects intermixing.[35] In their study of the fusion foods that result from historic and contemporary food commodity exchanges, scholars are right to ask who holds the authority to fuse; the conditions under which foods are fused, marketed, and sold; and ultimately who profits from such fusing. The answers to these questions give historians insight into the power dynamics that determine what commodities are ultimately counted in articulations of national and global cuisines.

Nevertheless, despite the real power of elite tastemakers, business owners, politicians, and diplomats over both the nationalization and globalization of foodways, ordinary labourers, producers, sellers, cooks, shoppers, and eaters played equally powerful roles in facilitating the movement of food commodities and hence, in fashioning

global cuisines, often in ways that challenged formal and informal obstacles.[36] Their experimentations and innovations—often the results of having to 'make do' on little money or few ingredients, or as a consequence of modifying traditional recipes to appeal to mainstream consumers—influenced the evolution of foodways in their households, communities, and beyond. The street food available for sale from pushcarts, markets, and food trucks punctuating urban landscapes around the world encapsulates food exchanges and experiences that facilitate globalization 'from below'. In the late nineteenth century, Indian indentured labourers created an easily held and quickly eaten street food for multi-ethnic Indo-Caribbean workers in the British West Indies when they innovated their roti flatbread into wraps holding vegetable and meat curries.[37] Similarly, informal and especially formal barriers to migration and trade, while slowing global commerce, opened up opportunities for creative, resourceful food entrepreneurs. When a complex web of US trade policies made it impossible to import many of the ingredients integral to Thai cooking, such as lemongrass, Thai basil, galangal, and mukrut lime leaves, Thai entrepreneurs in Los Angeles during the 1970s and 1980s created new sources by cultivating crops in Southern California and by establishing foreign trade zones in Mexico where South-eastern Asian produce was grown and shipped to Thai migrant-owned import houses in California.[38]

Women are vital yet still understudied everyday facilitators of the exchanges and experimentations that lead to national and global cuisines. Women have been conventionally tasked with the work of food procurement and preparation, even though they have also been integral as food producers. As the world's food system increasingly industrialized in the nineteenth century, large-scale factory work in the expanding food sectors and in commercial agriculture became gradually coded as male in ways that devalued and obscured women's continued labour in fields and factories.[39] Similarly, the professionalization of cooking starting in the nineteenth century, and in France rested in part on the masculinization of restaurants and cooking schools to exclude women from high-class expressions of national cuisines, as well as the symbolic and financial status afforded male chefs.[40] And yet women in kitchens, through their food management and actual cooking, controlled much of what everyday people ate, making them prominent agents in transforming food staples into vehicles for community and familial formation and sustenance.[41] Tulasi Srinivas argues that the pre-prepared, 'heat and eat' instant and packaged foods made in India and purchased by South Asian wives and mothers in both Boston, Massachusetts, and Bangalore, Karnataka, help mollify women's concerns about challenges to cultural retention and traditional gender roles brought on by migration. Imported from their home country, these meals are indeed 'homemade', serving as symbolic and material links to regional foodways. And yet, these mass-produced foods are divorced from the domestic sphere of mainly female food production even while the 'homemade' foods, marketed 'as mother made them', connote domesticity and womanhood reminiscent of pre-industrial food traditions.[42] Scholars such as Srinivas have moved the field forward by using gendered analyses to connect women's food work—often pre-formed within the private sphere of the home—to global

trade routes and, more recently, to international food corporations in ways that muddy traditional public-private, domestic-international divides.

The Pini Family and Transnational Food-Commodity Histories

The joined movement of commodities and people that give rise to global food histories is exemplified in Pini Brothers and Company. In the mid-nineteenth century, the Pini family left their home in the northern Italian province of Lombardy, boarded a steamship, and arrived in the bustling southern Atlantic port city of Buenos Aires, Argentina. They were part of a massive migration of people who moved across oceans and continents in search of work and opportunity: close to fourteen million people left Italy alone for destinations around the world between 1876 to 1915.[43] These mainly working-class migrants were instrumental to the rise of industrial capitalism worldwide. But their movements were also integral to histories of food globalization. The Pini family, like so many other migrants from Italy and elsewhere, facilitated the creation of global cuisines through trade, migration, and entrepreneurship. In 1864, Ermenegildo Pini opened a modest liqueur factory in Buenos Aires and with the help of his sons, Angelo and Antonio, turned Pini Brothers and Company into one of the largest, most successful wine and spirit factories in Argentina and South America. By the early twentieth century, the company's annual production of wines, vermouth, and fernet—an herbal digestif—reached some three million litres. Pini Brothers established a second distillery in Argentina's north-eastern Corrientes province and branch offices in provincial capitals across Argentina, and they regularly sent sales representatives to Chile, Brazil, Uruguay, and Paraguay.[44]

The Pini family's success in Argentina rested in large part on their ability to satisfy the cravings of European migrants for homeland tastes. Italians brought with them foodstuff, eating and drinking practices, and culinary traditions and made them central to their evolving identities and experiences abroad. In order to replicate the flavours of home, the Pini family imported commodities from Italy such as wine, almonds, saffron, and orange and lemon rinds, and in doing so, they created and sustained global food networks that linked Italy and Argentina economically, politically, and culturally. But migrant food entrepreneurs like the Pinis also experimented with new economic opportunities, consumer demands, and more abundant and varied foodstuff in their host country. By the early twentieth century, the Argentine provinces of Mendoza and San Juan had established a burgeoning grape-growing and wine industry, and the country's fertile pampas brought about large-scale wheat, beef, pork, and dairy sectors, supplying migrants with raw materials for making Italian-style wines, pasta, cured meats, and cheeses.[45] By blending the old and the new, migrants not only sustained food

traditions from their home regions but helped forge an Argentine cuisine, which like all national cuisines, was the result of historic networks of mobile foods and mobile people.

A century after Pini Brothers and Company helped familiarize Argentines with the bitter Italian fernet, it became one of the two principal ingredients in *fernet con coca*, today touted as one of the country's most popular, iconic cocktails, a symbol of Argentine identity. This emblem of *Argentinidad* is made from products originally introduced to the country through earlier circulations of people, culinary traditions, and commodities: fernet (imported from Italy or made by Italians in Argentina like the Pinis already in the late nineteenth century) and Coca Cola (the carbonated soft drink from the United States that became popular in Argentina in the post-war era). Its history as a national drink is rooted, then, in the historic and intertwined movements of people and culinary commodities that have created national and global cuisines.[46]

The transnational migrations and entrepreneurial endeavours of the Pini family, like so many other mobile people studied by food scholars, are inextricably linked to histories of trade, empire-making, and industrialization. As future Italian president and economist Luigi Einaudi wrote in 1900, 'trade flows must follow the currents of emigration'.[47] Like many Italian politicians, he hoped that mass transoceanic migration would lead to an informal, commercial Italian empire in Argentina and other parts of Latin America. While his imperial hopes were largely dashed, migrants like Pini family drove commodity chains in foodstuff, and to particular countries and cities with large migrant populations. It is no surprise that Argentina and the United States, the two most popular overseas destinations for Italians in the late nineteenth and early twentieth centuries, received by far the bulk of Italian exports headed to the Americas and, for select commodities, to all importing nations. In 1907, for example, as a percentage of Italy's total global exports, together Argentina and the United States received 75 per cent of Italian vermouth, 76 per cent of Italian oil olive, 37 per cent of Italian cheese, and 34 per cent of Italian wine. Most of this trade came through the port cities of Buenos Aries and New York, often on the same transatlantic steamships carrying migrants, making these two cities, like other migrant- and trade-receiving cities around the world, global nodes through which food commodities circulated. Demand for these comestibles and others also revolutionized Italy's commercial agricultural and food and beverage industries, leading to the growth of large-scale factories producing pasta, canned tomato products, olive oil, and bottled wines and sparkling water, exposing how migration and trade abroad stimulated economic development at home.[48]

The relationship between the local and the global, the universal and the distinct, a theme explored by food scholars, emerges when the Pini family's history is studied from a comparative commodity-history approach. While many of the same Italian food commodities, such as the Italian wines imported by Pini and Brothers, arrived in migrant cities throughout the Americas, juxtaposing Argentina and the United States sheds light on nation-specific differences in global food cultures and trade. A closer look at the 1907 trade date shows that while Argentina constituted Italy's number one global receiver of olive oil, wine, rice, vermouth, and spirits, the United States instead served as the leading global importer of Italian-made cheese, pasta, canned tomatoes,

hazelnuts, lemons, and citrus extract. Distinctive ethno-racial, socio-economic, and legal structures, such as restrictive immigration policy and the Prohibition movement in the United States, or the shared Catholicism and linguistic similarities between Argentines and Italians in Argentina, produced different migrant marketplaces of circulating people and foods in Buenos Aires and New York. The Pini family arrived in Argentina in the mid-nineteenth century when the country's liberal elites largely welcomed European migrants, commodities, and capital as vehicles for civilizing an allegedly backwards society made up of indigenous communities, African-descended people, and rural warlords and their *gaucho* (usually mixed-race cowboys of the pampas plains) supporters. Argentina's borders, therefore, remained largely open to Italian migrants, and their transatlantic commercial connections were encouraged through relatively low tariffs and taxes during the late nineteenth and early twentieth centuries. Argentine elites largely considered imported foods, drinks, and culinary traditions from Italy as acceptable middle-class fare, and in some circles, emblems of European culinary sophistication.[49]

While their counterparts in the United States also entered a country where liberal economic policies kept the country relatively open to European migrants and trade, this began to change in the twentieth century with the early industrialization of the nation's food sectors—including the rise of influential food trusts that advocated for high tariffs—and increasingly restrictive immigration legislation, among other factors. These obstacles presented a greater challenge to the maintenance of migratory and commercial connections between Italy and the United States. They also led to the rejection and racialization of traditional Italian fare and its eaters in a country whose political leaders defined the nation as Anglo-American; it would not be until the Great Depression, when immigration policy drastically reduced migration from Italy, and when Anglo-Americans began to see merit in the thrifty, simple, yet nutritious migrant meals that Italian regional foods experienced more widespread acceptance among mainstream eaters. And yet, even in the nineteenth century, migrants capitalized on the increasing numbers of obstacles to trade, migration, and acceptance in the United States; entrepreneurs from Italy and their descendants took advantage of the early industrialization, food safety legislation, and tariffs in the United States, as well as migrant labour and ethnic consumer demand to jumpstart all kinds of *tipo italiano* or Italian-style pastas, wines, cheeses, and other foods for consumers both within migrant enclaves and beyond. Legal and financial roadblocks to commodities, as well as discrimination against migrant groups, governed commodity paths and migrant and native-born consumers' food choices and identities.[50]

Given women's central role in the formation and perpetuation of food traditions, it is no surprise that advertisements for Italian food imports in Argentina and the United States, as well as publicity for domestic food commodities produced in these two migrant-receiving destinations, increasingly featured women over the course of the twentieth century. As ties between femininity and consumption intensified worldwide, and, in the case of Italians, as migrant communities shifted from male dominant to gender-balanced, producers and sellers of food commodities specifically called out

to women food shoppers.[51] Whereas earlier advertisements and trademarks for Italian food exports to the Americas featured the names and images of notable male political and cultural figures such as Christopher Columbus, Giuseppe Garibaldi, and Dante, by the interwar period, publicity and the migrant marketplaces of mobile food and people they represented had been feminized. One advertisement for Italian imported Sasso-brand olive oil that appeared in *La Patria degli Italiani*, the largest, most widely circulated Italian-language newspaper in Argentina, portrayed a group of women shoppers surrounding an oversized canister of Sasso oil; another played on transatlantic culinary connections between Italian women in Argentina and Italy by calling out to readers, 'Ladies! In Italy no food goods store lacks Sasso oil'.[52] Such advertisements demonstrate how food and beverage companies took advantage of increasingly powerful linkages between women, consumption, and both national and transnational identities, and they illuminate how gendered ideas about women and food intersected with ethnicity and nationality to influence the formation of migratory and commodity markets.

Conclusion

Recently, but especially over the past twenty years, historians have used a commodity-history approach to study how migrants like the Pini family helped transform the ingredients they imported, manufactured, sold, and consumed into platforms for creating livelihoods, individual identities, and national and global communities. These food producers, transporters, entrepreneurs, and sellers understood what moved migrant and increasingly native-born consumers: flavours, ingredients, and traditions from home, as well as novel tastes and inventive dishes. Scholars interested in mobile people and the foodways they helped form have shown that migrant entrepreneurs, consumers, and producers sustained foodways from home while utilizing new resources, opportunities, and markets in their host country to innovate on tradition, and, in doing so, altered the evolving cuisines of their host nations and other nations worldwide. They did so despite the plethora of formal and informal impediments to movement across regions, oceans, and borders.

Decades of research by food historians suggest that food-commodity histories are histories that cannot be contained solely with the confines of nation states since the stories they tell emerge out of and are embedded in historical processes such as migration, trade, slavery, imperialism, and capitalism that transcend national borders and influence the conditions under which food and the people who make and consume them, move. Simultaneously, however, obstacles put in place by imperial elites and national leaders to control both physical and cultural borders increasingly shaped and policed these routes and processes. Future scholarship in the field of food-commodity history might employ Jeffrey Pilcher's 'culinary infrastructures' framework to consider, as some of the scholars featured in this chapter do, the physical and technological structures (ports, warehouses, supermarkets, electrical grids, shipping containers, etc.) as well as

the infrastructures of knowledge and culture (social networks, identities, traditions, media, etc.) that allow for or prohibit food mobilities through particular locales and produce values about food. This holistic approach encourages a consideration of how material *and* immaterial infrastructures in places around the world 'convey power by determining the nature and meaning of food'.[53] Commodity history inspires an interrogation of linkages that culinary infrastructures convey—linkages between goods and people, between production and consumption, between the local and the global, between the concrete and the cultural, between historical processes, and between relations of power—to reveal food as a critical commodity in shaping human societies and cultures.

Notes

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CHAPTER 25

HISTORICAL ARCHAEOLOGIES OF COMMODITIES

Race and Consumer Culture in the United States

PAUL R. MULLINS

Archaeology concerns itself with the study of quotidian detritus, and through this documents the routine and commonplace activities of everyday life. While many archaeologists delve deep into the prehistorical past, 'historical' archaeology applies similar practices to more recent periods. As such, it can complement the work of historians, providing evidence and insights into the historical roots of contemporary society and culture. Given the widespread influence of Appadurai's definition of a commodity as anything intended for exchange, and the focus on the 'social life of things',[1] evidently historical archaeology's study of the found remains of manufactured items and sites of production, trade, and consumption can deepen our understanding of commodity history.

Historical archaeologists approach commodity analysis through the application of distinctive methods and interpretative frameworks, integrating documentary resources, oral memories, environmental science, and material things as multiple lines of analytic evidence contextualizing life in the colonial and post-colonial world. Conventional field excavation of prosaic mass-produced commodities is often the heart of the historical archaeological method, but contemporary historical archaeology also examines broadly defined material culture, including landscapes, ecology, and the built environment, as well as textual resources, ethnography, and visual records. Archaeologists examine a range of contextually distinctive influences on the exchange, consumption, and discarding of commodities.

Following a discussion of recent historical archaeological literature as it applies to commodities, an illustrative case is focused on—discarded phonograph records from the 1950s uncovered in Indianapolis. Through this, it explores what these reveal of

twentieth-century racial inequalities, and the ways these were reproduced, negotiated, and even subverted by consumers of mass-produced goods. The chapter ends by considering the wider potential complementarity of historical archaeology and commodity history.

Historical Archaeologies of Commodification

Historical archaeology shares some method, theory, and politics with a wide range of archaeologies. Cynthia Robin emphasizes that a breadth of prehistoric, classical, and historical archaeologists alike share a focus on the material traces of everyday life and address both dominant structural influences and the mundane materials and spaces of daily living.[2] However, historical archaeology departs from conventional archaeological scholarship that revolves around material description, is limited to excavated things, focuses on the distant past, does not include ethnographic method, or avoids the politically engaged dimensions of archaeological narrative. In contrast, historical archaeology emerged in the United States in the 1960s, influenced by the generalizing perspective of anthropology and simultaneously borrowing from the politicization of post-war social history that revolved around the interpretation of everyday life and inequality. Thus, historical archaeology borrows much of its expansive interpretative perspective from North American anthropology, which examines the broadly defined cultural, biological, and material dimensions of human experience across time and space. Rodney Harrison and Esther Breithoff, for instance, champion an archaeology of the contemporary world that engages with, illuminates, and intervenes in ongoing socio-material practices.[3]

A lot of recent historical archaeology focuses on European colonization and globalization over the past five hundred years, studying the development of structural inequalities and injustices such as racism in the colonial and postcolonial world, and probing the ways in which these have been constructed, experienced, and resisted in everyday life.[4] In the United States, those archaeological narratives have focused overwhelmingly on peoples who are not well represented in mainstream histories, such as working classes, immigrants, women, and people of colour. Such narratives are often painted as correctives to partial historical accounts, ideologically biased histories, or primary documentary evidence that simply does not represent many peoples' experiences. For instance, much of the narrative of African American experience in captivity is utterly reliant on archaeological material culture, as studied by the likes of Theresa Singleton, Charles Orser, and Maria Franklin.[5] Since the discipline's origins in the 1960s and 1970s, historical archaeology has been especially focused on the African American experience, with archaeologists making a compelling argument that materiality provided a picture of everyday life among African-American captives that had been misrepresented by primary documents and histories.[6] Historic archaeological interpretations of commodity consumption, such as those of Mark Leone and Paul Shackel, often illuminate the details

of everyday life that are not captured in mainstream histories, which may extend or even verify dominant accounts, but in many cases archaeological narratives are intended to expressly confront dominant narratives with contradictory material evidence.[7]

Some archaeological scholarship on commodities is a relatively functional description of the ways excavated commodities reveal exchange relationships between a host of agents. Systemic commodity trade networks linking these agents—ranging from labourers securing raw materials through producers manufacturing goods to consumers who eventually secure those commodities—has long been a staple of scholarship on colonial states and capitalist world systems. Archaeology often extends documentary analysis of trade and exchange networks by identifying the specific commodities that were shipped to and consumed in particular places, providing an exceptionally fine-grained record of exchange and marketing, and the concrete things that identifiable consumers acquired, used, and discarded in certain historical moments.

Such archaeology does not necessarily challenge the overall picture of commodity exchange in complex societies as much as it provides a detailed picture of the local experiences of global patterns. For instance, archaeology of shipwreck cargo has long been used to analyse the organization of maritime trade and the concrete goods that were trafficked across space. Roman period shipwrecks provide rich evidence to identify commonly traded commodities and interpret the degree of centralized coordination and state and merchants' control of the Roman trade of goods—like amphorae-borne food commodities, such as wine, oil, and salted fish. Candace Rice's survey of sixteen western Mediterranean wrecks illuminates how states, consumers, and traders collectively influenced the goods traded to particular consumers. Rice found that many cargoes carried a relatively homogeneous array of goods loaded in a single origin port, eliminating the need to load additional cargo and rebalance the ship at subsequent ports; other ships clearly included a second complementary cargo added along with a primary commodity loaded in a local production region; and some had heterogeneous cargo from multiple provinces. Some cargo clearly identifies the ship's port of origin, which suggests the commodities that were desired by consumers in particular destinations, but Rice argues that traders loading cargo were the primary force shaping trade patterns rather than the Roman state or consumers.[8]

As with Rice's examination of the tension between traders and consumer demand, Julia Costello's study of the twenty-one Franciscan missions in early nineteenth-century California examined the influence of demand at these locations, and the ways peripheralized consumers acquired highly desired goods and rejected other commodities traded there. Missions exchanged commodities through their own trade networks, involving Spanish colonial administrators, indigenous peoples, American traders, English ceramic manufacturers, and Franciscans. The key commodity the missions offered for exchange was sea-otter pelts, which were collected by indigenous neophytes (i.e. converts). The pelts were highly desired by colonial administrators who traded Spanish goods for them, but missions covertly exchanged many pelts outside Spanish market control to American traders. That trade is reflected in the English mass-produced ceramics that Americans bartered to the missions.[9]

Some archaeological studies focus most clearly on the ways commodities mirror global political economic patterns. In her examination of Ottoman ceramics, Lynda Carroll focused on how Ottoman sultans and elites consumed exclusive and expensive ceramics produced in Ottoman workshops at the empire's height of power in the sixteenth century. Yet as the empire's power eroded, the Ottoman elite began to consume Chinese and European vessels as confirmations of their power. Ottoman potters, robbed of their lucrative elite market, began to produce a broader range of wares for a domestic and export market, marketing their products beyond an exclusive elite and instead seeking a foothold in an international marketplace where Ottoman commodities like ceramics were sold and consumed.[10]

From the very origins of the discipline, many historical archaeologists have focused on how states and producers use commodities to reproduce, fortify, and expand their influence and integrate subject peoples into state societies. For instance, George Irving Quimby's study of European trade goods in the North American Great Lakes used those commodities to outline exchange patterns between Europeans and indigenous people. Quimby's analysis was not focused on how commodities documented social, marketing, and material relationships between Europeans and indigenous societies; instead, he fixed on the ways European commodities were mechanisms of domination that incorporated indigenous peoples and gradually erased their cultures.[11] Quimby's perspective is typical of a North American anthropological tradition that devoted much of its earliest scholarship to documenting disappearing cultural practices among indigenous peoples. These anthropological archaeologists long viewed commodities as 'inauthentic' things that originated in colonizing societies and were evidence of colonizers' erasure of indigenous cultures. The shallow polarization of commodities and traditional material things has eroded among contemporary archaeologists, but anthropological archaeologists still tend to view commodities as mechanisms that erode indigenous and local traditions and represent the march of colonization.[12]

Gradually that picture of commodities as vehicles of acculturation has been tempered by archaeologists who focus on how consumers negotiate, embrace, and contest commodities' meanings. For example, Orser has advocated pushing beyond seeing commodities simply as documents of trade networks or the influence of producers, instead arguing that archaeologists can interpret the ways commodities are socialized in distinctive forms in particular contexts. Orser focused his example on Southern plantations and the consumption of mass-produced commodities by captive African Americans who were themselves construed as commodities in the nineteenth-century economy. He championed interpretive 'biographies' of commodities, with the commodities recovered from African-American contexts illuminating global production patterns, a rich range of ways mass-produced goods found their way into the hands of captive African Americans, and the meanings of these things for various agents linked to that commodity exchange.[13]

Historical archaeology has an exceptionally rich primary documentary record that allows scholars to rigorously document the historical contexts in which commodities were produced, marketed, and consumed. The period since the late fifteenth century witnessed colonization, the emergence of consumer society, and global commodity

consumption that are reflected in everyday mass-produced goods, mostly excavated from household contexts. Carroll, for instance, championed an archaeology of commodities that revolves around how local collectives or individual households are implicated in global processes through this material medium.[14] Some of this scholarship is an ethnohistorical account of how local culture shapes commodity consumption. For example, James Flexner and colleagues' study of imported artifacts in Hawaii examined a wide range of mass-produced commodities from household contexts, and they argue that established cultural traditions shaped how those goods were incorporated into everyday Hawaiian life.[15]

Much of this archaeological scholarship illuminates the way consumers shape the meaning of commodities. Michael Dietler's study of the early Iron-Age Western Mediterranean argued for regionally distinctive patterns of discriminating consumption. He argued that some communities embraced the goods introduced by Greek colonizers, especially significant quantities of wine and drinking equipage, but they rejected many other goods. Rather than paint commodities simply as mechanisms of colonial domination, Dietler acknowledged the socially, historically, and culturally specific relationships commodities establish.[16] Caty Schucany's study of 'Romanization' in Late Iron-Age Switzerland echoed Dietler's perspective, examining the Romans' effort to set local tables with ceramics like those in Italy. Schucany concluded that the selective integration of Roman forms reveals that some local foodways persisted using Roman vessel styles.[17]

Such analyses revolving around consumed meanings of things is rooted in contextualized interpretations that interpret how states, marketers, and specific consumers in distinct settings see commodities in certain functional and symbolic ways. Jason De León's analysis of the materiality of contemporary migration across the Mexican-American border inventories rather prosaic commodities like water bottles, sardines, and garlic that assume distinctive meanings during a border crossing. Most of those goods have some functional purpose for border crossers that was revealed during ethnographic research associated with the material culture collections along the border. Particular water bottle sizes, for instance, are considered most practical to carry and obviously have the effect of slowing dehydration, as do the heavily salted fish. The garlic is rubbed on the clothing because it is believed to have properties that deter rattlesnakes.[18]

Shannon Dawdy's study of material goods manufactured from cremated human remains examines the way some commodified goods assume distinctive meanings that stretch the definition of the conventional commodity. The goods produced with cremated remains are what Dawdy refers to as 'commodity relics'; that is, they are simultaneously mass-produced, stylistically interchangeable, and exchangeable commodities, as well as sacred relics incorporating human remains that actively evoke the deceased. Most of the material goods produced from cremated remains appear to be commonplace replicable commodities, such as diamonds or glass objects that incorporate cremations through standardized industrial production. However, Dawdy argues that this appearance of being a typical commodity belies how these things have distinctive effects evoking the deceased, which renders them 'ghosts in commodity form'.[19]

Archaeologies of the African-American experience have been particularly focused on how consumption of otherwise commonplace commodities demonstrates resistance to anti-Black racism. For instance, Maria Franklin examined clothing fasteners in African-American burials and documented a distinctive array of 'modest, respectable' garments drawn from mainstream fashions. She concludes that such materiality did not signify incorporation into implicitly White dress codes but was instead a mechanism of resistance that staked a claim to bourgeois standing and 'served as a means of troubling the prevailing notions of whiteness and dress'.[20] Nedra K. Lee echoes this focus on African-American consumption as an expression of resistance to racism. However, she sounds a sober note about the structural effects of such resistance. Lee's study of African-American farmers argues that possession of farmland secured an important measure of self-sufficiency that was inaccessible to African-American sharecroppers who worked White-owned land. Lee's analysis of stoneware storage vessels, for instance, identified elevated quantities of the vessels among landed farmers. Stoneware was being used by these farmers as a mechanism to store their own food secured from their farming rather than rely on marketplace consumption; in contrast, sharecroppers were often compelled to secure mass-produced goods on credit from the White farmer who owned the sharecropper's land, leading to perpetual debt. Landed African-American farmers did not struggle with such debt. However, Lee concludes that it was very rare for landed farmers to become affluent or find economic possibilities beyond farming to secure wealth; instead, they simply aspired to secure modest self-sufficiency.[21]

Archaeologists examining commodities contextualize their meanings by examining a breadth of material and textual resources that illuminate household histories and document the ways producers, marketers, and ideologues construct and contest the meanings of commodities. Commodities provide the archaeological substance to narrate dynamic patterns of domination, imagination, resistance, and incorporation; they illuminate relationships between producers, ideologues, marketers, and consumers who were never part of concrete social relationships; and they demonstrate the conflicting interests of the state, marketers, and consumers along and across various lines of difference. This chapter examines some of these issues of manufacturing, marketing, and consumption of commodities and the contextual meanings of things by interpreting the history of record fragments from Indianapolis, and probing how they were situated within racial ideologies in the twentieth and twenty-first centuries.

Commodifying Jazz and Blackness

Sometime around 1958, an assemblage of household refuse was discarded into an outhouse that was being filled at an Indianapolis home at 458–460 Agnes Street. The detritus included relatively typical everyday things—ranging from food remains to bottled goods and clothing—that were recovered during a 2003 archaeological excavation. Among the discards was a scatter of shattered 78 RPM phonograph records. One

fragment was identifiable as a 1943 Bluebird Records release of the Lonnie Johnson songs 'Fly Right, Baby' and 'Rambler's Blues'.

It is not especially surprising to confirm that the African-American residents were listening to popular music by African-American performers like Johnson. Music was at the heart of African-American culture, with rich origins in a distinctive expressive culture that flourished in the face of captivity and was part of everyday life in churches, schools, and homes following Emancipation. Music is an artistic expression rooted in cultural practice, but it is simultaneously a commodity to which economic value is assigned during exchange. Music had been sold to audiences across the colour line since the nineteenth century, and marketed and exchanged in the form of material goods like phonograph records and public performances within a segregated landscape of theatres and clubs. Appadurai champions the 'commodity potential' of all things,[22] and music has the potential to take numerous commodified forms in a breadth of experiences like performances and material goods like records.

The excavated record rests firmly within an archaeological tradition of narrating the rich meanings of commodities. Like nearly all the archaeological scholarship on commodities, interpreting the record fragments focuses on a seemingly commonplace artifact and contextualizes its meanings alongside a broad range of material things and primary documentary resources. Such archaeological narrative illuminates how the interests of a breadth of agents converge in commodities, interpreting relationships that were not necessarily expressed by the people implicated in commodity manufacturing and consumption. These relationships always have distinctive contextual dimensions, and the phonograph record provides specific insight into how African-American consumers were structurally positioned in twentieth-century American society and the ways African-American expressive culture was commodified and marketed.

The records recovered on Agnes Street confirm the popularity of African-American music, which had been commodified since the late nineteenth century, first as live performances and eventually in forms such as radio airplay and phonograph records. African-American performers were prominent in a broad range of turn-of-the-century popular culture, with vaudeville performance introducing much of White America to African-American music, theatre, and dance. However, the tradition persistently invoked racist caricatures that would populate popular culture throughout the twentieth century. Popular musical forms began to be distinguished as either Black or White music by marketers and ideologues in the final quarter of the nineteenth century, just as Jim Crow racism was legally segregating public citizen rights in the South.[23] The seeds of these racist representations of Black life and music were planted by Blackface minstrelsy beginning in the 1830s, when physical caricatures of Black bodies, fantasies of contented plantation captives, and White imaginations of Black music were performed for White audiences.[24] Cylinder recordings and music publishing extended minstrelsy's racist themes in music and performance beyond the traditional minstrel show, and romanticized pictures of captivity and African America permeated performance for African-American and White audiences alike through the twentieth century.

Music publishers and the earliest cylinder recording companies recognized that Black caricatures were appealing themes for White consumers, and an enormous amount of music and performance borrowed from the visual caricatures of Blackface minstrelsy and spun fantasies of life in captivity. One of the very first sound recordings was an 1890 wax-cylinder recording of an African-American street performer, George Washington Johnson, who sang and whistled the vaudeville novelty tune 'The Whistling Coon', which sold at least 25,000 cylinder recordings by 1895.[25] Many of Johnson's fellow performers were African Americans, but there was no systematic effort to market music commodities to a segregated African-American consumer market.

Despite the advance of such racism, African-American expressive culture rapidly crossed the colour line in the late nineteenth and early twentieth centuries: a breadth of blues, folk, and ragtime were being played by African-American and White performers alike in a wide range of American venues. Marketers seemed unwilling to acknowledge the potential profitability of African-American consumers, nor did they imagine that many African Americans had middle-class material ambitions. In 1913, a Chicago phonograph dealer told *The Talking Machine World* that the African-American consumer 'is not nearly so ignorant and unappreciative of the world as the world in general would have us believe. . . . [T]here are right in this little old burg of ours, a goodly number of not only intelligent but cultured negroes'.[26] The White Chicago merchant championed music sales to African-American consumers a decade before the 'race market' emerged, arguing 'that it will pay every dealer to give at least some attention to the negro trade of his city. The coloured man is exceedingly fond of music'. The dealer acknowledged that the Edison Record Company had released some recordings by African Americans, but there was very little African-American music produced before World War I.

In the late nineteenth and twentieth centuries, most American live performance was segregated, and in Indianapolis African-American music was performed in the Indiana Avenue business and leisure district. Indiana Avenue's segregated clubs and marketing spaces were part of an African-American consumer landscape found in nearly every twentieth-century American community. In the South, legal segregation restricted African Americans' rights of access to public facilities, but in Northern cities like Indianapolis, de facto segregation controlled public rights as effectively as law. African-American performers on Indiana Avenue were playing blues, ragtime, gospel, and folk music alongside a rich mix of theatre, burlesque, vaudeville, and drag. The volume of African-American consumers in such communities and the appeal of the music beyond African Americans alone would gradually encourage national marketers to capitalize on that expressive culture in commodities like the phonograph record that was eventually excavated not far from the Avenue.

A handful of African-American performers were recorded when phonograph records began to be sold before World War I, but this market did not significantly grow until the 1920s, when African-American music began to be sold to a 'race market'. Between 1920 and 1942, 5,500 blues recordings and another 1,250 gospel records were issued in the 'race record' market.[27] Lonnie Johnson was among the artists recorded by these labels that produced records for Black consumers. Born in 1894, Johnson won a St Louis blues

talent contest in 1925 with an OKeh Records contract as the prize.[28] Founded by Otto K. E. Heinemann in 1918, OKeh sold budget records, including European immigrant music as well as African-American music. Johnson recorded his first OKeh songs in November 1925, and he recorded about 130 songs for OKeh Records between 1925 and 1932.[29]

The appeal of these African-American musicians to White consumers was circumspectly acknowledged by the labels. For instance, African-American singer Mamie Smith was an OKeh act being advertised by one of White Indianapolis's daily newspapers in 1921 alongside notices of her concerts at the segregated Murat Theatre.[30] In an August 1923 advertisement, OKeh acknowledged that the 'growing tendency on the part of white people to hear their favourite 'blues' sung or played by famous coloured 'blues' artists, added to the already immense demand by the coloured race for such records, has made the Negro Record field more fertile than ever'.[31]

Record stores emerged on Indiana Avenue in the 1920s selling many of the offerings of the 'race' labels, including Lonnie Johnson's OKeh release 'Mean Old Bed Bug Blues' and 'Roaming Rambler Blues'.[32] After Johnson's OKeh recording contract ended in 1932, he spent about five years working in a St Louis steel mill and then a factory manufacturing railroad ties before moving to Chicago, where he was once more recording in about 1937 for Bluebird Records.[33] RCA Victor founded the subsidiary label Bluebird Records in 1932 to record a breadth of music featuring Black blues and jazz artists, and Bluebird would become one of RCA Victor's most popular brands in a marketplace of short-lived budget labels.[34] African-American blues and gospel soon became a Bluebird staple, and Bluebird Records first recorded Johnson in 1939.[35] The record excavated in Indianapolis contained two of about thirty-four Bluebird tracks Johnson recorded between 1939 and 1944.

In August 1943, Bluebird released the Lonnie Johnson songs 'Fly Right, Baby' and 'Rambler's Blues', which were recorded in Bluebird's Chicago studio in February 1942.[36] The 78 revolution-per-minute 10" record was made of shellac resin, the most common medium for flat phonograph records until it was gradually replaced by vinyl beginning in the 1940s. The Agnes Street residents might have secured the record in many different market spaces or outside conventional retail exchange, but Bluebird records were available in many retail spaces in Indianapolis. In March 1940, for instance, the African-American columnist Frank Marshall Davis announced in the *Indianapolis Recorder* that 'Lonnie Johnson has a new blues double on Bluebird that should have all the women loving him. In She's Only a Woman, he takes up for the fallen female, and in Why Women Go Wrong, he defends the meandering wife. Accompaniment is gutty and solid'.[37] In 1941, Bluebird sold 23.4 million records and had a rich offering of 'race' artists, and an enormous number of shops became part of the African-American retail landscape when record and phonograph prices dropped in the early 1940s. All of them featured the race labels, which became known as the rhythm-and-blues market in the 1940s while the city's White stores were quietly marketing the same records.[38] Lonnie Johnson performed in Indianapolis after signing a contract with Indianapolis's own Ferguson Brothers booking agency in 1944.[39] Brothers Denver and Sea Ferguson were club owners who established a booking agency for African-American performers

around 1941, opening an office in Hollywood in 1943.[40] The Fergusons were among the most influential club owners in the 'Chitlin' Circuit', a network of clubs and theatres in which African Americans performed beginning around 1940.[41] Denver opened the Sunset Terrace in December 1937, perhaps the most prominent club on Indiana Avenue, and Johnson played the Sunset several times between June 1944 and January 1953.[42]

The Sunset Terrace was only a few blocks from 458–460 Agnes Street, where the Lonnie Johnson record was discarded around 1958. The Agnes Street home was a double (i.e. two units in the same structure) first occupied in 1875, and by 1930 all of the residents were African American. Around 1913, the owners added a second story to the home, and after that renovation the house had four rental units on a relatively small house lot. The expansion instantly increased if not doubled the landlords' profits, and it was part of a pattern of increasingly dense residential populations. One practical effect was that the Agnes Street home's outhouses must have filled much more rapidly. The landlord was not legally obligated to connect the home to the city's emerging sewer system, instead using backyard outhouses, and in about 1913, the owner constructed an eight-foot square, brick-lined two-level outhouse. The two upstairs households accessed a pair of upper-level seats along a walkway that extended off the second-story back porch. It was this outhouse that would eventually contain the household refuse with the Lonnie Johnson record that was discarded about a half century after the outhouse was built.

At the time the outhouse was filled with household refuse, the Agnes Street residents were working-class African Americans with relatively typical migration histories. John Grimes, for instance, was born in Mississippi in 1897 and moved into the Agnes Street home in about 1935, and he worked in construction and was still living in the home when the outhouse was filled in 1958. His neighbours in 1958 included Oscar Roddy and his wife Elena. Oscar was born in Arkansas in 1896 and came to Indianapolis in 1925, where he worked in Indianapolis foundries for twenty years. In 1945, he began to work at the Kingan and Company meat-packing plant, as did their neighbour Max Folley, who started at Kingan in 1949. Their neighbour Daisy Clay was born in Kentucky and had come to Indianapolis in about 1924 and moved into the Agnes Street home by 1947. Like a vast number of African-American women, Clay did laundry, cooking, and domestic labour, probably most often in White households.

In 1956, the two-story outhouse was still standing in the Agnes Street backyard, but by 1962 it had been razed; it seems likely the outhouse was torn down when the city required all homes to be connected to the city sewer system in 1958. When the outhouse was torn down the deep pit in the backyard was filled with household trash, probably over weeks or a couple months based on the stratigraphy revealing a series of successive deposits over a relatively brief time. The house still continued to be a residence until 1965, when it was purchased by Indiana University and razed for a parking lot to serve the Indiana University-Purdue University, Indianapolis campus.

The outhouse refuse might well have been deposited by anybody who had access to the pit, but it is likely that the residents of 458–460 Agnes Street threw their household refuse into the emptied outhouse. Items like bottled goods discarded in the outhouse,

or even the Lonnie Johnson record, might have been secured in many different retail spaces or entered the household outside conventional retail. A very large food assemblage in the outhouse was dominated by pork, and it is likely that much of that was secured by Max Folley and Oscar Roddy from the Kingan's meat packing plant, where labourers often secured discards. The residents and their neighbours certainly did much of their household shopping on Indiana Avenue and in corner stores in the immediate neighbourhood, which sold many of the same commodities being marketed in stores throughout the city and the national marketplace.

The household residents' musical tastes cannot be reconstructed simply from a single record, but there is a significant volume of documentary evidence confirming the marketing of African-American music in twentieth-century Indianapolis. The rigid segregation of African-American musicians and consumers certainly influenced the Agnes Street households' likelihood to listen to music by African-American performers like Johnson, but by the time the record was discarded, the divisions between African American and White artists had begun to erode. Post-war performance culture and the death rites for legal segregation eroded the boundaries erected by the recording industry ideologues who had engineered the commodification of White and Black music over the first half of the twentieth century. There had always been White people surreptitiously listening to African-American music and entertaining their curiosity with Black life in popular cultural forms, and African-American artists were marketed across the colour line by 1960. Lonnie Johnson was working as a custodian in a Philadelphia hotel when his 1943 Bluebird record was discarded in Indianapolis. The erosion of segregation provided Johnson a moment of newfound popularity as part of a 'folk revival' movement, and he performed in the 1960s before being hit by a car in 1969 and dying a year later.[43] A newspaper account described Johnson as 'a legend in the world of jazz' who 'died all but penniless'.[44]

Archaeology and Commodities

Focusing on African-American music simply as an art form springing from cultural practice risks romanticizing the ways expressive culture is rendered exchangeable, and it ignores the social implications of that commodification and the ways it racialized African America. African-American expressive culture was being performed for paying White and African-American audiences in the late-nineteenth century, and a twentieth-century recording industry marketed African-American music well beyond local clubs, so music was almost always commodified. A broad historical archaeological perspective on the commodity forms music assumed analyses artefacts like the record excavated in Indianapolis, but it also interprets the landscape of segregated performance spaces where music was played, consumed, and marketed and the systemic contexts in which marketers recorded, circulated, and sold music. Archaeological interpretation of that breadth of social practice and materiality examines how these commodified things

assumed meaning through consumption that was ensnared in a web of contested ideological interests.

The story of Lonnie Johnson's discarded records is like many archaeological narratives in which prosaic commodities link a host of agents who had no concrete social relationship and whose interests were reflected in the commodities connecting them. On the one hand, the record illuminates the ways African-American music was commodified in a segregated marketplace that wielded racist ideology to structurally marginalize Black consumers. The record was part of a twentieth-century American marketplace that was committed to White privilege and unwilling to extend African Americans the public citizen rights implied by participation in consumer culture. On the other hand, the consumption of commodities like phonograph records risked undermining racism by acknowledging the consequence of African-American expressive culture, even as African America struggled to escape the effects of White privilege. The furtive White consumption of such music and African-American music's centrality in American popular culture likewise hazarded unravelling the shallow ideologies marketers associated with African America. Consequently, the record provides an archaeological mechanism to interpret the ways Black consumers were uniquely positioned in twentieth-century America by racism and segregation, while it illuminates the everyday ways African Americans negotiated their structural positioning.

Commodities like these records are material evidence of the interaction of state, marketplace, and structural inequalities that confirm the ways disparate consumers embrace, contest, and reject a host of interests associated with commodities. In that sense, the narrative of this late twentieth-century material good is similar to the ways a wide range of archaeologists approach commodity consumption and its relationship with power in many times and places; that is, it analyses the concrete patterns by which a dominant state or producer class aspires to reproduce and reinforce their domination through commodity production, trade, and consumption.

Such archaeological studies reflect the complex ways the interests of a host of producers, marketers, and consumers intersected. An archaeological interpretation of recovered commodities can draw connections between a host of national, if not global, structural processes and histories, that were not necessarily evident to those immediately involved. Such analysis aspires to examine the relationships that intersect in such everyday goods. Historical archaeology can draw connections between a host of ideological and economic mechanisms, probing how they connect with the experiences of consumers in diverse contexts. Illuminating the ways in which all of these dimensions of commodity manufacturing, trade, and consumption shaped each other is at the heart of an archaeological perspective that narrates the connections between local and global commodity exchange. As such, an archaeological perspective on commodification is distinguished by the interpretation of such seemingly prosaic things that materialized dominant economic and ideological structures in the everyday life of consumers. Archaeological interpretation aspires to narrate the ways such things assume meaning in exchange and consumption, and reveal how those commodified meanings take shape in a tension between global structural processes and local everyday experiences.

Notes

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PART VII

METHODOLOGIES

CHAPTER 26

SEEING THINGS

The Visual Life of Commodities

ANNA ARABINDAN-KESSON

Most often when the issue of art and the commodity is raised, we are immediately primed to the theoretical implications of art as a commodity.[1] However, with a renewed attention to material culture in the discipline of art history, scholars are giving more consideration to the 'stuff' of artworks: the things of which they are made and which they represent, along with their material remains. This is particularly the case for scholars concerned with the visual culture of slavery and colonialism, as well as those working in less canonical art-historical fields. As an art historian focusing predominantly on the visual history and legacies of slavery and colonialism, I have found that the study of commodities and their representation (textiles, for example) often provides a way to unearth narratives and lives hidden from view in the 'official' archive.[2] It is also a crucial method for deconstructing how meaning is created, and transported, through the visual. I approach these objects as important historical sources, not as mere by-products of historical processes.

The title of this chapter is indebted to Arjun Appadurai's reflection on the meanings of things, as they are inscribed in their form, their uses, and their mobile trajectories. As he explores the relationship between exchangeability and the production of value, Appadurai traces how social value is created—even accumulated—from negotiations that move beyond the simple trade of one thing for another. The representation of raw materials, finished goods, and their uses in visual production form one of the layers by which a commodity's value is ascribed, and constructed, both within and beyond the limits of the market.[3] Such an understanding of an object's social life is particularly helpful in framing the visual significance of commodities, and the importance of how they come to be visually represented. Drawing on an art historical lens that emphasizes the close examination of things, their representation, and their circulation as, or in, artworks can also deepen our understanding about history itself. A model for this approach is Cécile Fromont's visual analysis of Christian objects from Kongo, which also sheds light on the history of Kongo Christianity.[4]

This chapter draws from both of these perspectives, to consider the visual 'lives' of commodities—resources traded and circulated across space—and the meanings constructed through their representation. The first section focuses on the intersection of commerce, colonialism, and aesthetic form. It provides a brief historiographical sketch of different approaches to, and representations of, the relationship between art and commodities. The second section draws on the concept of materiality through an analysis of the visual representations of cotton. This foregrounds representations of cotton's manufacture into cloth, and the symbolic and visual meanings this provided for nineteenth-century audiences negotiating an expanding commercial world. The third section examines how cotton's materiality and its representation became a visual paradigm for understanding commerce, in ways that could reinforce or elide the commodity's association with slavery. The chapter ends with a consideration of some of the colonial legacies of these visual histories, particularly in light of cotton's continued visibility in contemporary culture and a brief reflection on the implications of these case studies, along with future and further directions that visual histories of commodities might take.

Representational Paradigms

Commodities, both raw material and in their finished forms, have multiple visual meanings in, and as, art. Art historians such as Hal Foster and Thomas Crow have examined some of the tensions that underpin art's changing status in the twentieth century, and its function as a commodity, particularly in the context of modern art. Artworks have of course been produced for the marketplace since at least the Renaissance. Foster, however, traces the chronological specificity and representational implications of the art market as we think of it now, emerging from the boom years of the 1960s—an expanding network of commercial galleries and collectors and post-structural shifts in philosophical and aesthetic discourse.[5]

Important new work is also moving beyond analysing the artwork as a commodity, to investigating how commodities, and commodity culture, inform the substance of art itself. Alex J. Taylor shows the effect and influence of corporate patronage on artists' use of physical materials—such as steel. Meanwhile Sophie Cras examines how artists visualized (and critiqued) capitalism's economic systems by incorporating these processes into the very structure of their work.[6] These studies engage with art's commodity status to investigate the processes and practices of artistic form that sustain the distinction between art and objecthood. Nicholas Brown emphasizes form—the internal logic of an artwork—as the key distinction between art and the commodity by tracing the different relationships they create between maker and consumer. An exchangeable commodity has to mediate a marketplace of experiences. Because an artwork demands recognition of its intentionality and its meaning through an attention to form, it is able to suspend its commodity status, and its meaning is never reducible to the logic of the market.

An emphasis on form, to assert art's autonomy, has sometimes been used to disassociate art from its socio-political contexts, and to establish a hierarchy between art, visual and material culture, and popular culture. It was as if these latter categories did not have meaningful-enough form and were compromised because of their entanglements with the social world. Arjun Appadurai's work, however, urges us to hold onto the meanings of 'things' as they emerge from their aesthetic and material forms, as well as through their social contexts. His conception of social value flattens the hierarchies mentioned earlier, by emphasizing an object's mutability and its movements through different networks and forms of exchange. Nicholas Thomas makes some important challenges to Appadurai's theorization, particularly in relation to the distinction between the commodity and the gift. However, he also foregrounds the 'mutability of things in recontextualization' by examining the production and exchange of objects within and between Pacific and European communities. Focusing particularly on colonial encounters and their legacies, he has traced the different registers of value associated with objects that mediated these violent interactions, and the new identities and meanings that have emerged as they moved through networks of exchange—barter, gift giving, trade routes—created by and central to Indigenous and Pacific communities.[7] Christopher Steiner, Ruth B. Phillips, and Elizabeth Hutchinson have also, in different ways, considered how non-Western, in particular West African art works, and art produced by First Nation communities in the Americas, circulated across other networks of exchange, such as tourist economies of trade. They pay special attention to the practices of non-Western artists and their negotiation of these interactions, raising important questions about the relationship of colonial and contemporary cultures of display, collecting, and the categorization of non-Western art in the formation of ethnographic and anthropological discourses. They also probe how artworks, from these geographies, have been valued—as art works, as artefacts—to highlight the limitations, and constraints, of art historical definitions of art itself.[8]

Moving into more specific discussions of the materiality of artworks, scholars of Ancient and Indigenous American art have produced studies of the multivalent meanings of raw materials such as cotton, wool, gold, and silver in the art and culture of these societies. For example, Inca textiles produced from cotton, llama, alpaca, or vicuña wool were woven by highly skilled women and men into cloth with a complex semiotics of texture and colour.[9] These textiles could be ubiquitous and highly prized, decorative and functional, a form of currency and a symbol of social importance. Textiles have also played an important role in the art production of First Nation communities in the Americas, as utilitarian, commemorative, and trade objects. Studies of textile production by the Navajo, for example, have used the semiotics of changing patterns, colours, and textures to trace the changing socio-political landscape in which the Navajo lived and worked.[10] Historians of African and South Asian art have also examined how commodities were central to local artistic production and, in part, sustained by trade across Indian Ocean networks.[11] These studies reveal both the economic structures of artistic production and the ways raw materials were transformed into objects of aesthetic value, mediating a range of social and religious practices. These

scholars also problematize the (ongoing) effects of European and American colonization, while sustaining alternate meanings of artistic production beyond those associated with Western art history.

The raw materials from which these non-Western art objects are made, as well as the art works themselves, enter the frame of European art and museums in many ways, often signifying the various negotiations of colonial 'diplomacy', trade, conquest, and collecting.[12] For example, such objects might have been viewed in cabinets of curiosity or *Wunderkammers*: essential sites of knowledge production across early-modern Europe.[13] Specimens preserved in a cabinet might be replicated in print, as with Hans Sloane's curiosity cabinet, which was accompanied by sketches of his travels in Jamaica. The intermedial translations of new world resources into curiosities reveal the close connections that existed between trading companies, scientific practitioners, and entrepreneurs in the early-modern world. In his discussion of the visual culture of the early-modern Netherlands, Margóscy shows how these networks of art and commerce 'directly contributed to the development of natural history and anatomy, and in the process transformed the practices and intellectual claims of these disciplines'.[14] For example, the naturalist and scientific illustrator Maria Sibylla Merian (1647–1717) created drawings and watercolours of the flora and fauna of the Dutch colony of Suriname in her book *Metamorphoses Insectorum Surinamensium*, made for wealthy collectors and patrons.[15] Her illustrated book, similar to Hans Sloane's natural history of Jamaica, presented the exotic curiosities of these new colonial spaces by emphasizing their commercial potential.[16] Texts like this, sustained by emergent plantation systems and the transatlantic slave trade, drew attention to new commodities for European markets—spices, pharmaceuticals—while also emphasizing their representational accuracy. As the texts circulated amongst European collectors, becoming mobile commodities themselves, they reveal how commodities, and their trade, were changing how people thought of, and understood the natural world. Commercial in their outlook and empirically accurate, these texts laid the groundwork for the rise of science globally, and also transformed image-making techniques. These objects and the networks they moved through played an important role in debates over the epistemological status of visual images themselves—particularly in natural history and anatomy.[17]

The development of consumer society in Europe, coinciding with the expansion of European trade and colonial exploration in the seventeenth century, also gave rise to still-life painting as an independent genre. Seventeenth-century Dutch still-life canvases are defined by their sumptuous detail and highly defined, finished surfaces. These paintings mediated new forms of consumption, as Julie Hochstrasser's masterful study has shown. The genre's materialization of commodity culture emerged alongside and underscored the development of early-modern capitalism.[18] Hochstrasser examines the commodities, their representation and the circulation of art objects, describing their importance for mediating social relations. Other scholars examine the genre's importance for the production of vision.[19] As a closed system of meaning, still-life paintings (see fig. 26.1) might be thought of as 'objects of desire'[20]—connoting both attraction and

inaccessibility—that in the modern era could reinforce the nature of the commodity fetish itself.

Remnants of the genre emerge in the conventions of portraiture and the 'conversation piece'—an informal group portrait usually of subjects engaged in genteel activities—that became popular in eighteenth- and nineteenth-century Britain.[21] As we see in Arthur Devis's portrait of the Orde family, well-dressed sitters were regularly accompanied by a range of decorative objects and textiles, as well as their black servants or enslaved subjects.[22] The depiction of commodities in these scenes helped enhance and reinforce a subject's status and consolidate their position within society.[23] Paintings like these were particularly important for those whose upward mobility in the metropole was made possible by colonial exploitation in the Caribbean or India. Scholars are



FIGURE 26.1 Arthur Devis, John Orde, His Wife, Anne, His Eldest Son, William, and a Servant, between 1754 and 1756. Oil on canvas, 37 x 37 7/8 inches (94 x 96.2 cm), Public Domain, photograph Yale Center for British Art, Paul Mellon Collection

finally beginning to unearth the not-so-hidden histories of these genteel scenes and the families they represent.

These genres are also in conversation with the market scenes of an artist like Agostino Brunias (1730–1796). Market scenes often responded to the changing social relations—of space, proximity, and labour—dictated under an emerging capitalist economy, and later industrialization.[24] Brunias's scenes are located in Dominica where he travelled under the patronage of its Governor Sir William Young in the late eighteenth century. In figure 26.2 he depicts the colony as both a contact zone and a space of bounty, while promoting the island as a site of commercial possibility for British viewers.[25] Along with the panoply of goods and bodies on view, ships are anchored in the background collapsing the distance between the Caribbean and Britain. Drawing on a range of genres, the scene presents a spectacular vision of global colonial commerce and the commodities that connected the Atlantic and Indian oceans worlds.[26] The intimate entanglements depicted here, between the British metropole and colonies, remind us that commodities—and the commerce they often reflected—were not simply objects of representation but have shaped our understanding of aesthetics and aesthetic production itself.[27]



FIGURE 26.2 Agostino Brunias, 1728–1796. Linen Market, Dominica. 1780. Oil on canvas, 19 5/8 x 27 inches (49.8 x 68.6 cm) Frame: 23 5/8 × 31 × 2 inches (60 × 78.7 × 5.1 cm), Yale Center for British Art, Paul Mellon Collection

The Materiality of Things

In the previous section, the emphasis was on the representation of the commodity itself, and the ways its economic value was translated into symbolic meaning. However, now scholars, of different disciplines, interested in the global history of commodities, have begun to focus on the materiality of commodities. The increasing emphasis on materiality in art history owes much to the methodologies of material culture developed by Jules Prown, with their emphasis on close 'reading' of objects (from art works to ephemera), their study of the interaction between material and human worlds, and their broad definitions of what constituted worthy objects of analysis.[28] Material culture studies is now a diffuse and interdisciplinary field that emphasizes the centrality of material(s) to the production, and our understanding, of culture.[29] Materiality studies encompasses a range of disciplines from anthropology to communication studies, with an emphasis on the often dialectical relationship between people and things, the nature of object worlds, and the agency and effect of material life.[30]

The (visual) iconicity of commodities is so often related to their physical qualities: think of the sweetness of sugar, or the way cotton was known as 'white gold'. Materiality is illuminating as a methodology then because it allows us to seriously engage with how the physical matter of a commodity influences its meaning in the world. Consider how in the paintings discussed above artists used colour, sheen, and shading to emphasize the texture, visual appeal, and circulation of these commodities. In these representations, the materiality of commodities was integral to a viewer's aesthetic experience of an artwork. Studying the materiality of an object might involve focusing on its object-hood—its 'thingliness',[31] its physical characteristics, or its production. It might focus more on networks of consumption, or it could take into account the relationship between material meaning and social value. Materiality also offers a way of grappling with the physical transformations of a commodity from raw material into finished product, and the ways these transformations were experienced and understood.[32] Certainly, we need to be aware of the commodity fetishism to which these kinds of readings may run close; however, examining the material qualities of commodities deepens our understanding of their impact in, and on, their social contexts.

Through the case studies analysed in the following section, I consider how different aspects of cotton's materiality influenced people's perception of, and relationship to, this expanding commercially connected world. Cotton's movement as cloth and its industrial production provided a useful visual framework for ways of seeing and understanding spatial relations shaped by commerce. Illustrating, but also relying on, cotton's physical characteristics and the material changes it underwent through manufacture, these visual representations of cotton mediated meanings about trade, the geographies it connected, and the social relations it sustained. This understanding of materiality is particularly significant for understanding the relationship of commodities to cultural worlds of empire. Cotton was a commodity that linked colonial expansion and

sustained and fuelled the transatlantic slave trade. As cloth, it was used to buy and sell enslaved Africans;[33] and in Europe, particularly Britain, the imitation of printed textiles from India was spurred by a desire to meet the demands of West African consumers involved in the slave trade.[34] These nineteenth-century circulations of cotton have been the subject of studies by scholars including Giorgio Riello, Adrienne Hood, and Colleen Kriger, who connect industrial processes to everyday consumption.[35] The emphasis on cotton's transformations across time and space foregrounds its centrality to histories of industrialization, consumption, and, as Sven Beckert so clearly demonstrates, global capitalism.[36] These studies have also moved us from an Anglo-American perspective to exploring the ways trade with Asia and Africa also underpinned European industrialization.[37]

Other histories by John Styles, Beverly Lemire, and Rosemary Crill have foregrounded the materiality of cotton in mediating new experiences of fashion and consumption in eighteenth- and nineteenth-century Britain.[38] Their work alongside that of Sonia Ashmore, Philip Crang, and Felix Driver emphasizes the material histories and relationships between labour and geography that accumulate through and in the movement of cotton itself.[39] In the context of colonial India, Natasha Eaton, in her discussion of Indian uses of English prints, shows how these objects complicated, confused, and even enchanted, the production of knowledge and meaning created within colonial social structures.[40] Drawing on Bruno Latour, she emphasizes the relational and dialogic modes of interaction—the chains of associations—that assemble and reassemble the social worlds in which humans and objects exist.[41] More recently, histories of textile production have focused on the global movement, transformation, and display of fabric to emphasize their importance in creating and sustaining what we now think of as a global imaginary.[42] In these ways, across disciplines, cotton's circulation has provided a framework for tracing, uncovering, and mapping historical experiences of local intersections with global processes.[43] This return to the material also fits well within the broader framework of global history: the movement of commodities is a useful schematic for the long-distance networks and flows that have shaped historical change.

Because of its manufacturing process and physical characteristics, cotton was often used to symbolize commerce as a process that connected people, places, and things. It could materialize a whole network of commercial linkages and meanings. Described by Ralph Waldo Emerson as a fibre that connects,[44] cotton's circulation both symbolized the movement of capital across borders and could visualize the ways local markets were situated within larger national and international systems. This is illustrated in a set of twelve lithographs by the artist James R. Barfoot called *The Progress of Cotton* (figs. 26.3, 26.4). It begins with enslaved cotton pickers in a plantation and ends with a view of printed cotton being manufactured, ready for export to the world. Along the way we follow cotton's geographical and material transformation. We move from a southern plantation to a Lancashire factory, and we watch cotton being cleaned, refined, and processed from raw material into finished product.

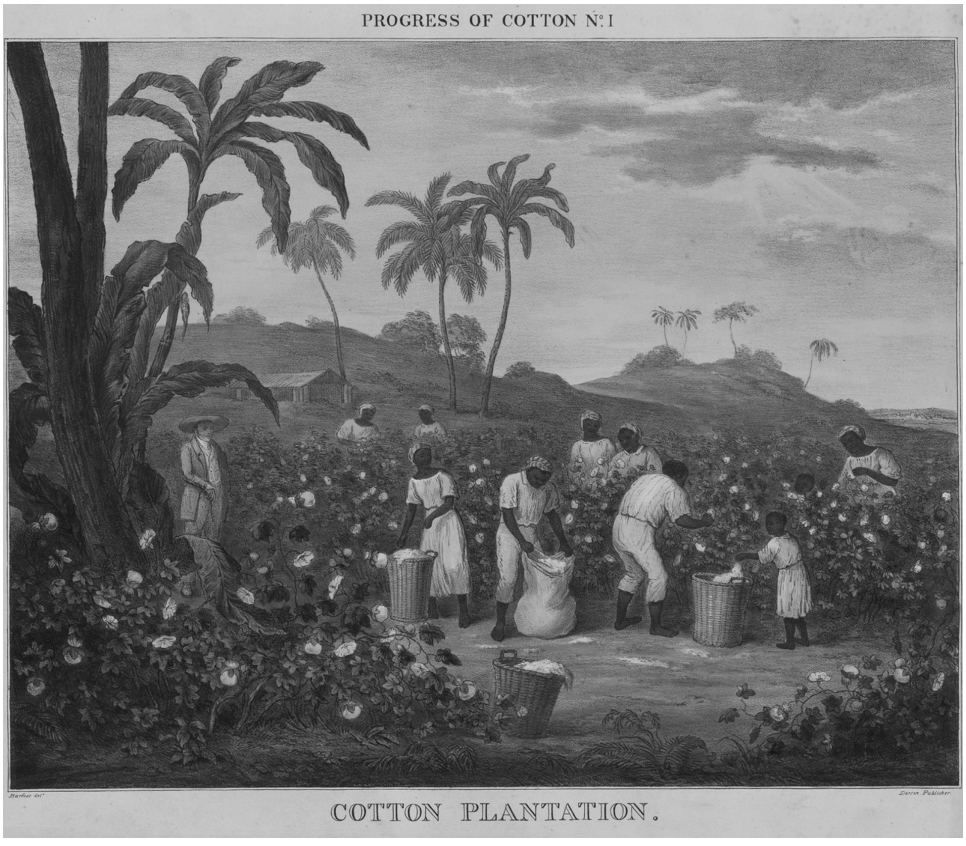


FIGURE 26.3 James Richard Barfoot, Progress of Cotton: #1—Cotton Plantation 1840. No. 1 of a set of twelve lithographs with colour sheet: 34.5 x 48.8 cm (13 9/16 x 19 3/16 in.), Yale University Art Gallery, Mabel Brady Garvan collection

Charles Knight (1791–1873) was a journalist and publisher of *The Penny Magazine*, which was an inexpensive, London pictorial miscellany and one of the first magazines to popularize knowledge about art as well as socializing the English worker.[45] One of his articles is entitled *The History of a Cotton Gown*, and it provided a meandering, informative description of the means by which cotton was manufactured into cloth. Describing the process of trade, from the growth of cotton to its manufacture, his article was an attempt to understand the unique materiality of an object. Knight explains:

> nineteen-twentieths of [clothing] materials have originally had the form of slender fibres and have once possessed either animal or vegetable existence . . . such a statement would excite surprise in many. The short fibers contained in the seed pod of the cotton plant . . . are worked up by man into a fabric or extended substance, from which garment of every form and size can be made.[46]

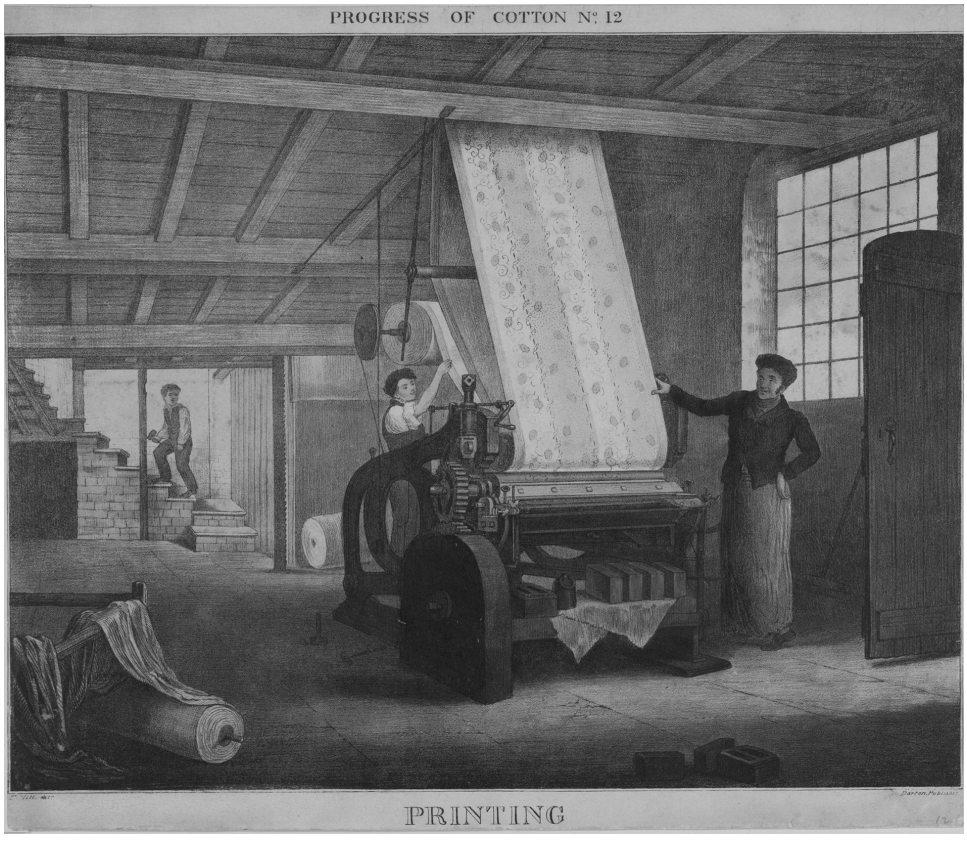


FIGURE 26.4 James Richard Barfoot, The Progress of Cotton. #12 Printing, lithograph with colour, sheet: 34.5 x 48.8 cm (13 9/16 x 19 3/16 in.), Yale University Art Gallery, Mabel Brady Garvan collection.

It is this transformation—from cotton's vegetable state into its physical use—that, for Barfoot and Knight, seems to encapsulate cotton's materiality: a materiality that in turn framed a way of visualizing industrialization itself, as a process that connected people and their locations. Both Knight and Barfoot describe the processes of cotton's manufacture as well as the physical characteristic of the plant, including informal, detailed descriptions with images that reflect the technical perspective of mechanical illustrations of the period published in popular trade histories.[47]

Barfoot's images graphically illustrate how the process of integrating the vegetative and the mechanical to produce the material underpinned the progress symbolized by the cotton trade. The description Barfoot includes with the tenth plate in the series is particularly evocative: 'what a great number of hands the COTTON must pass through before it appears in the form of cloth . . . what a large amount of labor, skill and care, must be bestowed upon it'![48] Here, cotton materializes a geography connecting consumers, factory workers, and merchants with a trade in human flesh.

Visualizing Production, Materializing Slavery

From the perspective of Black studies and art history, the ways in which commodities were and are still used to visualize the networked nature of global history raise important concerns that return us to the question of materiality. Thinking of a commodity like cotton as emblematic, or illustrative, of these global networks can mean missing the material implications—the tensions and contestations embedded in and formulated through—its movement and manufacture. Cotton's materiality, in other words, can also put pressure on market-driven concepts of global history and globalization. This is because cotton, like sugar, is a commodity in which cultural forms and historical experiences of oppression are clearly linked.

I am reminded here of Stuart Hall's observation on British colonialism and historical memory:

> I am the sugar at the bottom of the English cup of tea. . . there are thousands of others beside me that are, you know, the cup of tea itself. This is the symbolization of English identity—that is the outside history that is inside the history of the English. There is no English history without that other history.[49]

This other history is underpinned by the commodification of human life, first in the enslavement and genocide of indigenous workers, and then more specifically through the transatlantic movement of enslaved Africans.[50] To talk about and visualize the production and movement of commodities requires us to also take stock of what Ian Baucom has discussed as the mobile liquidity of Black life.[51]

It is this mobility that centres the market scene by Brunias that I discussed earlier. There we saw how the commodification of Black lives underpinned imperial networks of trade, but also forms of patronage, artistic production, and circulation. What we do not see, although it is implicitly referenced, are the spaces of consumption and display in the metropole. The Black abolitionist and missionary Henry Highland Garnet travelled and lectured extensively in Britain and the United States, emphasizing the links sustained by slavery in the trade of cotton and sugar. In his lectures, he frequently reminded audiences how the everyday act of wearing clothes or using sugar tied the lives of ordinary English and Americans into the trade in enslaved people. Garnett reminded his audiences that there was

> an integral relationship between the price of cotton in Britain and the value of slaves in America. An increase of one cent per pound of cotton in Britain raised the price of slaves in America by a hundred dollars . . . Britain was participating therefore in an international system that promoted American slavery. While America built the 'fleetest vessels' England wove the fabrics that were exchanged for the captive African and forged his chains.[52]

For Garnet, the solution was the boycott of American cotton and the development of alternative sources in West Africa and Jamaica. A strong supporter of the Free Labour and Free Produce Movements, he argued that producing cotton by free labour was, ultimately, cheaper than producing it through slavery.[53] It is worth pointing out here that while the European and American cotton trade was mostly sustained by slave-grown cotton, yeoman farmers also grew subsistence amounts of raw cotton, which was sold north.[54] Garnett constructed a moral economy of cotton, using its associations with conceptions of commerce to urge his audiences to read other meanings of value in its production. By foregrounding how human labour and human bodies were translated into monetary value through cotton's circulation and manufacture, he established a correspondence between British consumption and American slavery and used the materiality of cotton to insert his audiences—as consumers—into this network of commerce.

It is possible that J. R. Barfoot, and his publisher, may have also been abolitionists. His caption for the first plate of his series (fig. 26.3) includes a sympathetic description of enslaved cotton pickers. Yet by the end of the series, this has been replaced with a celebratory description of Britain's manufacturing and industrial prowess. The plates, through their serialization, create distance between viewers and their starting point at the plantation. Eventually the 'taint' of slavery is wiped away in cotton's movement from raw material to finished product. Serialization emphasizes the formal relationship of the part to the whole, so that each phase of labour here is given meaning through its relationship to a larger industrial process. Trade, particularly the ideal of free trade, as a culmination of this system of integration, could then be constructed as a measure of national progress and understood as the basis of harmonious social relations.[55] By establishing a correspondence between commerce and national progress, these lithographs also allow viewers to look back across the manufacturing process from a position that emphasizes oversight and mastery. What is normalized from here is the ordered and disciplined relationship between bodies and the system in which they function. Read this way, we see how these lithographs (themselves produced through the serialization of labour), show the benefits of trade to seemingly outweigh the horrors of slavery.

Barfoot's prints are illustrative of the tensions embedded in the material and visual associations of cotton—and by extension commerce—as a connective thread. They also illustrate how this association provided a representational paradigm for nineteenth-century audiences, drawing on a supply-chain model of commerce to visualize forms of social cohesion through the integration of different regional geographies into one connected landscape. This visual paradigm was spectacularly demonstrated in the exhibitionary practices of International Exhibitions that began with the Great Exhibition of 1851. In the emporium-like surroundings of the Crystal Palace, conceptions of progress, networks of trade, and the logic of display coalesced as visitors were able to experience just how their individual consumption, tastes, and styles connected them to global modes of production.[56] The exhibition was organized geographically, creating a distinction between (pre-industrial) countries that produced raw materials and those that manufactured them, materializing a political economy in which industrial development was often aligned with national progress and the advancement of civilization as a

whole. Cotton also helped materialize the civilizing benefits of commerce. One economist described it this way:

> There is one important feature in the cotton industry, which invests it with more than simple commercial considerations, it is that cotton has greatly contributed to the spread of comfort and civilization among the masses of the people. Hitherto it has been the cheapest material for clothing ever produced. Even where the masses are yet sunk in the most abject condition, and in places not yet brightened by the light of civilization and Christianity, wherever in fact, a cover is needed to shelter man, whether in frozen regions or in tropical climates, a cotton dress and a fustian jacket will ever find a hearty welcome.[57]

Displays brought Barfoot's prints to life. Viewers were able to see how different factory machines operated, peruse different products contributed by manufacturers from across the world, and learn to compare them.[58] Other displays celebrated the artisanal work of non-Western nations, allowing organizers to demonstrate evolutionary differences in human progress through the development of national industry. For example, a set of clay figures from Krishnagur were used to display 'The Hindoo Cotton Manufacture' and show different methods of cotton production. An article described the non-mechanized work of weaving illustrated in the display, observing:

> Weaving is sedentary occupation and thus accords with his inclinations . . . [for] his hand [is] altogether unrivalled in his flexibility of fingers and delicacy of touch . . . the physical preparation for such delicate manipulations . . . is hereditarily transmitted.[59]

In the panoply of objects displayed at the Crystal Palace, commerce was experienced through its commodities and cotton was used in multiple ways to illustrate the mutual benefits and civilizing tendencies of free trade and industrialization.[60] A cotton dress or a jacket could bring viewers into an immediate and sensorial relationship with processes of production, allowing them to better grasp the importance of commerce and their involvement in its international networks. Understanding how the cloth you wore, the things you ate or drank, and the utensils you used were emblems of, and emerged from, these transregional and transnational processes also meant seeing anew the everyday spaces one inhabited.[61] Cotton's symbolism provided a way of presenting slavery as a necessary institution, within an integrated system of trade, or apparently eliding it from view altogether.

However, not all viewers were taken in by these tactics. The United States contributed a cotton gin, cotton fibre, and New England cotton cloth to the 1851 Exhibition. In response, the satirical magazine *Punch* published a scathing article called 'Sample of American Manufacture', which depicted an American Eagle dressed as a planter, holding a whip in his left hand while his right hand points towards four shackled, enslaved figures: two kneeling and two standing. The image was accompanied by an article that mocked the American exhibit and ended by suggesting 'America hire a black or two to stand in manacles, as American manufacture, protected by the American eagle'.[62] This article inserted slavery into the commercial celebration of the Great Exhibition, illustrating how

it was embedded in, and sustained, the networks of trade on display. It also foregrounded the market mechanism that turned bodies into mobile commodities just like the non-human commodities on view. The implications of commercial exchange are here taken to their logical conclusion: the market for goods on view at the Great Exhibition is also the market that dictates the buying and selling—the mobile liquidity—of Black lives. While ostensibly a critique of American slavery, and the hypocrisy of a nation, the 'Sample of American Manufacture' also functioned as an important critique of the British involvement in the slave trade, showing how cotton was both a symbol and a result of this trade in human life.[63]

Subsequent exhibitions across Britain and the United States continued these modes of display. In the 1881 Atlanta Cotton Exposition, viewers could watch Black sharecroppers pick cotton in small plantations, follow its production into cloth in the Manufacturer's Hall (which later became a cotton factory), and then see it worn by local dignitaries.[64] By following the production of cotton, viewers were encouraged to envision the boundless potential of the South (which included newly freed African American labour), and see it as a centre of the cotton trade and consequently a centre of a new American empire.[65] A few years later at the 1884 Worlds Industrial and Cotton Centennial Exposition in New Orleans, Mary Townsend published a poem that described this global cotton empire connected by cotton:

> Cotton, that ruler of each hemisphere . . .
> Creeping, creeping, . . .
> . . .
> Gently across the hemisphere it trod . . .
> While all the world assents . . .
> Hangs its white banner—over the Continents[66]

An illustration in the magazine *Puck* (fig. 26.5) showed Uncle Sam and a regal Southern Queen dressed as Columbia with her Phrygian hat, surrounded by an array of industrial goods including cotton bales, welcoming the countries of South America. The caption makes the meaning clear: 'The Southern Queen bids all the wide world welcome to her door . . . where the white splendour of her heaping bales answers the snow of crowding foreign sails'.[67] The free trade imperialism displayed at these industrial fairs influenced the development of commercial museums, many of which acquired objects from these international exhibitions, and were created to promote the benefits of commerce.[68] In these museums, merchants, workers, and manufacturers could view samples of commodities—at all stages of production—and methods of manufacture from around the world. In a similar vein as industrial design schools in Britain, the aim of such institutions was to educate American and British manufacturers so that they could successfully imitate and produce commodities for the overseas consumer. Cotton played a crucial role here as both Britain and the United States sought new supplies and markets to support their cotton industry.[69] Through commerce, new forms of colonial conquest in Africa, South America, and Asia could be achieved.[70]



FIGURE 26.5 Joseph Ferdinand Keppler, The World's International and Cotton Centennial Exposition, New Orleans, La., open from 1 December 1884 to 32 May 1885. Chromolithograph in *Puck* 16/405 (1884 December 10), Library of Congress, Illus. in AP101.P7 1884 (Case X), Prints and Photographs, LC-DIG-ppmsca-28257.

These kinds of exhibitionary practices took another form in bureaucratic structures like the British Empire Marketing Board. The board was created to encourage, sustain, and improve the quality and distribution of British colonial production. Advertising media were crucial to its function, and the board employed talented and sometimes well-known artists to create posters that would quite literally sell empire. These posters used a linear, narrational style at a time when Cubist abstraction was in vogue.[71] Their depiction of raw materials like cotton and sugar commodified colonized spaces and colonial workers in ways that return us to the market scenes of Brunias. British colonies were presented as exotic sources of extraction, resources to refuel the industrial decline that Britain faced in the first half of the twentieth century.[72] While Brunias maintains a safe distance between metropole and colony, these posters emphasize how consuming the fruits of empire could sustain its very centre.

Conclusion: Commodities as Visual Metaphors

The representation of commodities takes multiple forms and has multiple meanings. Their representation, particularly through the visual culture of cotton, has been linked to

commerce, meanings of consumption, and experiences of the intersection of the global and the local. What has emerged is how the materiality of commodities—their physical substance—was used to visualize and mediate meanings about people, places, and forms of labour. A material culture approach allows us to address the layers of meaning that accumulate in an object—meanings that change and transform, like the commodity itself as it moves across time and space and between human worlds. Materiality is a useful standpoint for working through the concept with which the chapter began: the social lives of a commodity. It is a perspective that requires working through the implications of things: from their physical substance to their symbolic meanings, the situations from which they emerge, and the contexts they influence and shape, including the very forms of their representation. Finally, materiality is a concept that also takes into account the multiple and often contradictory meanings that are embedded in, and emerge from, objects. Images of cotton's manufacture, for example, suggest how audiences in Britain and the United States interacted with new industrial processes. Their serialization also materialized a particular logic of social integration in a way that textual sources could not. While I have examined the material significance of cotton, I have also emphasized how this materiality is not merely illustrated in works of art but also influenced the ways people saw and experienced their social worlds.

In the future, visual histories of commodities might engage with the material interactions between commodities and visual forms, asking how commodities emerge in art and visual culture, as medium, as subject, or investigating their impact on processes of artistic production. Scholars might use art works to further dissemble and unravel the changing meanings, often contradictory, associated with commodities. This might expand our comprehension of a particularly historical moment, while also deepening our understanding of how visual culture and commodities act on their particular contexts. Further studies might also consider what representations of commodities can tell us about the broader processes that sustained commodity production itself. Reading commodities through the lens of art history can provide important methodologies for approaching these objects as historical documents, able to open up and expand our knowledge of particular places and times. What may also emerge from these studies is a deeper engagement with the importance of visual forms themselves, in disciplines outside art history, as agents and actors in the production of historical knowledge.

Today, commodities continue to be used as visual metaphors. In fair trade campaigns, the movement and circulation of cotton or coffee are used to visualize our participation in a supply chain of exploitation and consumption. The emphasis in many of these campaigns is on the 'haptic' (a term that refers to the perception and meaning of objects using the sense of touch). By buying and wearing cotton, we participate in the exploitation of workers, whose labour is literally embedded in the object, forms part of its material substance, and is materialized in the threads and the stitches, in the texture and the shape. This was brought to life in 2017, for example, when consumers found pleas for help, by Turkish workers, sewn into clothes sold by the fashion label Zara.[73]

These kinds of promotions recall the abolitionist campaigns mentioned earlier. They emphasize how our experience of wearing textiles is intimately tied to, and mediated by,

the physical labour of those who produced them. Historicizing these constructions of the haptic nature of cotton cloth, I have explored the ways cotton cloth was used to visualize and market enslaved Black Americans as commodities. Conversely descriptions of its touch and feel—the experience of wearing, working in, and manufacturing cotton used to clothe enslaved people—reveal how it materialized other affective experiences of connection and kinship, creating the space to construct alternative meanings of value beyond the confines of the market.[74] New directions in material culture studies that investigate and explore the haptic might then provide alternative methods of reading commodities and their visuality. It is these alternative meanings that artists like Yinka Shonibare, Lubaina Himid, Leonardo Drew, Grace Ndiritu, and Nikhil Chopra foreground in their use of commodities in and as art. Working with commodities like cotton and sugar, they animate its social lives. They excavate hidden histories that continue to frame our present, but use them to envision new possibilities for our future.

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CHAPTER 27

COMPUTATIONAL METHODS FOR THE HISTORY OF COMMODITIES AS ILLUSTRATED BY APPLE PIE RECIPES

MARIEKE VAN ERP AND ULBE BOSMA

The increasing availability of high-quality digitized archives provides humanities scholars with a wealth of new research opportunities, as well as challenges.[1] Some scholars claim that we have arrived in the era of Big Data for humanities, but our research methods have yet to grow in line with the processing of the vast quantities of text and structured data that are now available.[2] Nevertheless, advances in natural language processing (also called 'computational linguistics' and 'language technology') and the Semantic Web (the field of study concerned with representing knowledge in a machine-readable manner, allowing for integrating information from different sources and reasoning over them) are slowly becoming part of humanities scholars' toolboxes, assisting in the answering of their research questions. However, as these are research fields in themselves, it is no trivial task to adapt these technologies to the idiosyncrasies of humanities case studies.

Generally, computational workflows follow four steps: data collection, data pre-processing, data processing, and results analysis. In name, these steps are not so different from traditional humanities research projects, although they do require different tooling, and in some cases a different conceptual approach. Data collection often involves downloading large data files ('data dumps') from data providers or using a computer programme to send automated queries to a data provider's application programming interface (API). Then data pre-processing involves cleaning the data and transforming it into the correct format for processing. For example, the Dutch National Library offers a data dump of its seventeenth-century newspapers, which comes with

a great deal of coded information. Since a particular use case might only require one aspect of this, it might be necessary to extract and copy elsewhere the relevant data for subsequent processing.

Data processing is the step where data are transformed to information or knowledge. In the case of text corpora, this might entail extracting commodities, locations, and relationships between them from texts. The result of this step typically does not answer a humanities scholar's research question, but it gives them the structured data to inspect and base analyses on. In an interdisciplinary research project, this step can lead to answers to research questions of computational researchers, such as to what extent automated tools can extract a particular type of information from a text. Having processed the data, results analysis is where scholars analyse and contextualize the automatically extracted information to answer their research questions. As processing large text corpora may yield a file with hundreds of thousands of entries, statistical analyses or visualizations are often employed.

In this chapter, we first present an overview of current developments in the use of computational methods for the humanities, in particular commodity history. This is followed by an illustrative case study related to the history of sugar. To illustrate the use of computational linguistics and Semantic Web methods in commodities research, we have chosen to analyse apple pie recipes, demonstrating what computational study of historical apple pie recipes might reveal about changing sugar consumption. Accessing and processing these recipes allow us to illustrate the benefits and challenges of using computational methods in each step of the workflow. This is used as the basis for a discussion around the challenges and limitations of such computational methods. The chapter concludes with an outlook and guidelines for the inclusion of computational methods in commodity history research.

Computational Methods for Commodities Analysis

To the best of our knowledge, no large-scale computational projects for commodity history have been funded yet. The best example of a digital commodity history project is *Trading Consequences*, which received funding as part of the second *Digging into Data Challenge* (an international grant competition for the exploration of the possibilities of using large-scale digitized collections in social science and humanities research). In that project, a team of commodity historians, computational linguists, computer scientists, and librarians in Britain and Canada created tools to perform a Big Data-driven analysis on nineteenth-century commodity trade. Language technology was adapted to automatically analyse two million pages of digitized historical documents. From those documents, the system recognized commodities, locations, and relationships between these (for example, Ontario cheese producers shipped three tons of cheddar to

London).[3] The locations were also 'geoparsed'—that is, located on a map. As the *Trading Consequences* team has shown, this is far from being a trivial problem to solve, with, in some cases, several locations bearing the same name (there are, for example, more than twenty Oxfords in the United States), while sometimes personal or organizational names are difficult to distinguish from place names.[4] The extracted information was recorded in a database and visualized for analysis.[5]

Despite funding for interdisciplinary commodity history research lagging, scholars are nevertheless exploring computational tools developed in various related disciplines that can be integrated with commodity history research, potentially enabling both the analysis of large bodies of text and the representation and analysis of knowledge. Contemporary language technology is already being used in many domains, with personal assistants such as Siri and Alexa using it to tease out user requests, and companies and political parties using it to analyse (social) media streams to monitor public opinion. Humanities scholars have also begun to make use of such technology to make sense of the past. For example, studies such as those of Kettunen and Pääkkönen and Ehrmann et al. have applied it to the study of historical newspapers,[6] and Hendriks et al. to the recognition and linking of entities in historic Dutch notary records.[7]

Traditionally, language technology tools operate in a pipeline fashion, consisting of several modules that each perform a language analysis task. Usually, modules are first aimed at splitting a text into sentences and words; then one or more morphosyntactic analysis steps are performed to obtain information about the tense and singular and plural words, followed by the so-called semantic analysis, where words are analysed for their meaning. This includes word-sense disambiguation (e.g. does the mention of 'wood' in a given sentence refer to the hard fibrous material that forms the main substance of the trunk or branches of a tree or shrub, or to an area of land, smaller than a forest, that is covered with growing trees), and named entity recognition and disambiguation (e.g. detecting that a mention of Oxford in a sentence is a location and refers to the town of Oxford in Maine, United States). Each of these steps can introduce errors in the process that can proliferate through the pipeline.[8]

In the early days of the field (from the 1950s to 1990s), rule-based methods were employed. However, current tools are generally based on statistics and make use of machine learning models. Progress in natural language processing (NLP), with links to the most recent studies, is being tracked on the NLP-progress website. At the time of writing, deep learning approaches seem to be achieving the best results within many of the benchmark tasks. Such approaches are often not employed in a pipeline-like fashion. Instead, large amounts of text are ingested into a neural network, which creates a so-called embedding space. In this hyperdimensional space, similar words should find themselves in close proximity, according to Firth's distributional hypothesis.[9] The hyper-dimensionality of these embedding spaces allows for text analysis tools to investigate in what relation a word occurs with respect to another word that is known to be a personal or a location name. However, a major downside of such approaches is that generally large amounts of data are needed to achieve good outcomes. When working with specific languages or domains for which not many digitized sources are available this approach may not be suitable.

A further problem encountered in historical research is the longue durée of the subject of study. 'Diachronic language variation'—that is, the changing meaning of words—can present an additional challenge. This is an issue that is receiving some attention within the research community[10]—for example, with the recent funding by PDI-SSH in the Netherlands of the MacBERTh project, which seeks to develop new ways of analysing historical text by making the underlying meaning of words, phrases, and abstract sentence patterns accessible, searchable, and analysable. The goal of this project is to enable present-day researchers to uncover and draw connections between concepts and ideas from the past.[11]

High-quality structured data can help NLP methods overcome the data sparsity problem that often confronts historians. The Semantic Web research field specializes in the creation of such data sets. The notion of a 'semantic web' was contained within the vision of Sir Tim Berners-Lee when he created the World Wide Web.[12] One major difference is that links on the WWW are not typed, a hyperlink only expresses that there is a link between webpage A and webpage B, whereas those on the Semantic Web are typed, thus creating a machine-readable web that allows for reasoning over information. Such data structures allow, for example, for zooming in and out between individual addresses and regions in a geographical data set, but also to connect disparate information sources such as information about locations, tax registers, dialects and sociolects, and entertainment venues to investigate potential correlations. This is something that Noordegraaf et al. have carried out, looking at late nineteenth- and early twentieth-century theatre and cinema culture in Amsterdam. Another example is *Wikidata*, which is an open access Semantic Web resource that can be read by both humans and machines. For example, its entry on cotton states that it is a plant fibre, found in the Indus Valley in the sixth millennium BC, but it also specifies its uses and has connections to identifiers in sources such as the *Encyclopaedia Britannica*, the *Art and Architecture Thesaurus* and the *Europeana Fashion Vocabulary*, each of which contains more detailed information about this concept from a different perspective.[13] In general, Semantic Web research is focused on how to represent and use such knowledge, a task in an order of complexity that has eluded philosophers since Aristotle—and which the Semantic Web community will in all likelihood not resolve, which is why most research efforts are now devoted to focusing on specific domains rather than one single all-encompassing data set.[14]

As it is not possible to capture all world knowledge in a single database, many smaller domain-specific data sets have been created that are connected through some shared entries. This resource has become the Linked Open Data (LOD) Cloud. For example, it is not necessary to capture the fact that Amsterdam is a city in the Netherlands at 52°22'N 4°54'E in every data set. It is more efficient to have a high-quality detailed data set describing locations and then have other data sets refer to that rather than to redo the task for every resource. Such databases are generally called 'knowledge graphs', as they follow a graph structure and represent (world) knowledge. Whereas many Semantic Web data sets focus on contemporary data, resources focusing on historical data are starting to receive more attention, in particular in the geospatial domain. Examples include Isaksen et al.'s emerging graph of ancient world data,[15] and the FAIRifying

Historical Toponyms project that started in 2021 at the International Institute of Social History.

Semantic Web technologies are beginning to gain traction in historical research. For example, in biographical and proposographical research—with Koho et al. integrating historical person registers as linked open data.[16] As many linked open data resources are modelled from an entity-centric perspective, research into persons and organizations is a likely crossover between disciplines.[17] However, large-scale diachronic geographical resources, such as those created by HiSGis in the Netherlands,[18] are opening up the field of semantic digital humanities, as Meroño-Peñuela et al. have discussed.[19] Practical programming examples can be found on the Programming Historian website, and in the humanities data-analysis case studies recently published by Karsdorp et al.[20]

The combination of NLP and the Semantic Web is gaining popularity, with conferences that combine the two, as well as dedicated handbooks such as that of Maynard et al.[21] Generally, language technology is either used to create or to improve Semantic Web data sets such as knowledge graphs,[22] or even create them from texts; or Semantic Web data are used to improve language technology.[23] The following section presents the apple pie case study showcasing the use of these technologies.

Case Study: Apple Pie Recipes

Sugar consumption has become a central topic of contemporary debates about health and well-being. Social and medical sciences are focusing on how individual characteristics and social conditions shape unhealthy sugar consumption patterns. Much of this research does not take a wider view on how these patterns have emerged over time and have become part of market forces and national cultures. Leaving the important question of relative prices aside, this case study will focus on how cultural factors, and culinary traditions in particular, impinge upon sugar consumption. The point of departure for this is that despite global market convergence of sugar prices, significant variations in demand emerged within the industrializing countries of the nineteenth and early twentieth centuries. It takes up the work of Anne McCants and Maxine Berg, which looks at the cultures of consumption as an explaining variable.[24]

Urbanization, with its accompanying increase in real incomes, played a crucial role in the spread of sugar consumption in Europe. In general, per capita income was highly correlated to sugar consumption, with rising wealth resulting in increased use until a certain saturation level had been attained. However, a difference can be seen between countries. While nineteenth-century per capita income in the United States ranked in the middle of the five countries studied, as illustrated in Fig. 27.1, its per capita sugar consumption was three times higher than that of France and Germany. Indeed, by the mid-nineteenth century, per capita sugar consumption in both the United States and Great Britain was at least three times than in Germany and France and at least 25 per cent higher than in the Netherlands. Sugar consumption in the United States soared in

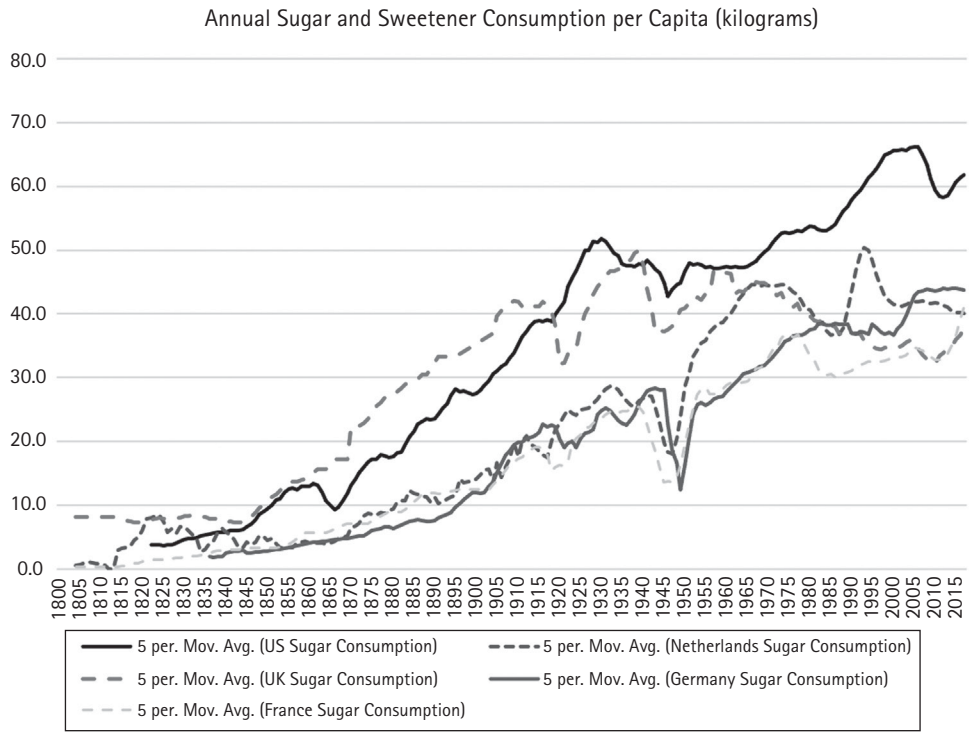


FIGURE 27.1 Sugar and sweetener consumption per capita over time for the United States, Netherlands, UK, Germany and France.

Sources: Stephan Guyenet and Jeremy Landen, 'Sugar Consumption in the US Diet between 1822 and 2005', Online Statistics Education: A Multimedia Course of Study (http://onlinestatbook.com/). Project Leader: David M. Lane, Rice University; Julius Wolf, Zuckersteuer und Zuckerindustrie in den europäischen Ländern und in der amerikanischen Union von 1882 Bis 1885, Mit besonderer Rücksichtnahme auf Deutschland und die Steuerreform Daselbst', *FinanzArchiv* 3/1 (1886): 71; British Parliament, Select Committee on Sugar Duties, 1862, Appendix 1, 87; H.C. Prinsen Geerligs, *De Ontwikkeling van het Suikergebruik*. Utrecht: De anti-suikeraccijnsbond, 1916; Hans-Jürgen Teuteberg, "Der Verzehr Von Nahrungsmitteln in Deutschland Pro Kopf und Jahr seit Beginn der Industrialisierung: Versuch einer quantitativen Langzeitanalyse," *Archiv für Sozialgeschichte* 19 (1979): 348; Dutch Central Bureau of Statistics; Cahiers de l'I.S.E.A., Économies et Sociétés, (Paris: Institut de science économique appliquée, 1971), 1398, Table 16; FAO, *The World Sugar Economy in Figures 1880–1859* (Rome: FAO, 1961), table 14; FAO STAT, "Food Balance Old" (with Sugar*0,9 accounting for loss).

the nineteenth century, to equal the already high British consumption in the early twentieth century. This trend has continued into the present, with US per capita consumption of sweeteners in general widely exceeding the intake of Europeans. From the 1960s on, artificial sweeteners have grown in popularity; since the late 1970s, high-fructose corn syrup has taken over large parts of the US sugar market. This agrees with the point made by McCants and Berg that demand for commodities is also a matter of taste in the most literal sense.

To demonstrate this, we have looked at apple pie recipes to trace sugar consumption patterns through time from 1830 onwards, as well as to compare the sugar consumption between different countries using NLP. Apple pies were chosen as the recipe use

case as many European countries and their colonial offshoots have some form of apple pastry as part of their culinary tradition, due to the apple tree's flexibility and resilience. This has involved the analysis of hundreds of apple pie recipes from historical corpora from the Netherlands, United States, France, and Germany. This approach is inspired by Christian Reynolds, in his comparison of thirty-three roast beef and Yorkshire pudding recipes that established which ingredients are representative, in which quantities, and using which cooking times.[25] Here, we only consider sugar quantities in apple pie recipes, with the intention of showing how computational methods can be used in commodity history research. Through this case study, we demonstrate the process of using automatic methods for collecting and analysing sugar quantities to show that such sources can provide an interesting perspective on historical consumption patterns. However, their use is not without caveats, and computational methods need to be adapted to this historical dimension.

Historical newspaper collections usually do not contain topical tags indicating which of the articles are, for example, recipes or sports announcements. The first step was therefore to detect which newspaper articles or pages constituted apple pie recipes. For Dutch newspapers, we used the Dutch National Library's Delpher.nl portal; for American articles, we used the Library of Congress's Chronicling America Portal; for French, we used the Gallica portal maintained by the Bibliothèque Nationale de France; and for German, we used the Europeana Newspaper data set.

In the retrieved texts, we found articles that discuss that a particular person mentioned likes apple pie or reports on the price of particular goods. As van Erp et al. have shown, it is possible to train a machine-learning algorithm to further filter the articles to distinguish recipes from non-recipes.[26] For this apple pie use case, such algorithms were trained for Dutch, English, and French. For German, from the 1,029 text snippets that contained the term *Apfelkuchen*, *Apfelstrudel*, or *Apfeltorte*, sugar is only mentioned in eleven snippets, which were inspected manually. Only four of these were apple pie recipes and there were two recipes for other types of pie whose instructions were *Alles weitere wie beim apfel-strudel*. ('henceforth as with Apfelstrudel'). In the apple pie recipes, one recipe had no indication of how much sugar was to be used, while in two recipes, the OCR (Optical Character Recognition, the technology that transforms a scan or photo of a text into a text file) 'misread' the quantity and turned the $^{3}/_{8}$ or $^{1}/_{4}$ Pfund into '% Pfund'. Only one recipe's sugar quantity did come out of the digitization process readable, namely, calling for two hundred grams of sugar. Furthermore, the recipe calling for $^{1}/_{4}$ pound of sugar was promoted as 'French apple pie', illustrating how elements of different cultures intermingle.

The different libraries offer digital access via different means, meaning that for each library, the data collection and clean-up were slightly different. Some libraries, such as the Dutch National Library, provide access to individual newspaper articles, whereas for the Library of Congress, the page level is the most fine-grained access level. In the Gallica portal, our search queries returned 750 hits, but only 147 text files could be downloaded. For some files, the library does not allow off-site access, and for other files no OCR transcript was available. As a quality check, we manually checked the 136 text snippets that

the French machine-learning algorithm classified as a recipe. The classifier correctly distinguished recipes from non-recipes in ninety-two cases, resulting in an accuracy of 68 per cent. Most important to note here, is that the classifier was too lenient in deeming a snippet a recipe, thus leading to some false positives. This is less of a problem than too many false negatives, as in the next step, where we aim to detect the sugar quantities, the snippets that are not recipes but erroneously classified as such will not contain any mentions of sugar, thus filtering themselves out. Finally, our selection yielded sixteen apple pie recipes.

This significant reduction in results shows that looking for recipes in large corpora is often akin to finding a needle in a haystack. But it also shows the power of using a computational method. Although we cannot be certain that all apple pie recipes were retrieved (as this would involve inspecting all available documents in the collection), we can fairly quickly filter out the documents that are definitely not apple pie recipes.

To extract sugar quantities from the newspaper recipes, we used regular expressions from Dutch, English, and French, looking for phrases of the pattern '<quantity><unit><sugar>', with variations in quantities as they can be expressed by numerals, fractions, or words. Units might include grams, as well as ounces, pounds, and measures such as 'tea cups'; while sugar might be specified only generically, or more specifically as, for example, 'powdered sugar' or 'brown sugar'. For quantities that are not expressed in grams, we normalized those to grams using conversion tables (e.g. one American cup equals about 200 grams, one standard European cup 180 grams). This is an example where Semantic Web technology comes in handy as structured sources conversion tables combined with reasoning over data can help us make these conversions easily.

As the historical recipes contain some gaps, or are in some cases not even available, we also included some contemporary recipes published online. The advantage of working with digital-born data is that there are no digitization artefacts to contend with, and the increasingly popular use of micro-formats makes it relatively easy to extract ingredient information. Information encoded in micro-formats is not visible to website visitors, but 'under the bonnet' indicates that '300 grams' is a quantity and that 'apples' is an ingredient, making the creation of an ingredients database in theory trivial. However, minor errors and the use of different formats does still require some work. For Dutch, we analysed the thirty-three contemporary apple pie recipes that came up through a query for *appeltaart* on Allerhande—the recipe resource of the largest Dutch supermarket chain. To be able to say something about German sugar consumption, we analysed 630 contemporary apple pie recipes from the Chefkoch website. Marmiton is the most popular French recipe website, hosting over 70,000 recipes. We downloaded and analysed the first 208 recipes for the query *tarte aux pommes* that were tagged with the categories *tarte aux pommes* or 'dessert'. To account for the lack of British historical recipes, we downloaded all 115 recipes tagged with 'apple pie' from the Allrecipes UK website. We also downloaded 133 contemporary American recipes from the Allrecipes US website. The publication dates of these are not always easily retrieved, therefore the English and American recipes are mostly clustered in 2020 as we filled this in as a dummy date to be able to plot them.

The extracted and normalized sugar quantities are plotted in Fig. 27.2. As the x-axes illustrate, there is a difference in the coverage of the collections used. There are also large differences between recipes, as the quantity trends plotted using the mean value per year per country illustrate.

Figure 27.2 shows that the amount of sugar in American apple pie recipes is well beyond the Dutch. The data seem to indicate that American apple pies are also sweeter than those of the French and German. In that respect, our findings underline the available data on sugar consumption. Although it is a well-known fact that the US sugar consumption ranks amongst the highest in the world and, many would say, is excessive, we are only at the beginning of understanding the historical roots of this phenomenon. One factor that may explain the rapid growth of sugar consumption in these still highly rural societies with a modest income level is that some influential dissenting Protestant denominations abstained from alcohol or at least preached moderation. For Quakers, alcohol was not strictly a taboo, but they generally rejected it as blurring spiritual life. Sweets, by contrast, were allowed and embraced. Philadelphia, the capital of the Quaker colony Pennsylvania, emerged as a centre of sweet making in the thirteen colonies and later the United States. German immigrants, making up one third of the state, introduced the art of sugar bakery and pastry making.[27]

While the link between abstaining, and later on in the 1920s US anti-alcohol legislation, and the proliferation of sugar consumption deserves further investigation, the mechanization of household tasks demonstrably enhanced sugar intake. This also has a direct bearing on the sugar input in apple pie recipes. After the Civil War, baking powder combined with sugar and refined flour became the basic ingredients for home baking, which was made easier with the cast iron wood stove. Invented in 1796, it was present in most households of moderate means by the mid-nineteenth century.[28]

In the course of the 1930s, sugar was inserted in many standardized foodstuffs in the United States.[29] Massive advertisement efforts helped to make industrial food socially acceptable, and in these foodstuffs liquid invert sugars were generously dosed because of their powerful preserving qualities. Moreover, sugar is cheap and gives producers of sweetened products enormous margins of profitability.[30] The authors of American cookery books found jobs with big corporations, with recipes in popular magazines putting together mass-produced convenience food. Sugar was also a crucial ingredient in cake mix. Since fewer and fewer women made their own bread, cake mixes became a new and promising niche for flour companies. In the United States, it was a booming business in the 1950s, but it had to push through the idea that housewives could do something creative with this cake mix. Eventually, the standardized taste and texture and the reliability of the product (as long as the directions on the box were followed), have made cake mixes a product that most Americans, as well as Europeans, prefer.[31] The food industry accustomed Americans to high sugar contents in their pastries, which had a direct effect on the apple pie recipes.

The data we were able to collect suggests that the amounts of sugar indicated in the apple pie recipes correlate with national per capita sugar intakes, and thus with specific culinary practices that can have a stronger explanatory power than per capita income

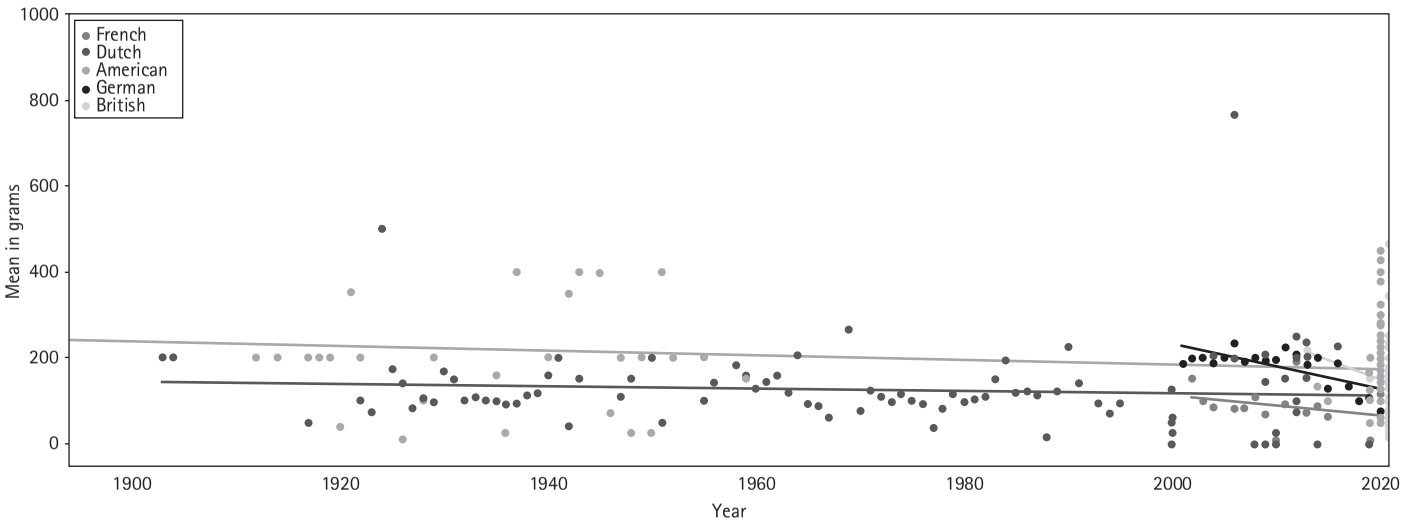


FIGURE 27.2 Averaged sugar quantities over time for Dutch, American, French, German, and British apple-pie recipes.

and urbanization ratios. The outlier position of the United States, which had a low urbanization ratio compared to the other countries from which we collected apple pie recipes, exemplifies the importance of cultural factors.

In this study, we found data covering the time before the year 2000 for the United States and the Netherlands. These show the American apple pies being sweeter on average than the Dutch. Figure 27.2 also shows surprisingly large divergences between the sugar content of apple pie recipes within national collections. This means that at a given time and within the same country, one apple pie can be much sweeter than the other. This is particularly surprising because we would expect that the preference for sugar in specific dishes or pastries would be rather stable at a given time and place. A more detailed analysis of the recipes would potentially enable us to obtain information about portion sizes derived from the amounts of flour and apples used. However, this requires a much greater language technology effort. For pre-mixed ingredients such as pie crusts or ready-made pie mixes, information such as package sizes would be required, indicating that there is plenty more work to be done.

Towards Computational Commodity History Research: Challenges and Limitations

There are several challenges that make it difficult to work with digitized resources such as recipes from newspapers and cookbooks. Firstly, not all issues of a series may be digitized—for example, because items were not preserved prior to digitization. The Dutch National Library estimates that they have digitized about 15 per cent of all newspaper pages published in the Netherlands between 1618 and 2005. Via different projects, the digitization efforts may have a bias towards certain time periods or publications. This is essential to take into account when analysing such data.

Big Data are often defined around four Vs: volume, variety, velocity, and veracity. Volume is how many items the data holds or how much space it takes up on a hard drive. Variety is one of the most important aspects for computational humanities data, as we often need to deal with different types of sources. In our apple pie use case, that is exemplified by the differences in the corpora explored. But one can even use this to dig deeper using the metadata of the corpora. The collections investigated, for example, provide detailed metadata on the publication the text first appeared in. In the case of Chronicling America, for example, specifying which state the newspaper was published in would allow for regional comparisons. Velocity is at what speed the data need to be processed. For many history projects, the data are likely to be older and do not have to be processed in real time—as, for example, election polls need to be. Veracity applies to the trustworthiness of the data—for example, by including its provenance in the project,

one can inform users of where information came from and what data transformation steps were performed on it.

Another aspect of historical research is its long-term perspective. As customs, traditions, but also writing styles and vocabularies have changed over time, the data sets spanning longer periods reflect this. For example 'Pyequick' ads in 1940s American newspapers (such as the one shown in Fig. 27.3) illustrate that cooking was often deemed the realm of women, and many women would have been taught basic or more advanced cooking skills as part of their upbringing. This results in older recipes often being less detailed than recipes one would expect to find in contemporary publications.

Dealing with older language variations and units of measurement requires adapting tools and ensuring that extracted information is normalized, as we did with cups to grams in our use case. Venues such as the 1st International Workshop on Computational Approaches to Historical Language Change held in 2019 and projects such as Impresso are helping to address this.[32]

Under-specification of information is an issue that occurs in many types of documents that were meant for readers from that time. To exactly interpret the details in our recipes, for example, the information about the number of expected portions would be needed, while in, for example, historical job advertisements, interpretation of 'a good salary' requires background knowledge of the customs of the writers. Performative methods are employed to rediscover aspects of daily life in the past, but this knowledge is often not yet translated into automated systems.[33] Herein lies a promising research direction for the Semantic Web.

Older recipes also often do not follow a strict 'list of ingredients followed by the instructions' format, but ingredients are rather mentioned as they are used resulting in recipes where for the dough, firstly twenty grams of sugar is called for, followed by six or seven sugar lumps (which are each about eight grams). To fully extract both 20 grams + 6 or 7 lumps of sugar, the entire recipe needs to be fully understood requiring deep natural language understanding. This would involve computationally analysing the sentence structure, extracting and 'translating' phrases such as '6 or 7'. Artefacts of the digitization process, such as OCR errors, hamper these processes, as not all characters are recognized correctly, which in some cases only renders parts of a sentence unreadable (e.g. *grammes de sucre*) and in some cases render entire documents unintelligible (e.g. *Pfund Zucker* for *Pfund Zucker*). In particular, the use of the fraktur font in German publications makes this quite difficult—but the problem also occurs with other typefaces. This is as yet an unsolved problem, although it is an active research area in language technology.[34] Lastly, we do not know how often people would eat pie, how big a portion they would typically eat, and how sweet the apples used typically are. However, as the graph shows trends over time and averages, the role of sugar can be indicated.

Advances in computational methods and the digitization efforts being made by archives are opening up new research angles for our subjects of study. Language technology tools can now be employed to extract quantities, commodities, entities, and much more from texts, and advanced Semantic Web data models allow us to create knowledge graphs that represent our data in many dimensions. However, these technologies are often



FIGURE 27.3 Ad for 'Pyequick' mix including recipe on how to use it.

Source: Evening star, June 22, 1947, Image 119. (Washington, D.C.) at https://chroniclingamerica.loc.gov/lccn/sn83045462/1947-06-22/ed-1/seq-119.pdf

not (yet) adapted specifically to deal with diachronic language variation, OCR errors, and underspecified information. Furthermore, the large amounts of data might make it easy to forget that there are gaps and blind spots in the data. We therefore presented a use case that shows the steps involved in setting up and carrying out a computational commodity-history use case using apple pie recipes as a proxy for sugar consumption. Our use case shows that much can be extracted, but the analysis and contextualization are always a *pas-de-deux* between the technology and the scholar. As language technology and Semantic Web are active research fields, we recommend that computational projects are carried out in an interdisciplinary fashion, to benefit from the latest developments in the computational as well as the humanities domains involved.

We also see recipe studies as an important research avenue to help us understand the role of cultural factors and culinary traditions in shaping the demand for specific commodities. To conduct such research in a comparative way is tantamount to searching for the needle in the haystack. Through our use case we have shown that computational methods enable us to find these needles and expose patterns in how specific commodities end up in recipes. Pattern recognition can be complemented with qualitative analysis of recipe texts and of images included in recipes. We conducted our research for a limited number of countries and were somewhat handicapped by the restricted access to digitized collections. The results are nonetheless promising for further research, which could include all countries that have substantial digitized collections and all commodities that can be found in recipes that are popular in a variety of countries.

We invite readers to think about data sources and other perspectives that can be explored with researchers from other disciplines that can lead to a greater understanding of commodities' history and not just in the realm of consumption but also with regard to the incorporation of nature and labour in commodity frontiers. Some avenues of research pertaining to the production of commodities could be the analysis of maps and GIS data as exemplified in the work of Rombert Stapel at IISH[35] and the *Machines Reading Maps* project at the Alan Turing Institute. In addition to this, information on where commodities are grown or produced, labour migration records can be used to assess supply and demand in different economic spaces.[36] By analysing the impact of commodities production, trade, and consumption in a spatio-temporal setting, new, multifaceted view of the 'lives of commodities'[37] can be constructed.

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CHAPTER 28

MAPPING COMMODITY HISTORIES

Historical GIS and Canadian Forest Products

JIM CLIFFORD, JOSHUA MACFADYEN, AND STÉPHANE CASTONGUAY

Digital mapping tools, including traditional desktop Geographic Information Systems (GIS) software and cloud-based interactive maps (e.g. StoryMapJS and ArcGIS StoryMaps), are creating new opportunities for researching and disseminating commodity histories. Historical GIS involves linking spatial data (points, lines, polygons, and geo-referenced digitized historical maps) with other database information including dates, numbers, and text.[1] It not only results in maps to visualize historical quantitative data, but also serves as an iterative methodology to prompt new research questions and provide tools to answer questions by examining information gleaned from historical maps, qualitative information, and textual sources. During the past few decades, urban, public health, agricultural, environmental, demographic, social, and economic historians have demonstrated the power of combining maps with data using GIS software. Some of these histories address commodity production, but most are not explicitly commodity histories.[2] Most of these studies have focused on local, regional, or national studies, with little crossover with the global and transnational turn in other fields of history. Most early historical GIS projects focused on digitizing national censuses, but recent innovations in the use of qualitative textual sources open the field to topics and questions without qualitative data sets.[3] Free and open source software combined with open access textbooks and tutorials also help reduce the barriers that limited the spread of historical GIS methods beyond research-intensive universities with budgets for expensive commercial software licenses. Digital mapping and GIS offer important new methods that may be incorporated into commodity histories.

Roger Tomlinson began developing the Canadian Geographic Information System in 1963, creating the first GIS using computers to better understand and manage natural

resources across Canada.[4] From the start, GIS involved using computers to analyze the location of different resources to facilitate high modernist economic development. However, GIS were always focused on analyzing and visualizing spatial patterns, and it took decades for the software to include effective and user-friendly tools for visualizing trends over time and overcoming problems associated with the constant flux of geographic boundaries.[5] Historians and historical geographers, including some interested in commodities, trade, and slavery, have used databases with spatial information since the 1970s and GIS software since the 1990s, but challenges related to the software, the data available in the archives, and the questions historians have asked have slowed its adoption as a central methodology in commodity histories.

Following a review of the use of digital spatial history methods by commodity historians, these are illustrated through case studies focused on the lumber and firewood frontiers in central Canada during the nineteenth century. The versatility of GIS methods for commodity historians is demonstrated through the use of different data sets and archival sources; concluding with some remarks about the potential power of digital spatial history in mobilizing academic commodity histories to reach a public audience.

Historiography

Charles Joseph Minard, famous for his maps of statistical data created in the nineteenth century, published commodity flow maps in the 1850s and 1860s to visualize British coal exports and French imports, and to analyse the growing supply of cotton from Asia during the American Civil War (see Fig. 28.1).[6] Minard created a visual way to represent data that remains very similar to a lot of maps produced with GIS software today. Historical atlases in the twentieth century continued to use Minard's approach to produce flow maps and other visual representations of quantitative data to show the growth of global trade and migration during the centuries of European imperialism.[7]

Historical geographers and economic historians have incorporated maps into their publications for decades. Historical geographers in particular included maps that became antecedents to later computer-generated maps created using GIS software. Cartographers built on Minard and developed a range of approaches to visualize geographical data. Graeme Wynn's 1981 book *Timber Colony* serves as a good example. He includes maps of the forest composition; maps that show timber licenses by regional district; and he expanded on maps of sawmills to include the geography of licenses owned by individual companies.[8] These maps are not significantly different from many produced using GIS for publication in recent years, and the artistic talent of cartographers often produced more effective maps than GIS software for conveying information to readers. The major difference is in the research and analysis stage, where the iterative process of exploring spatial data would have all been done by hand and

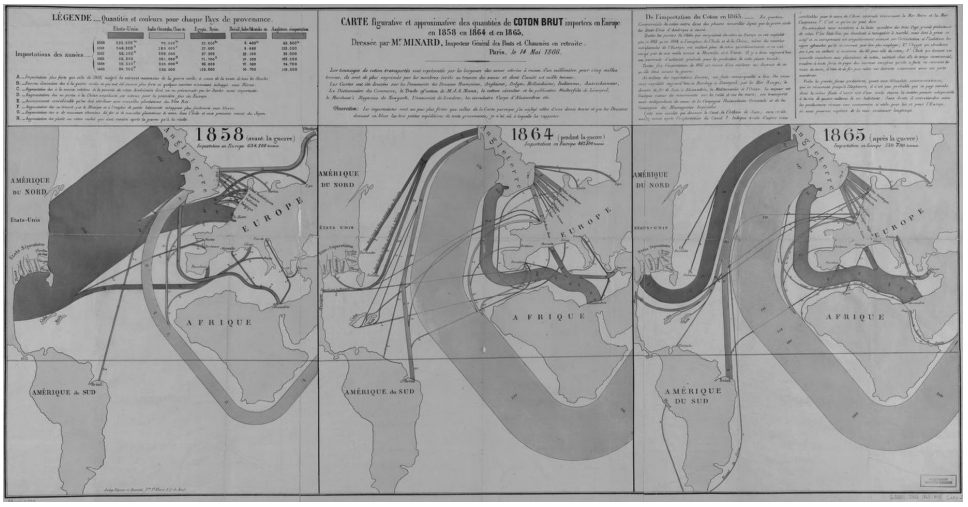


FIGURE 28.1 Charles Joseph Minard, *Carte figurative et approximative des quantités de coton brut importées en Europe en 1858, en 1864 et en 1865* [Paris: S.N, 1866] Map. https://www.loc.gov/item/99463789/.

Source: Library of Congress, Geography and Map Division.

without the powerful ability to make quick maps, overlay different types of data or systematically analyse large collections of historical maps.

The Transatlantic Slave Trade database is another early example, with historians using computers to record and analyse the voyages of slave ships across the Atlantic. A number of individual projects began during the 1970s and 1980s, in different national and regional archives, all working to convert archival records into machine-readable data sets. During the 1990s, a larger effort brought these existing projects together and began compiling a very large database of the transatlantic slave trade. Given these data included geographical information such as the European ports where the ships left from, the locations on the coast of Africa where slaves were purchased, and the ports in the Americas where the slaves were disembarked, along with the number of slaves and other qualitative information, the database has been used to produce an atlas, maps, and animated visualization showing the scale and geography of the trade.[9] This project stands out as the single major historical GIS project that extends its scope beyond the national scale with coverage of the transatlantic and inter-American slave voyages. It is also notable for extending this methodology beyond North American and European histories.

William Cronon used early computational mapping methods in his 1991 history of commodities and the making of the American West.[10] His work predates the introduction of desktop GIS software and is not discussed in the existing literature on the origins of historical GIS methods, but it is probably the first example of a commodity history based on GIS methods and it might be one of the first examples of a historian using these methods. Cronon used SAS (Statistical Analysis System) software to create a database

of bankruptcy records and SAS/GRAPH (the graphics component of the software that allowed for basic GIS visualizations) to map capital flows between Chicago, the western states, and New York City.[11] This innovative method allowed him to show that Chicago not only became the hub for railways and the flow of wheat, cattle, and timber in the American west, it also became the second city for American capital and a crucial nexus in the flow of capital between New York and the west. He did this by mapping the counties where bankrupt companies based in different regional centres owed money during the 1873–1874 crash. This showed that creditors in cities like Minneapolis-St Paul or Milwaukee had limited geographical reach to nearby counties, while creditors in Chicago were lending to borrowers as far away as Nebraska and Missouri.[12] Visualizing these data on a map is essential in Cronon's analysis, as it demonstrates the unique geography of Chicago's capital when compared with other regional cities and allows him to historicize and add nuance to the work done by central-place theorists.

The *Laboratoire de géographie historique de l'Université Laval* also produced some innovative early work using historical GIS to explore commodity histories.[13] Jean Martin uses Joseph Bouchette's *Topographical Description of the Province of Lower Canada* published in 1815 to identify and map the abundance of timber available, the proportion of the land under cultivation, and the number of sawmills in each of the regions discussed by Bouchette.[14] The *Laboratoire de géographie historique de l'Université Laval* also used GIS early on to produce a historical atlas on trade and commodity production of the St Lawrence Valley in the nineteenth century.[15] These early examples merit attention as the *Laboratoire* innovated the use of textual sources in historical GIS long before this became a significant trend in the past decade and because we use this same source later in this chapter. It also confirms that historical geographers, with their established traditions of using analytical cartography, were at the forefront of the transition to using GIS software in the mid-1990s.

Cronon's approach, more than Martin's, foreshadowed a lot of the early work done by historians using GIS, as he visualized quantitative data and used maps to show geographic patterns. In the decade that followed, historians turned to national censuses that recorded population and economic statistics and used GIS to identify patterns in the otherwise overwhelming data. For reasons that are not clear in the historiographical record, commodity historians were slower than historians in fields like environmental, economic, and urban history to see the utility of historical GIS methods. We speculate that GIS was more intuitive to introduce to research focused at the local, regional, and national scale during a period of time when many commodity historians focused on the global scale.

Historians using GIS software and methods started meeting at the Social Science History Association conferences in 1998, and this led Anne Kelly Knowles to edit four early collections of scholarship: a special issue of *Social Science History* in 2000; a special issue of *Historical Geography* in 2005; and two edited collection books published by ESRI Press in 2002 and 2008.[16] The history covered in Knowles's first overview of the field ranged widely in topic and geography, from a longitudinal analysis of migration in England and Wales, to Tokyo's spatial history, to an article on China's fertility

transition.[17] *Past Time, Past Place*, published in 2002, featured two articles on race in American cities, a topic that remains a focus of historical GIS research. It included papers from scholars using GIS for archaeology and ancient history—two other fields that continue to push the boundaries of GIS and related digital methods. The rest of the chapters ranged from the Salem witch trials to American Civil War battlefields and the causes of the Dust Bowl.[18] The 2005 special issue focused on large-scale infrastructure projects to build national historical GIS databases that matched census data to the correct geography boundary lines, but it also included papers on other topics, including indigenous agriculture, the environmental history of a Virginian forest, and land tenure in nineteenth-century Japan.[19] Most of the national projects focused on digitizing census data for countries in western Europe and the United States, but the China Historical GIS project, based at Harvard starting in 2001, was a very prominent exception with more than two thousand years of place names and administrative boundaries available for researchers to use in their historical GIS research.[20] *Placing History* included revisionist environmental histories of the Dust Bowl and of New England's early settlement, more work on the Roman world and the American Civil War, and some introspective papers on what GIS meant for the field of history and teaching.[21] What is notable is the absence of papers on commodity histories or the Transatlantic Slave Trade database. The closest these multiple collections of essays came to commodity histories is a paper on regional economic growth in 2000.[22]

In the decade that followed Knowles's foundational work in historical GIS methodology, the field expanded and started to include work on commodities and industrial histories. *The Routledge Companion to Spatial History*, edited by Ian Gregory, Don DeBats, and Don Lafreniere and published in 2018, includes historians using a wider range of source material than the quantitative data privileged in the early years.[23] It generally still does not include explicit commodity histories focused on long-distance trade, but Knowles has a chapter on her 'Mapping the American iron industry' project, and the book includes chapters on railways and fish supplies.[24] The field remains more focused on urban social histories of gender, race, and inequality than on histories of commodities and consumerism.

The work featured in *The Routledge Companion* confirms GIS historians have not followed the global and transnational trend of other fields in recent years, with most work centred on a nation, or on cities or regions within one nation. Of the twenty-eight chapters, only three extended beyond a single nation. This is not particularly surprising, as key data sets, like the national census, create a strong incentive to work at these scales of analysis. It is also very notable that only two articles extend beyond North America and Europe, with Ruth Mostern on Imperial China and Zephyr Frank on Rio de Janeiro.[25] Billy K. L. So and David W. Wong edited a special issue of the *Annals of GIS* in 2012 featuring articles focused on twelfth-century and republican China and modern Japan, in a refreshing alternative to the Anglosphere focus of so many of the other collections of essays.[26] So also led the GIS Database of Cotton Textile Industry of the Greater Songjiang Region from the Late Ming to the Mid-Qing project, which stands out as a rare example of GIS being used for commodity history, with the data available

for scholars who can read Chinese.[27] A few recent urban history publications focused on cities in India and Nigeria suggest that historians are starting to use GIS to study other regions of the world.[28] For commodity history in particular, Martin Giraldo's impressive MA thesis on environmental and land-use transformation that proceeded widescale sugar production the Cauca River Valley in Colombia is an indication that we can expect new work in the coming years.[29]

Individually and in collaborations, two of us have addressed commodities in several recent transnational studies. Joshua MacFadyen's *Flax Americana* used GIS to track the movement of this small commodity at multiple scales and across two regions that cross the US-Canadian border.[30] *Trading Consequences*, an interdisciplinary and transatlantic partnership, applied a new approach using textual sources in historical GIS to create research tools for commodity historians.[31] Historians partnered with computational linguists and data-visualization computer scientists to use geoparsing—a form of text mining—to identify spatial patterns in a large corpus of historical documents.[32] The project mined millions of pages of text in the *United Kingdom Parliamentary Papers* and the *Canadiana Online* collections for sentences that mention commodities and place names, and then used software to automatically ground the place names to a latitude and longitude while trying to correctly distinguish between, for example, London, England and London, Ontario. The project identified many of the limitations of mining nineteenth-century sources with tools trained on modern text using modern place name gazetteers, but the end result proved useful for historical research, as it created an effective search engine and interface to find discussions of commodities in particular places and periods of time. For example, Jim Clifford used the tools to better understand the decline of Russian tallow exports to British soap makers during the second half of the nineteenth century.[33]

Canadian Timber Case Studies

Historical GIS methods extend well beyond visualizing and analysing large quantitative data sets. New cloud-based GIS software lends itself to piecing together the geographical elements of historical questions in an iterative process where the maps help identify patterns and in some cases prompt new questions that require further work in the archives. It provides a useful tool for amassing the insights of all the different scholars who have published on the timber trade in what became Quebec and Ontario supplemented by primary sources with new information, all in a spatial database that allows us to identify patterns in the geography of the timber industry over time.[34] We are using historical GIS methods as a part of a larger project focused on the environmental history of long-distance trade between the St Lawrence watershed and Great Britain during the nineteenth century. Because this research builds on a century of scholarship, historical GIS tools are very useful in making sense of the existing scholarship and identifying areas for revision.

Historians started writing about Napoleon's continental blockade creating opportunities for the British North American timber industry and decades-long struggle over the protectionist tariffs in the early twentieth century.[35] Canadian historians made commodity exports central to their national histories and timber exports were amongst the most important staples. Harrold Innis's 'staples thesis' placed commodities at the centre of Canada's economic, social, and political development, where furs, fish, timber, and wheat exports dominated at the cost of other forms of economic development. Innis also used the different regional staples to explain the different cultures between the wheat-dominated prairies in the west, fish in the Atlantic provinces, and the centralized capitalist power built on the fur and timber trade in Quebec and Ontario.[36] The staples thesis remained preeminent in Canadian history during the mid-twentieth century and it went on to influence commodity historians in other national contexts, even as it faced heavy revision within Canadian historiography.[37]

Arthur Lower was a collaborator with Innis and he focused much of his career on the importance of the timber trade. He began with his 1928 dissertation and retired by reaffirming the centrality of timber exports to the United Kingdom, when he finally revised his dissertation into a second book at the end of his career in 1973.[38] Countless more books, articles, dissertations, and theses were written in the 1970s and 1980s before political economy largely fell out of fashion among Canadian historians.[39] However, the vast majority of this work predated spreadsheets, desktop GIS software, and online primary sources. Few of these historians revised major tenets of Lower's interpretation and instead built on his contributions through more detailed regional studies or research on particular firms and individuals. Returning to this field with new questions and new tools, we have identified some persistent blind spots in the historiography. We address some of these in the case studies below.

The sawn lumber trade, including the innovation of using spruce along with pine in sawn lumber production, started decades earlier than Lower suggests, and Canadian exports to Britain were significantly more resilient during the free trade period between 1867 and the end of the century. Moreover, just as social and economic historians redirected the field's attention from staple exports back to internal domestic activity, new GIS resources, including maps of commodities in nineteenth-century censuses and transportation records, help us better understand the complex impacts that commodity flows had locally as well as nationally and internationally. For instance, firewood was another important component of the Canadian agri-forestry economy that was often eclipsed by histories of timber exports and new fossil fuels such as coal. By mapping both lumber and firewood as they moved across Canadian railways, we see that these two forest commodities expanded together; and even firewood, typically a local forest resource, began to reach new markets in Central Canadian and US cities.

For this chapter, we began looking at Joseph Bouchette's 1815 maps of Lower Canada and Vermont, the first detailed maps that include grist and sawmills. GIS software makes it possible to geo-reference scanned historical maps, giving the computer the location of the maps and making it possible to identify interesting historical features on the maps by creating points, lines, or polygons. We linked the points created to identify

mills with other information, such as type (grist or saw), dates, and text describing the mill (when available). A clear pattern appeared in the initial results of this historical GIS database showing the concentration of mills in Vermont and far fewer in Lower Canada (see Fig. 28.2). This confirmed the evidence from the historiography and some key primary sources that the Lake Champlain region south of the US border had an established timber industry in 1807 and provided much of the squared timber and sawn lumber during the early years of large-scale timber exports from Quebec (1808–1812).

The Bombardment of Copenhagen in the late summer of 1807 cut the British off from Baltic ports that they relied on for much of the timber used by the Admiralty and the wider British economy. Timber was an essential resource, and the British were forced to turn to their remaining colonies in North America to shore up their supply. Between 1807 and 1812, Lower Canada's timber exports increased from 11,502 loads to 64,971 loads. Lower notes that 'Over half of the oak timber exported from Quebec during the years 1807–12 came from the Lake Champlain region,' and our calculations suggest the same was true for squared pine timber.[40] In fact, if we extend the calculation from

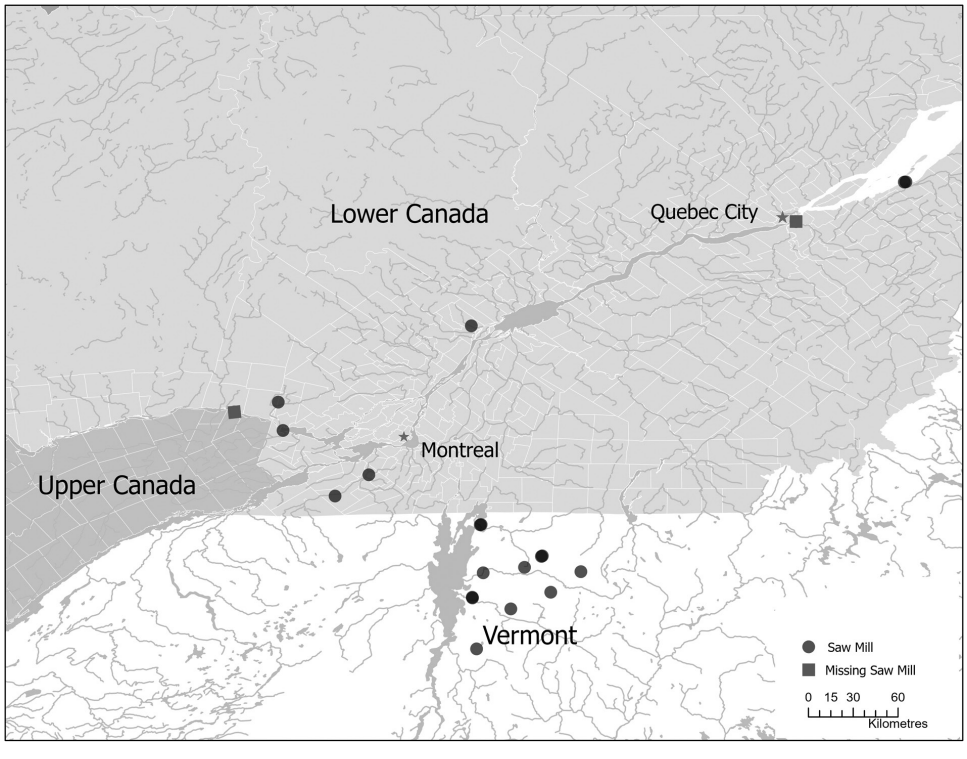


FIGURE 28.2 Mills on Bouchette's 1815 maps of Lower Canada and Vermont. Darker circles show locations with two sawmills.

Source: Joseph Bouchette *(Composite of) To His Royal Highness George Augustus Frederick . . . This Topographical Map of the Province of Lower Canada, Shewing Its Division into Districts, Counties, Seigniories, & Townships* (London: William Faden, 1815).

1800 to 1812, the Lake Champlain region accounts for almost 80 per cent of oak and pine timber exported from Quebec City—and this includes 1808 and 1809 when the Jefferson Embargo slowed the passage of rafts down the Richelieu River (see Fig. 28.3). The embargo came when President Thomas Jefferson attempted to pressure the British to stop the impressment of American sailors by cutting off trade with the British North American colonies.[41]

Deals, which were twelve-foot-long sawn lumber boards that ranged between two and a half and three inches thick and seven and eleven inches wide, only account for about a fifth of Lower Canada's exports between 1800 and 1812. The majority of timber was exported in hewn (squared) logs and cut to size at timber yards and building sites in Britain. These early sawn lumber exports, nonetheless, have a lot of historical significance, as they required more capital investment in sawmills and technological innovation. The abundance of mills recorded on Bouchette's maps in Vermont led us initially to think Quebec City sourced most of the deals from south of the border and prompted us to look for confirming evidence. The customs records instead showed a declining contribution from Vermont during the early surge in exports from Quebec. Between 1800 and 1812, Lower Canada imported about half the quantity of deals it

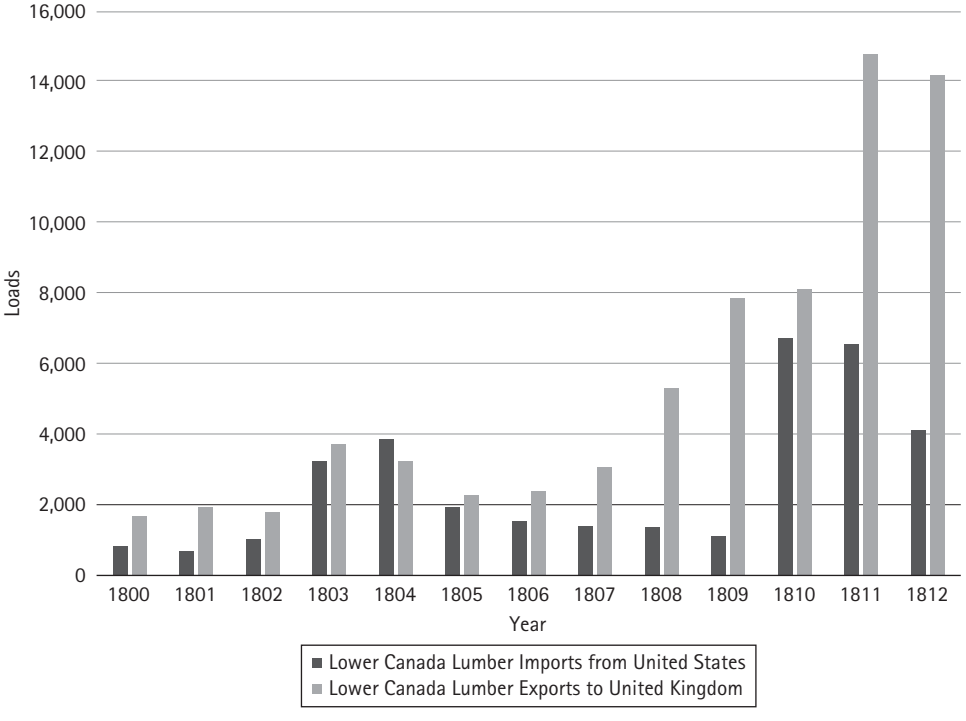


FIGURE 28.3 Lower Canadian Lumber Imports and Exports 1800–1812.

Source: 'Account of Rafts of Timber Cut within American Lines Imported into Lower Canada and Exported from Quebec, 1800–20', *19th Century House of Commons Sessional Papers* 17/66 (1821); Henry Petty-Fitzmaurice, 'Select Committee of House of Lords on Means of Extending and Securing Foreign Trade. First Report (Timber Trade), Minutes of Evidence, Appendix', *19th Century House of Commons Sessional Papers* 3/269 (1820): 92–97.

exported to the United Kingdom, and during the Jefferson Embargo, the percentage dropped to 26 per cent in 1808 and 14 per cent in 1809 before a surge of deals arrived after the embargo collapsed in 1810 (see Fig. 29.3). The records from the St John customs office on the Richelieu River make it clear that domestic sawmills produced at least half of the deals exported and they played a particularly significant role during the first two years after the Danish straits closed to the British, when deal exports from Quebec City increased from 66,720 deals and deal ends in 1807 to 171,640 in 1809. This leaves the question of which mills scaled up production and allowed Quebec City to more than double its exports in two years. While Bouchette's maps prompted the initial questions, they did not contain the answers. We turned to textual sources to augment the mills identified on the 1815 map and to learn more about which mills produce deals for export.

Two of the most significant early sawmills in the Canadas, at Montmorency Falls and Hawkesbury, did not appear on this map. The Hawkesbury mill, built in 1805, was on the Upper Canada side of the Ottawa River, which probably explains its omission. We have not found records that clarify the scale of the early mill that burnt down in 1811 shortly after it transferred ownership to the Hamilton Brothers, so it is unclear whether it made a major contribution to exports in 1808 and 1809.[42] The Montmorency Mill was located close to Quebec City and should have appeared on the map, given Lower explains that Henry Usborne—who moved to Quebec City from London in 1801—was 'the pioneer of the deal export trade, having put up the Montmorency Mills at the foot of the Montmorency Falls at an early date'.[43] Bouchette published a book describing the geography of Lower Canada alongside the maps and he does include a page on Montmorency Falls, but makes no mention of the mill.[44] We turned our attention to when the mill was built and realized that while the site was identified as an ideal site for a sawmill in 1795, construction did not start until 1811.[45] Bouchette must have visited this region before 1811, as he only found a rundown manor house alongside the natural waterfalls.[46] The first effort was aborted and the site was sold to Henry Usborne and Peter Patterson. Patterson completed the challenging engineering work that involved diverting the river down a canal built into the rock to power the mill in 1818.[47] The absence of this mill on Bouchette's maps forced us to re-evaluate Lower's description of the early deal trade and start looking elsewhere for more information.

In the process of searching for this information, we realized another large mill in the vicinity of Quebec City played an crucial role during these early years. Lower briefly mentions John Caldwell's involvement in the deal trade but mostly focuses on the scandal in the 1820s and 1830s, when this politically well-connected Receivers General was caught using public money in his private investments. We followed this thread and found that his equally well-connected father, Henry Caldwell, built a sawmill in 1804 at the mouth of the Etchemin River just south of Quebec City, across the St Lawrence River. With Napoleon's efforts to block trade with Britain in Europe, Henry Caldwell lobbied Henry Dundas, the First Lord of the Admiralty, to begin sourcing some of the timber for the navy in British North America.[48] The Etchemin Mill is marked as a grist mill on Bouchette's map, but he confirms the Etchemin powered a number of sawmills

in his accompanying text.[49] This is an important component of the history of Quebec's timber industry as it shows leading capitalists were investing in this export-oriented trade before 1807, which helps explain how they scaled-up exports so quickly in the four years that followed. We knew Henry Usborne arrived early, in 1801, but it is now clear the Caldwells, along with other prominent Quebec City business leaders, John Mure and George Hamilton, were all working on developing timber and lumber exports by 1804. This additional information from primary and secondary sources allows us to augment the points found on the Bouchette map with additional sawmills (see the missing sawmills marked on Fig. 29.2).

John Caldwell built on his father's early investment in the Etchemin Mill by expanding these works and experimenting with the production of spruce deals. Lower argues:

> [William] Price became the pioneer for Canada in the export of spruce deals to England, and for many years he alone traded in them. It took a great deal of persistence to sell a new article in England, and English buyers kept on claiming that Canada spruce was not equal to the whitewood of northern Europe; but eventually this product became well established.[50]

Price did not arrive in Quebec until 1810 and was not doing business on his own until later in the decade. John Caldwell introduced spruce deals to the British market by 1808 or 1809, and they were a significant part of both Caldwell and Price's exports by 1821 when both these men testified before a select committee at the British House of Commons.[51]

The Select Committee on Foreign Trade responded to petitions from London's timber merchants involved in Baltic trading networks who wanted the tariffs to end with the conclusion of the wars. Here the importance of the spruce deals trade started by Caldwell becomes clear. Opponents of the tariffs argued that the economic and social benefits were limited as most of the timber was either imported from the United States or cut by gangs of Americans harvesting white and red pine on Crown land with limited benefit to landowners or labourers in Lower and Upper Canada. Caldwell, Price, and John Hamilton responded that the spruce-deal trade provided winter opportunities for farmers to be economically productive, as spruce trees were abundant in the agricultural regions of Lower Canada (while pines were scarce).[52] Moreover, the mills were significant capital investments and provided more work for people in Upper and Lower Canada. The Select Committee decided to recommend leaving the tariffs in place with minor adjustments, and it would take another two decades for the free trade advocates to win a significant reduction in timber tariffs.

This examination of sawmills in a specific region is an example of historical GIS in practice. By first working with maps of sawmills built during the first decade of the export-driven timber industry in the Canadas, we began to understand the oversights in the historiography, find primary and secondary sources that could clarify the errors, and eventually start to recognize its wider historical significance. By building a mill for export and realizing they could market spruce, which grew much more abundantly on

their own land around Quebec City than red or white pine, the Caldwells launched an important sector of the timber industry and significantly increased the geography of the Canadian British timber trade to much of the St Lawrence Valley.

Mapping St Lawrence Exports in 1898

The end of the imperial preferential tariffs for colonial timber is said to have resulted in the rapid decline of Canadian timber exports to the British market, and the re-orientation of Canadian forest industry to the United States to offset the steep drop in transatlantic trade. Presented by Arthur Lower in his doctoral thesis of 1928, then republished in his books *The North American Assault on the Canadian Forest* (1938) and *Great Britain's Woodyard* (1973), the classic account of this commercial, industrial, and ecological decline of the Canadian forest industry is still present in the international literature on the nineteenth-century timber trade. Thus, the Swedish economic historian Sven-Erik Åström has drawn on the writings of Lower to make Canadian imports a relatively brief 'episode' in the history of British timber imports, which have otherwise been oriented towards the ports of Norway and the Baltic region. More recently, British historical geographer Michael Williams took up this interpretation in his study of planetary deforestation.[53]

The *Timber Trades Journal,* published weekly in London starting in 1873, is an essential source on these later decades in the nineteenth-century Canadian-British timber trade. In addition to analysis of the international timber trade and debates about whether North American and Baltic forests were being depleted, the journal included weekly tallies of all the ships and their cargo landing in British ports. This is an overwhelming amount of data that we have only begun to process, but our preliminary efforts are yielding interesting results.

Historians have shown that Canadian timber remained a major commodity on the British market after the complete elimination of tariffs on imported wood in 1866.[54] An increased demand in Great Britain enabled Canadian exports to keep a steady presence on the British market, albeit proportionately smaller compared to its Baltic competitors.[55] While correct, these assessments overlook the complexity of consumption patterns and the structure of the timber trade. For instance, Canadian square timber was driven off the British market not so much because of the elimination of the tariff than because of the decreasing consumption of that commodity. Timber merchants who imported squared timber to be sawn by British saw pits and mills turned to deals, boards, and battens: 'foreign shippers are gradually doing all the sawing formerly done in this country; and the same thing applies all round, both to hewn and sawn'.[56] And this sawn lumber was increasingly supplied by Baltic ports in the second half of the nineteenth century.[57] The abolition of the timber tariff is often invoked to explain the increased timber imports from the Baltic, but the modernization of sawmilling industries in Sweden and Russia made it possible—especially after the liberalization of

forest use in both countries. Swedish exports acquired 30 per cent of the British market of sawn goods and 40 per cent of the French market.[58]

Our research using historical GIS to map the timber exports from Montreal and the other St Lawrence ports in 1898 (see Fig. 28.4) and London's timber imports (see Fig. 28.5) shows the resilience of the Canadian lumber industry decades after the end of

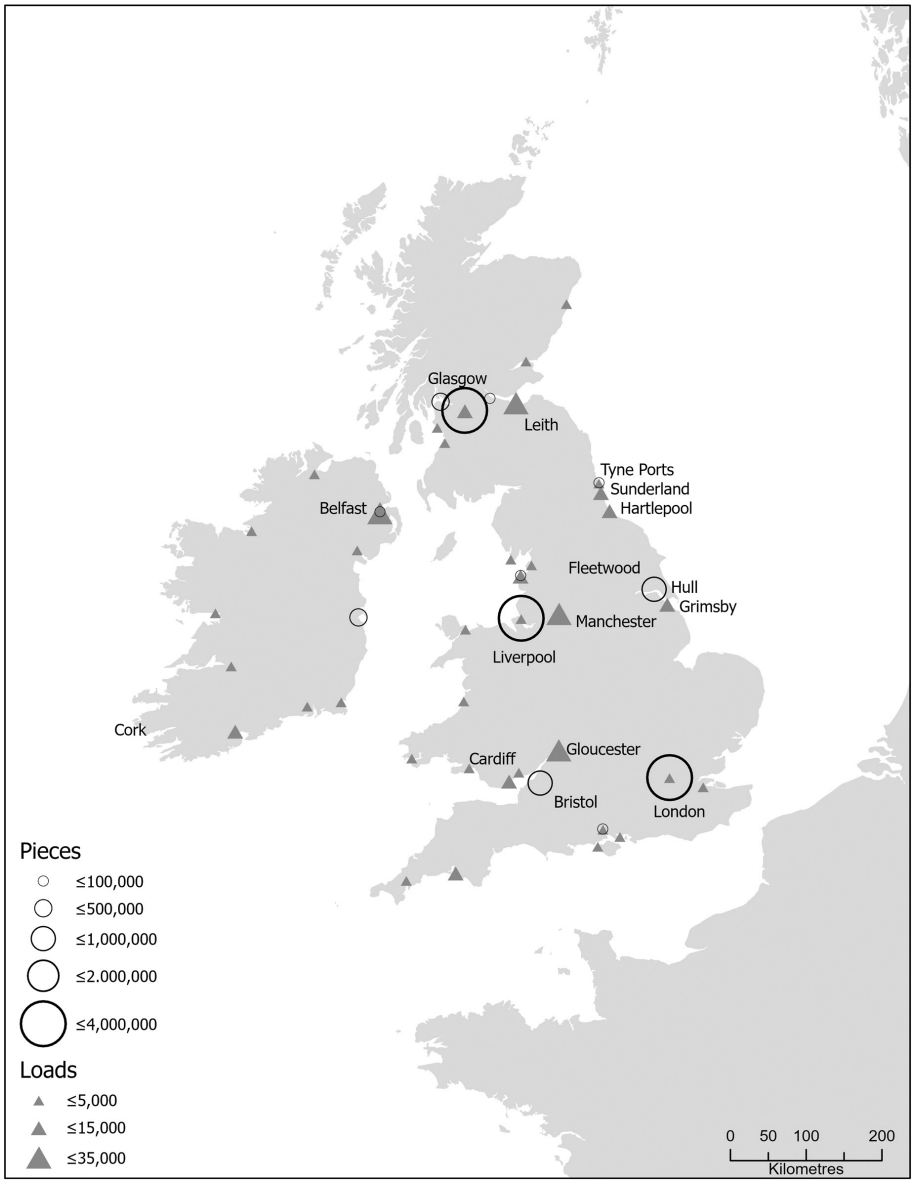


FIGURE 28.4 St Lawrence Ports Exports to British Ports in 1898.

Source: *Timber Trades Journal* (1898).

the tariffs. Despite the gradual decline of square timber consumption, Canadian deals remained an important commodity on the British market.[59] Lower noticed that New Brunswick occupied a strong position in deal exports once its pine forests had been depleted of its large specimens during the first half of the century, but his analysis did not extend to the thriving deal trade in the 1880s and 1890s. Since Lowers' publication of *The North American Assault* in 1938, historians have explained that Canadian lumbermen looked south of the border to export their sawmill production.[60] Historians have noted that Canada was exporting deals to Great Britain at the same time that it was supplying the American market with planks and boards in the second half of the nineteenth century, but they have not explored the geography of this later trade.[61]

Historians have emphasized the west coast of Great Britain as a recipient of Canadian imports, but few have considered the British eastern ports on the Thames, the Tyne, the Humber, and the Firth of Forth, with easy access to the Baltic. Mapping all the ports that import timber from StLawrence ports in 1898 shows the ongoing demand for Canadian timber at the end of the century. The records make it clear that London imported a similar quantity of timber from Quebec ports as Liverpool. This surprised us, as we assumed Liverpool and Glasgow would have been more likely than British east coast ports, to continue importing from Canada. Before the tariffs stimulated the growth of British North American timber imports, English timber imports centred in east coast ports like London and Hull.[62] Liverpool only emerged as a major timber port with the growth of the transatlantic trade in the second decade of the nineteenth century.[63] London builders retained a strong preference for Baltic deals from Memel and Riga even during the protectionist period when they willingly paid a high premium for the denser Baltic pine deals they considered to be superior for most construction purposes. For these reasons, while we knew from the trade statistics and economic historian Guy Gaudreau that Canadian deals retained a significant market share during the free trade period, we expected to see most of it flowing into Liverpool, Glasgow, Bristol, and other west coast ports.[64]

Mapping all the ports that import timber from St Lawrence ports in 1898 reveals a different story. It shows not only the ongoing demand for Canadian timber at the end of the century, but also that London and Liverpool imported a similar quantity of timber from Montreal and other ports in the St Lawrence. This surprised us, as we assumed Liverpool and Glasgow would have been more likely to continue importing from Canada than ports with easy access to the Baltic. Furthermore, the St Lawrence ports supplied more than forty British ports with timber products at the end of the nineteenth century, including significant quantities to Leith and Hull on the east coast. Sweden and Russia (which then included the Grand Duchy of Finland) may have surpassed Canada in terms of total timber exports to the United Kingdom, but Canada remained the third most significant exporting country: pine and spruce deals from the ports of the St Lawrence Valley remained competitive in all British ports during the final three decades of the nineteenth century.[65]

Focusing on all London imports in 1898 provides another perspective. Montreal was the single largest export port in that year. As Fig. 28.5 shows, this mostly reflects the

large number of Swedish ports exporting to London, while the deals from the Ottawa valley were funnelled into a single port for export. It also confirms the once formidable sawmilling empire built by William Price on the eastern edge of the St Lawrence Valley declined during the 1880s and 1890s. A few years after 1898, his grandson, another William Price, began the process of reorienting the company around pulp production, which allowed them to harvest the ubiquitous balsam fir that previously held no value for lumber production.[66] Montreal and Quebec City were significantly more successful in the London market than New Brunswick ports. New Brunswick exports are much more concentrated in Liverpool, where they outcompete the St Lawrence and Baltic regions, but the Maritime province only supplied small quantities to London in 1898.

Mapping London's 1898 imports also captures the rise of the White Sea region, which became the Russian Empire's largest timber-exporting area during the 1890s.[67] While Norwegians had established a modern sawmill industry in the Grand Duchy of Finland in the early 1870s, the sawmill industry of Northern Russia benefitted from Swedish engineering equipment and foreign capital from timber-importing countries like Britain, France, and the Netherlands at the end of the century.[68] The map also shows the relative

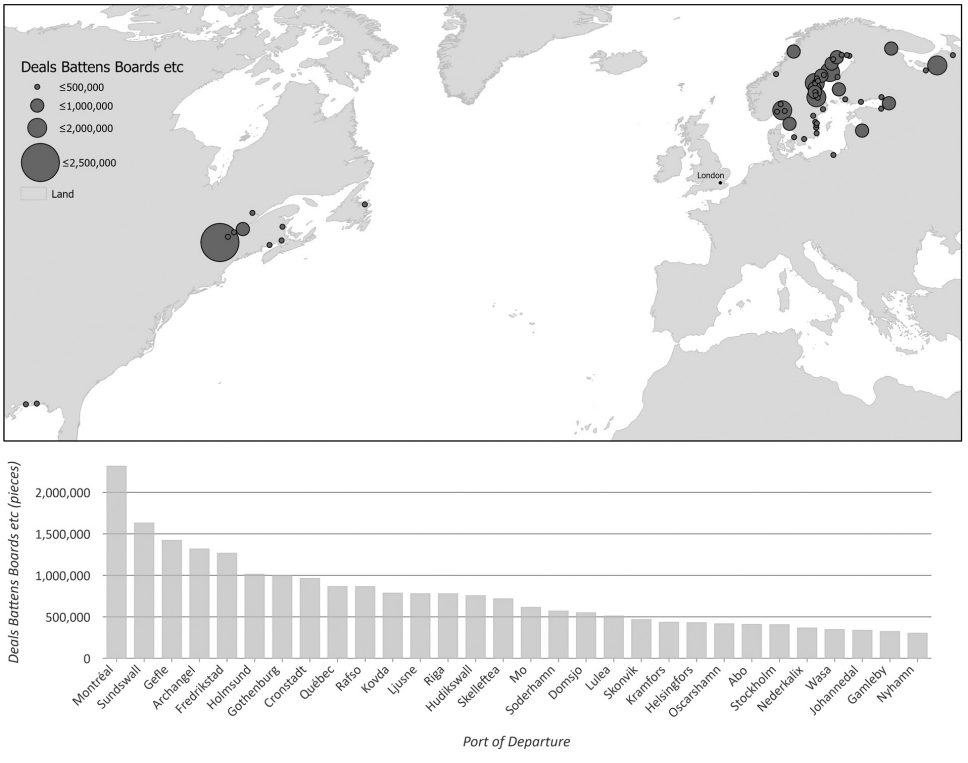


FIGURE 28.5 London Lumber Imports, 1898. This map includes all ports that exported at least 100,000 pieces. These sixty-six ports account for 83 per cent of the total timber imported into London.

Source: *Timber Trades Journal* (1898).

decline of southern Baltic ports like Memel, Danzig, Riga, and St Petersburg, compared with the mid-nineteenth century when these ports maintained strong exports to London even after the introduction of tariffs in the 1810s. The map does not show the importance of these ports in railway sleepers, which were recorded as loads instead of pieces. Memel, for example, only exported a few thousand deals but shipped more than two hundred thousand loads of sleepers to London's creosoting works.

Mapping the data from the *Timber Trades Journal* upends the historiographical consensus about the declining importance of Canadian timber exports to the United Kingdom. Ottawa Valley mills did not simply reorient themselves to the American market and British free trade did not make Canadian deals uncompetitive. It does not on its own provide clear answers on why Montreal retained such a strong part of London's market share. Steamships helped reduce the cost of shipping deals and other sawn lumber across the Atlantic, and the regular traffic between Montreal and London might help explain the continued trade between these ports. The dredging of the St Lawrence River facilitated improved navigation towards the harbour of Montreal, where better facilities meant faster loading of large ocean steam vessels, with deals coming in barges mostly from the Ottawa Valley, but also from the state of Michigan.[69] Moreover, the British demand for sawn lumber was insatiable at the end of the century because of a boom in home construction.[70] The forests of the Laurentian Valley had a large supply of pine and spruce, and Canada possessed an industrial infrastructure with a large output capacity that the American market was no longer absorbing because the United States imposed protective tariffs for its lumber industry in the west coast and south-eastern forests. Other possibilities include the importance of horizontally integrated family networks. Robert Cox from Liverpool was deeply invested in the Ottawa Valley and imported large quantities of lumber through Montreal. The *Timber Trades Journal* data show that Cox imported at least 986,796 pieces of lumber to Liverpool along with 224,119 to Hull and 166,515 to London. The historical GIS database allows us to identify which merchants were dominant in which ports on both sides of the Atlantic, narrowing our search for business archives that might shed more light on this history.

Mapping Firewood and Lumber Markets on Canadian Railways

Railways, canals, or pipelines are an ideal focus for commodity histories using GIS. The expanding transportation network (lines and the year of completion in GIS data), combined with data that recorded what and how much freight different lines carried, provides tools to explore the spread of commodity frontiers and the movement of commodities to market.[71] During the final decades of the nineteenth century, railways started transporting timber and at the same time facilitated the development of new firewood commodity frontiers. It is well known that Canadians burned large quantities

of firewood in homes and industries in the colonial periods, and recent research has shown that household consumption continued well past the widespread adoption of coal.[72] Data collected by the Dominion Department of Railways and Canals suggest that firewood was transported and traded extensively in Canada, and the expansion of Canadian railways in the late nineteenth century created new demand to fuel locomotive engines and new pathways between forests and urban household and industrial markets. The spatial patterns of firewood and lumber freight in the railway company records suggest that many central Canadian cities used the lumber railways to supply firewood. As railways began to compete with waterways for an increasing share of the export-oriented lumber transportation market, they increased the quantity of firewood carried on the same lines, from the northern forests to Canada's growing urban centres. By 1893, the annual reports included data on sixty-five companies, representing well over one hundred lines and 15,021 miles of track. Forty-five of the companies reported firewood and fifty-six reported lumber. These data demonstrate that firewood transitioned from being a local product supplied by farmers in urban hinterlands, to a major business, cutting, transporting and distributing softwood from northern forests to cities in Canada and the United States.

Farmers had long provided firewood to urban markets, but as cities grew, they increasingly turned to railways to bring firewood from the Canadian shield forests beyond agricultural settlement in the north. Figure 28.6 visualizes the data reported by the Eastern Canadian railways that included firewood in 1893. Many of the smaller railways had been consolidated into the Canadian Pacific Railway and other larger companies. We selected symbolism that shows the amount of firewood reported by the parent company divided by the total length of railway that the company owned. We cannot know exactly where on each line the wood was hauled, but this way of visualizing the data highlights the importance of both long lines and short or medium lines that hauled large amounts relative to their total length. The resulting maps show that firewood was hauled on most railways, but it emphasizes where large amounts were hauled from northern forests to southern cities (and to the US border).

The Ottawa Valley lumber baron, John R. Booth, is best known for building one of the world's largest lumber companies, but he also hauled thousands of cords of firewood from the Canadian Shield to Ottawa and cities in Quebec and the United States on his railway, the Canada Atlantic. In the 1880s, Ottawa newspapers began to note large deliveries from nearby townships, and one paper argued that the railway offered 'a prospect of cheaper fuel for the city for some time to come'.[73] However, the historical GIS shows that the company only hauled a few thousand cords per year, or between forty and fifty cords per kilometre of track, in that decade. The real increase came later, as the railway expanded westward into the Shield. In 1890, firewood production increased twentyfold to almost seventy-five thousand cords (875 per kilometre), and in 1893 it was still hauling 521 cords per kilometre (Fig. 28.6). By the early 1900s, when the route across the Shield and through Ontario's Algonquin Park to the Great Lakes was fully operational, the railway was hauling an average of sixty-seven thousand cords per year (234 per kilometre) to urban markets.

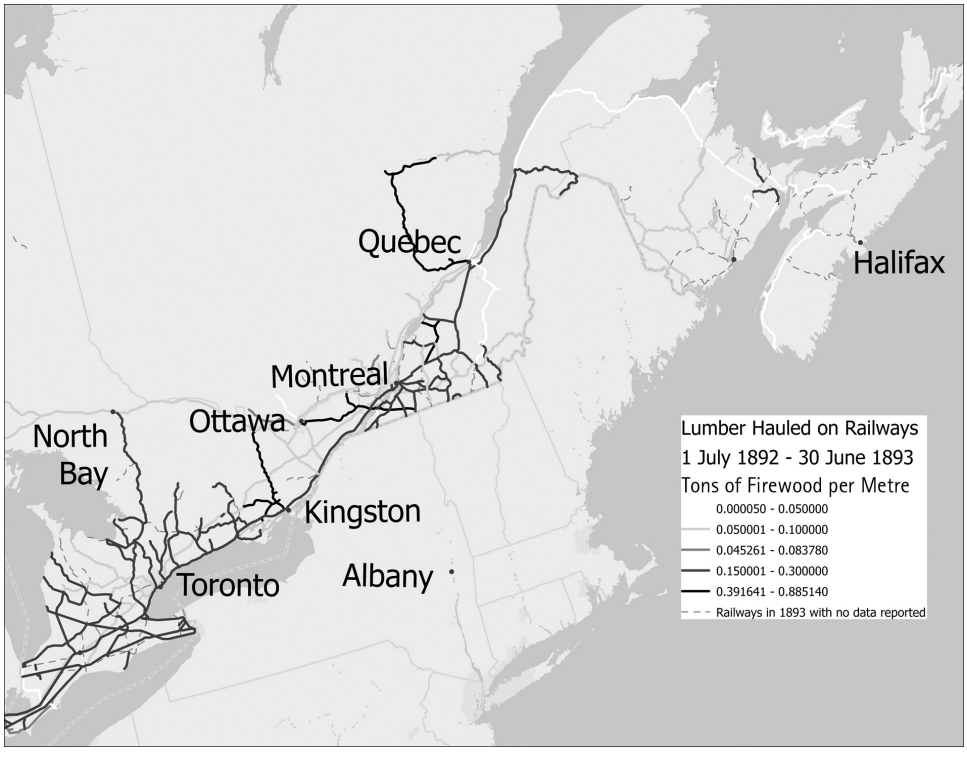


FIGURE 28.6 Tons of firewood hauled on Eastern Canadian Railways, 1893. This map includes the total weights of firewood on all railway companies who reported this commodity in the annual Reports of the Department of Canals and Railways.

Figure 28.7 shows lumber hauled by Canadian railways in 1893, using the same measure of tons hauled per kilometre of railway. The fifty-six companies that reported lumber hauled 476 tons per kilometre, on average. The data show the importance of lumber on a few outliers—including Canada Southern, in Southwestern Ontario, and Booth's Canada Atlantic, stretching east from Ottawa to the US border in Quebec. Most other outliers were short lines that serviced either lumber companies near the Bay of Quinte and Thousand Islands in Ontario or the Eastern Townships in Quebec. The two largest concentrations in the latter group were the Montreal and Vermont Junction and Massawippi Valley Railways.

We fully expect to see the growth of rail-based lumber exports to the United States, but firewood was also shipped across the border in surprising amounts. Firewood transportation was increasing on Quebec railways in the 1890s, particularly in the Saguenay–Lac-Saint-Jean region in the north and the Eastern Townships region in the south. As more Quebec railway data became available in this decade, they revealed that the Eastern Township railways had been hauling significant amounts to the United States as well. By 1899, the short Hereford line dedicated 25 per cent of its freight to firewood and hauled 418 cords for every kilometre of track. In 1901 and 1902, it hauled more than eight hundred cords per kilometre, and allocated half of its freight to firewood. It connected to

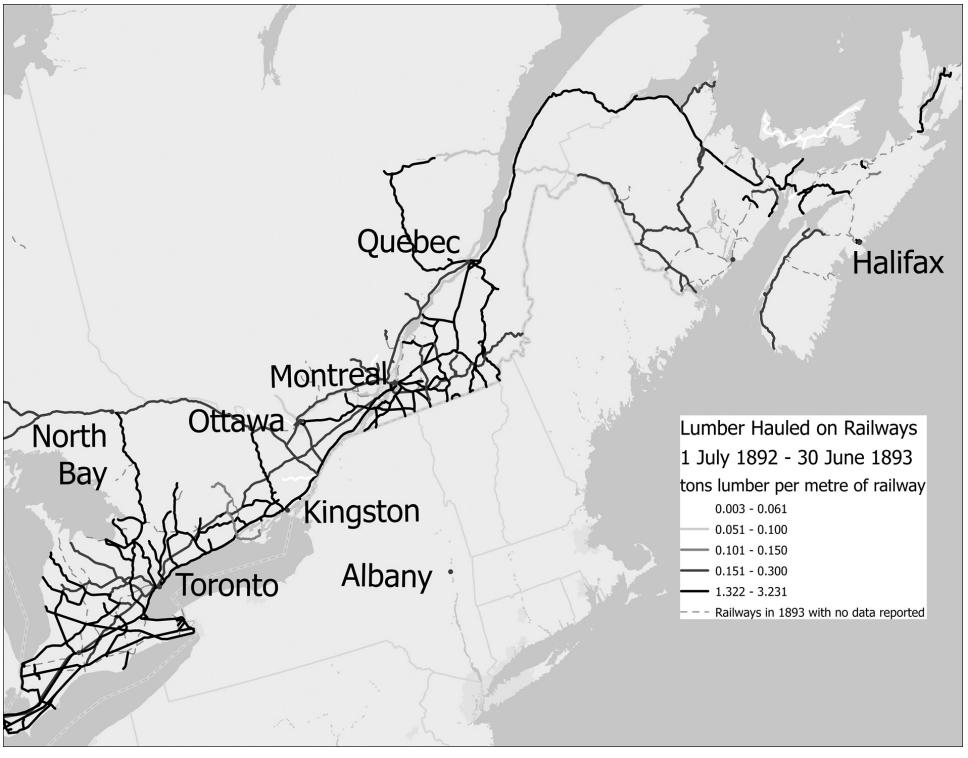


FIGURE 28.7 Tons of lumber hauled on Eastern Canadian Railways, 1893. This map includes the total weights of lumber on all railway companies who reported this commodity in the annual Reports of the Department of Canals and Railways.

the Maine Central Railroad, and, according to one memoir, it burned wood for fuel and hauled at least twenty cars of firewood a day, to Portland and other cities.[74] Similarly, the Canada Atlantic connected Ottawa Valley forests and US consumers through Quebec at Rouses Point, New York. Even before the Canada Atlantic railway connected directly to American lines in 1897, the *Ottawa Free Press* noted that '[l]arge shipments are also made of it to Albany and other points in New York state'.[75] Many Central Canadian railways were built as overland alternate routes to haul lumber from the Canadian Shield to US markets, but these lines also produced alternative outcomes—including increased biomass energy supply to the region's energy-hungry cities. Even as US coal began to pour into Canadian cities, firewood occupied at least some of the trains and ships returning to the south.

Conclusion

Historical GIS methods are proving to be very powerful in providing historians and historical geographers with additional tools for analysis, iterative discovery, and visualizing

results. GIS software on desktop computers simplifies the process of creating maps to visualize data, building on the Minardian tradition and the work done by generations of historical geographers and the cartographers with whom they collaborated. But it is more than a tool for visualization, and it has the power to support the research process, allowing historians to bring together a heterogeneous archival material and secondary sources to better understand how the geography of commodities changed over time. It is also important to note that more often than not, the digital methods prompt questions instead of providing answers, and we often turn to textual sources from the archive to better understand the patterns we see in the maps.

Until recently, GIS software was prohibitively expensive for researchers not working at well-funded research-intensive universities. Open-sourced QGIS, the free tier access to ArcGIS' StoryMaps, and other free cloud platforms makes this technology accessible to more researchers around the world. Online tutorials from the Geospatial Historian and other websites reduce the barriers to entry, though we expect the steep initial learning curve to familiarize oneself with GIS software and jargon will remain a hinderance to more widespread adoption. We still do not have tools as simple as spreadsheet software to encourage easy adoption of historical GIS methods. That said, if one collaborator learns the basics of the ArcGIS Online platform, they can develop web-based interfaces for the rest of the team to create historical GIS data sets. Some universities have map libraries or digital humanities centres that can assist with developing this kind of interface. As a result, it has become a lot easier to use GIS methods without extensive expertise in the software, and we expect this trend to continue in the coming years.

Digital maps also create new opportunities to reach new audiences and bring commodity histories to a wider public. Andrew Kahn and Jamelle Bouie's 2015 collaboration using the Transatlantic Slave Trade Database to create a visualization showing the scale and geography of the trade in a two-minute video points to the potential. Hundreds of thousands of people have viewed this video, which provides an entry point into this important history of human trafficking and its connections with the growth of consumer culture, industrialization, and capitalism. Numerous online platforms enable opportunities to create interactive digital maps and exhibits. Andrew Flaches led a diverse team of scholars using the ArgGIS StoryMaps platform to publish 'The Global Lives of Indian Cotton' in 2020. This site shows the potential of mixing interactive maps with primary sources and text to create a new way to disseminate commodity histories.[76] While challenges remain with publishing outside the traditional peer-reviewed platforms, the potential to reach a wider audience and to create open access teaching materials should encourage more historians to follow Flaches' lead in the near future.

While our case studies have focused on forest products in Eastern Canada, we agree with Ruth Mostern that GIS is an essential method for geo-referencing a wide array of historical evidence about the formation of particular commodity frontiers on a global scale. Mostern argues that it is one thing to discuss the general phenomenon of commodity frontiers; it is another matter to empirically map the process as it developed across specific times and spaces.[77] She calls on commodity historians to embrace GIS methods to collaboratively begin to understand the role of global commodities in the

history of capitalism. We are developing numerous interrelated GIS databases focused on everything from the qualitative British import statistics; geo-referenced records of map and textual evidence of logging in specific locations in Algonquin territory in the Ottawa Valley and Innu territory in the Saguenay valley; a database of logging infrastructure including timber slides to bypast waterfalls, canals, dredge rivers, port facilities, and railways; and census statistics showing the growing population and agricultural production as settler colonial agriculture followed in the footsteps of the logging frontiers. We very much hope to see more projects developing spatial databases of records related to, for example, Baltic pine, Indian teak, and Honduran mahogany, to develop a global understanding of the timber trade and extractivist colonialism as a step towards Mostern's 'impossibly ambitious task—a world-historical and world-systemic atlas of capitalism'.[78]

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CHAPTER 29

COMMODITIES, INTERDISCIPLINARITY, AND HISTORICAL GIS

Early Modern Maritime Routes and Timber Supply

ANA CRESPO-SOLANA

Commodity history initially emerged as a branch of economic history—one that sought to focus attention on the extraction, manufacture, trade, movement, and consumption of the material goods that provided the resources for global industry and commerce. However, it quickly became evident that in order to fully understand the interconnecting chains and networks that have characterized the field, a certain degree of interdisciplinarity was not only made possible but was arguably a necessity—all the more since ecological, as well as social, impacts and their origins have become a growing contemporary concern. Large-scale interdisciplinary projects have increasingly sought to take advantage of access to scientific laboratories, large data sets, and the potential of utilizing new computer technologies, in order to follow commodities and understand their effects across space and time on a scale previously impractical to achieve.

Starting with an overview of the historiography of timber in commodity history, in particular in relation to shipbuilding, this chapter explores how one such interdisciplinary commodity-history project, *ForSEAdiscovery* (Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery), has been using interdisciplinary approaches to build historical Geographic Information Systems (GIS) as both a research tool and means of presenting of results. An international partnership of research centres in Spain, Portugal, the United Kingdom, the Netherlands, France, the United States, Denmark, and Poland, *ForSEAdiscovery* is bringing together several study methods—including history, archaeology, and dendrochronology (the science of dating events, artefacts, and environmental change from timber and tree trunks).[1] It is producing historical information that offers knowledge of the use of wood in the naval industry and the production of the early-modern ship, and also the geographical logistic

dynamics of the origin of timber and how it contributed to the creation of a maritime historical narrative and ocean interactions. The chapter ends with a consideration of what the implications of such interdisciplinarity, and the use of large data sets and GIS, could mean for future commodity history research.

Timber in Commodity History

Political and economic cooperation and competition between maritime states influenced the exploitation of forest resources. State control, production, and commercialization of forests were among the factors related to the accumulation processes giving rise to mercantile capitalism between the sixteenth and nineteenth centuries. This was accentuated by nature itself, economic relations, and social and political dynamics, sometimes making it necessary to seek resources outside each country. This happened in Spain and Portugal, with the necessity of developing strategies of control, monopoly, and trade that were profitable for those social groups that managed to gain control of the exploitation and commercialization of forest resources.

Fernand Braudel describes the processes of production and timber trade as one of the most important chapters in the integration of the northern regions of Europe in European consumption chains.[2] Likewise, Wallerstein discusses how the greatest transformations taking place after 1492 happened as resources were transferred from the periphery to the centre, at the same time as competition for access to those resources resulted in control over trade and accumulation of capital.[3] As John McNeill argues, timber made the processes of accumulation in world history possible, directly or indirectly.[4]

The need for timber for shipbuilding was paramount. John H. Pryor has explored the significance of medieval ship construction in both peaceful and warlike encounters between Mediterranean peoples.[5] In the early-modern age, the construction of ocean-going ships was essential to the development of seafaring and cultural encounters around the world. Ships were both the vehicle for trade and commodities in themselves, as can be seen in many of the contributions to Christian Buchet and Gérard Le Bouëdec's collection on the sea in early-modern history.[6] Technologically, the so-called Iberian ships were the result of exchange between Mediterranean and Atlantic shipbuilding traditions. They were sophisticated machines created to overcome the great spatial challenge presented by the oceans, and their evolution contributed to the ideological and economic construction of maritime empires, the formation of supranational entities, and the relaxation of borders resulting in a spatial economy characterized by the integration of regions beyond the territorial limits of each country, empire, or nation. Jonathan Adams in his archaeology of ships has demonstrated the connection between naval innovation and social change in medieval and early-modern Europe.[7] Until well into the nineteenth century, with the appearance of railways and aviation, and the exploitation of new resources, wooden boats were the main means of communication

and integration for human networks. Early-modern ships mapped the planet, and, in a fast-changing world, they witnessed the rise of centralized European states.

The timber trade was global, something that highlights the theory of frontier-based development as explored by Edward Barbier:[8] extension and search for new land is intrinsically related. This brought the need to create shipyards in strategic places, in order to experiment and learn how to use wood for shipbuilding. From the first decades of transoceanic travel, coastal communities—such as those of the French Atlantic coast, researched by Le Bouëdec—specialized in maritime crafts, mainly shipbuilding and the organization and provisioning of resources for the shipbuilding industry.[9] The establishment of new commercial routes led to a growth in shipbuilding, models with new designs and structures, and an unprecedented demand on Iberian forests for the supply of timber.

Shipbuilding and the timber trade are therefore two nexuses for understanding the relationship between maritime empire and technological advance, at the foundation of the development of mercantile capitalism. This has been explored by the present author and others.[10] The scarcity of wood encouraged technological changes that occurred in shipbuilding, and the demand for timber led to sustainable changes in forestry practice in the Iberian Peninsula, at the same time that deforestation resulted in increasing dependence on imported material—especially from the Baltic but also from colonies in the Americas and some Mediterranean areas. The increase in state interest in forestry practices since the end of the fifteenth century ran parallel to two aspects: Firstly, a high exploitation of oak, a wood more appropriate for the hulls of ships and for the increasing use of barrels for transportation; and of pine, used for planking and masts. Secondly, timber merchants who developed monopolies over logging and especially transport from the forests to the shipyards were able to accumulate exorbitant wealth.

The question arose as to whether this increasing demand for timber could be sustained by Iberian forest resources, or if it needed to be imported from elsewhere. Maria Bogucka—following on earlier pioneering research by, for example, Robert G. Albion—pointed out the importance that Baltic wood had for the emerging naval industries of Western Europe.[11] This has been supported by quantitative data on the global timber trade, as presented by John Wing, who also shows that wood supplies for the naval industry posed serious problems related to forest management, control by local authorities and the political administration, as well as supply problems derived from environmental circumstances.[12] The problem of wood scarcity was an obsession since the beginning of maritime expansion, when the traditionally local shipbuilding industries oriented to feed regional economies became great businesses connected to dynastic states, controlled by merchant networks, and financed by the new maritime empires. Forests and timber went from being communal assets to being controlled by the state throughout Europe.

Maritime archaeological studies provide new information on such policy construction and the resources used, especially wood. Alfredo Martínez shows how the global trade in wood affected resource management in Spain, where there were already regional antecedents from the late fifteenth century, when demand from the naval

industry rose due to the increase in transoceanic journeys. But it was in the sixteenth century that systematic supervision of forest resources for construction began. The politicization of timber resources was reinforced with a forest law in 1518[13], and the creation of the *Superintendencia de Montes y Plantíos* in 1574.[14] The seventeenth century was a culminating moment of this process, coinciding with the appearance of important political-economic documents for the regulation of forest use. Spain followed similar practices to those observed in other European maritime countries. For example, in 1516, King Francis I of France promulgated ordinances for the protection and regulation of forests, at the same time that 'royal forests' were declared in France and England; while in 1610, the French Forest Code was established.

Continued concern about wood shortage led to the conversion of this natural resource into a luxury commodity. This not only contributed to commercial exploitation of timber by international financial networks, but also led to the substitution of species in many geographical areas—something that greatly affected oak, due to its extensive use in shipbuilding. Both in France and the German principalities, lords wanted to have dominion over the forests by protecting them from peasant movements. Consequently, in Central Europe there was widespread deforestation, but at the same time this produced both regulations on forests and violations of them due to conflicts between groups. As Joachim Radkau asserts in his history of wood: 'The history of forest regulations can be written as the history of their violation'.[15] Forests were plundered in an unsustainable way.

In a work by Sing C. Chew, on the historical relationship between human cultures and the natural environment, the relationship between deforestation, global timber trade, and capital accumulation is highlighted. Chew affirms that in the last five hundred years, '[t]he history of civilizations, kingdoms, empires, and states is also the history of crisis and ecological degradation'.[16] Indeed, the role of wood in global history contains an environmental narrative, as has been explored by both John Perlin and Joaquin Radkau. Broadly speaking, since the construction of the modern state, the management of the environment has been an essentially destructive process, exemplified by intensive deforestation.[17] Michael Williams, in his book *Deforesting the Earth*, considers the long-term implications of the European discovery of the New World and colonial expansions as well as developments within Europe itself. He describes the varied ways in which more than 222 million trees disappeared from the tropical world, particularly in southern and south-eastern Asia from 1750 to 1920. He analyses the impact of indigenous uses of forests, including shifting and permanent agriculture, grazing, and burning, as well as capitalist penetration and colonial consolidation that led to the use of thick forests, railways, plantations, and commercial farming.[18] That said, reforestation began to be implemented in various places, notably from the eighteenth century onwards.

Most of the work on the use of forests in the modern age refers to the demand for wood for domestic uses and the impact of agriculture and livestock. For example, in Central Europe since the Middle Ages, forest clearing, a peasant movement, altered the landscape in an aggressive way related to the extension of agriculture that led to the spread of a new species: the birch. Also, in the German states there was extensive

deforestation and consequent erosion, already noted from 1340, due to agriculture and the felling of trees for use in domestic fireplaces.[19] There are also important European antecedents, from the twelfth century, with historical evidence of ecological suicide, as happened in the Mediterranean with the shipbuilding program of the Venetian Republic. The centralization of its arsenal in 1320, combined with the building of its merchant fleet, contributed to the destruction of Adriatic forests. This is one of the few cases of the relationship between mercantile empire and shipbuilding that has been historically documented.[20]

Deforestation has been linked to colonialism, as, for example, by Pallavi Das, who explores the environmental consequences of colonialism and development—in particular with the spread of railways—in India in the nineteenth century.[21] In the Americas, deforestation has been closely linked to the plantation economy as well as shipbuilding (the Spanish crown encouraged the construction of shipyards in Havana, Campeche, Guayaquil, El Realejo, Nicoya, Panama, El Callao, and Coatzocoalcos), as Reinaldo Funes examines in the case of Cuba.[22]

The emergence of ideas about resource protection influenced the timber trade and its use for shipbuilding. As John F. Richards points out, 'a prevailing sense of scarcity and doubt about sustaining local resources [led] organized groups to push commercial and political activities into new frontiers'.[23] Deforestation and the timber trade were amongst the factors around which wars and monopolies developed and influenced elite power strategies. The monopoly on wood enforced by economic and financial lobbies and the shipbuilding programs of maritime empires came to constitute two sides of the same coin. The development of naval technology and the ship itself became the true social capital of the incipient mercantilist maritime trade, especially following the price revolution that affected all of Europe in the sixteenth century. Oceanic navigation was the basis of mercantile capitalism's control over resources and markets, creating hybrid monopolies between dynastic houses and monarchies but with a high level of private participation based on contracts with the Crown, along with private traders establishing businesses with local builders and timber suppliers. This is what Iván Valdez-Bubnov has called the 'contractor state'.[24] Such integration was very effective and resulted in shipbuilding contracts based on the capacity of the contractor to mobilize wood resources that had to be transported from the forest, generally along rivers. In exchange, the merchant could also obtain a license to trade with the Indies or to include his ship in the fleets and galleons sailing to the Americas.

In both Spain and Portugal, the evolution of ports, maritime skills, and regulation of forest resources were advanced or delayed according to state involvement and the ups and downs of the uncontrolled large-scale international trade that opened along ocean routes. Between 1570 and 1620, this coincided with important debates and treaties regarding shipbuilding and hull design; and stockpiling timber became a widespread practice in royal shipyards as the provision of timber had to take place at least four years before being used.[25] The resulting scarcity of wood led to the politicization of forest problems, which in turn resulted in the accumulation of ecological-forest knowledge. Contemporary naval construction treatises presented two important issues related to

ship measurement and the materials required for construction. Firstly, the Spanish government promoted a coercive policy of planting to remedy the shortage of supply by forcing the free competition of the towns to re-forest; secondly, they created a strong regulation of demand, limiting logging, and establishing state intervention and control over production and its price.[26]

To avoid wood shortages in the various regions of Europe linked to the Habsburg Empire, efforts were made to maintain the local timber supply, but this was not able to compete with the international timber-trade lobbies. In Iberian territories and other lands controlled by the Hispanic monarchy, paradigms of local industry became adapted to the demands of an imperial ideology imposed by the state. For example, in the Basque Country at the end of the sixteenth century, the shipbuilding industry turned from a regional fishing economy to a war and trade economy. Although the Spanish king attributed the Armada disaster of 1588 to the elements, in reality this reflected the problem of the lack of centralization and the scarcity of wood, requiring a policy of arsenals and shipyards with intervention from the Crown. But the naval needs of the empire demanded the massive felling of trees across the Iberian Peninsula with environmental consequences: desertification and sedimentation of important rivers, like the Ebro, Guadalquivir, and Tajo. Thus, the most important shipyards and arsenals, where stockpiling was also practised, arose in areas near exploitable and controlled forests.

Two situations arose in the seventeenth century: firstly, North European mercantile networks, particularly Dutch and Flemish, began to supply wood to Spain; and secondly, the Crown established a naval policy reflected in ordinances and regulations that did not always consider the important relationship between naval architecture and the provision of wood. Wood-management practices were also developed in order to adapt to certain logging practices—such as the pollarding techniques employed in Gipuzkoa, in the Basque Country, whereby the growth and shape of oaks was carefully guided.[27] In 1656, Toribio Pérez de Bustamante established how the removal of wood from the forest would be organized. This influenced shipbuilding, but also the geography of forest exploitation that culminated in the institutionalization of the *montes de marina* (marine or mountain forests), which was consolidated with an ordinance in 1726.

Similar policies were developed in the rest of Europe. In other maritime powers, such as England, a relationship began to emerge between the demand for wood and the need to adopt policies of conservation, reforestation, and maintenance of balance in order to avoid the systematic destruction of forests. John Evelyn wrote in 1662 a *Discourse of Forest-Trees, and the Propagation of Timber in His Majesties Dominions*, presented to the Royal Society. This was a practical treatise on silviculture,[28] which remained the main text in English until the nineteenth century and had an important influence in Spain. Duhamel du Monceau, general inspector of the French navy, published a work in 1755, in which the term 'provenance' began to be used to designate the place of origin of wood, and it is still used in dendroarchaeology.[29] Governments never used this ecological information in a disinterested way, as their objectives were always to intensify the use of resources as a 'common good' or in the 'public interest'.

Until then, the valuation of nature was based on the usefulness of resources. But this changed at the end of the eighteenth century, when importance began to be given to the beauty of the landscape. Nevertheless, Antonio Ponz's work, *Viaje por España*, had an economic value, intended to promote silviculture and forestry as part of the reform program. The Bourbon state influenced the organization of forest resources with state protection of private and council forests, regulating the uses for fuel and timber that until then were governed by local private ordinances, and imposing laws on towns for planting and forest conservation. Laws were also passed that especially affected the navy, such as the Royal Forest Ordinances of 1748. Already in the first half of the eighteenth century, Gerónimo de Uztáriz, in his *Theory and Practice of Commerce and the Navy* dedicates a chapter to 'the great profits that maritime armaments and commercial vessels have established within Spain, thus the cutting and conduction of trees, planking and other wood for masts and other works of them, such as the fabrication of tar and rigging'.[30]

It remains the case, however, that the environmental question in history has been studied more by biologists and ecologists than by historians and archaeologists. Before the first decade of the twenty-first century, there were no studies that examined the adaptation of culture to the environment as one of the most interesting interdisciplinary issues in the social sciences, and the relationship between forest ecology and the history of maritime empires had hardly been the subject of attention before the *ForSEAdiscovery* project.

ForSEAdiscovery: An Historical-Archaeological-Dendrochronological-GIS Approach

Human interaction with the sea has been the focus of study for scientists and social scientists, who have collected large bodies of data and developed databases, digital repositories, and GIS models. Dynamic developments in digital humanities offer both new challenges and opportunities within the sphere of maritime cultural heritage. Much of this heritage is situated in challenging environments that are vulnerable to rapid environmental change, and digital humanities provide a bridge across disciplinary boundaries, encouraging collaboration and multidisciplinary research. The *ForSEAdiscovery* project focuses on the study of transoceanic voyages, timber trade and networks, and the use of wood for shipbuilding between the sixteenth and eighteenth centuries. It is an historical-archaeological research project with an ambitious chronological scope, linking the global history of seafaring with the trade, exploitation, and use of natural resources, like forests.

Ships are archaeological artefacts, both in themselves and with everything transported—whether cargo, crew, passengers, or artillery—forming an archaeological site that ended up on the seabed. Their study allows us to know and date with great accuracy the vessel and associated materials, as well as providing information on topics such as maritime trade routes,

shipbuilding, shipboard life, and the possible reasons why the vessel never reached its destination. From the eleventh century, the archaeological analysis of wrecks has had a great ally in the historical documentation kept in archives, more accurate and plentiful in more recent periods, which is useful for referencing thousands of historical shipwrecks. The archives also allow the identification of the crew; the inventory of transported merchandise (with its origin and destination, owner, property brands, prices); references to artillery (casting location, characteristics, cost of parts); technical details of the ship (history, construction data, repairs, plans); and even the typology of economic activities that developed around the various voyages and routes that the ship undertook during its life.

Ships bring together an extensive narrative for each port of call and for each region visited where products and people were collected and landed. Although the preservation of shipwrecks remains dependent on the environment, they can provide precious historical information. Broadly speaking, the observed pattern for historic shipwrecks is a consequence of a combination of historical and natural factors, including imperialism, commerce, warfare, and technological change. A shipwreck by nature is testimony of trade and cultural dialogue between peoples through the analysis of specific factors such as the historical shipping routes, port locations, shoal reef, sand bar, barrier, island locations, ocean currents, and winds or historic hurricane paths within a wide chronological trend.

The archaeological and historical evidence that we can obtain from shipwrecks allows us to extract qualitative and quantitative data to understand the use of wood in relation to this naval industry. In case studies of the naval architecture of a certain ship, when its remains are located and studied under the sea,[31] the surviving wood from hull remains presents direct evidence of the forests from which the pieces were extracted, and provides information on the forest management that it underwent. The study of timber supply with dendrochronological techniques enables dating the last ring formed to determine, for example, the exact year in which a tree was felled, transported, worked, and used in the construction of a ship. Like metallurgical artefacts, wood samples provide empirical data complementary to historical documentation.

ForSEAdiscovery studies the timber that was used in the construction of Iberian ships—with timber brought not just from the Iberian Peninsula but also from territories under the dominion first of the Habsburg dynasty and then the Bourbons. The project seeks to uncover not only the use made of wood in the naval industry and early-modern ship production but also the geographical origins of the wood and how it contributed to transoceanic interactions. The analysis of a ship's construction can also demonstrate whether the master builders were governed by the ordinances, regulations, and provisions stipulated by the Spanish monarchy.

Most Iberian shipwrecks have been damaged by treasure hunters, but, in theory, those that have been underwater for over one hundred years are protected by the 2001 UNESCO Convention, which represents the international community's response to the increasing looting and destruction of underwater cultural heritage. Thanks to teamwork, wood samples have been collected from underwater archaeological sites and from abandoned shipwrecks on coasts and estuaries. This collection of samples has been

subjected to dendroarchaeological analyses in order to establish the origin and species of wood, resulting in a map of provenance, but also to learn more about the chemical composition of the woods used in these early-modern ships. The result has been the gathering and integration of these data with historical archival documentation, alongside a bibliographic reconsideration of existing literature on historical timber.

No tree is the same, they all tell a story, and tree rings tell us much more than simple chronological age. Dendrochronology can date events, environmental change, and archaeological artefacts by using the characteristic patterns of annual growth shown in tree rings and thus read a tree's life story and struggles: the seasons in which there was a shortage of water; the years of snowfall; the impact of pests, fires, and their use. Through dendroarchaeology, the provenance of timber can be established. As Nigel Nayling has said, the application of wood provenance and dendrological techniques in an archaeological context should address 'questions of woodland management and exploitation, timber trade and supply, and the provenance of that portable antiquity par excellence, the ship'.[32] This application of dendroarchaeology is being carried out in a systematic way, involving sampling during diving and laboratory testing.[33]

Research of the kind being undertaken by *ForSEAdiscovery* requires a broadly interdisciplinary perspective in order to extract all the possible information relating to the ship. These ships were mirrors of the first globalization, so all their pieces, contents, and integrated stories are important for understanding and analysing historical-social, economic, cultural, technological, and even environmental processes. They reveal information about the science, life, and customs of those times and details about the historical events and the social networks involved in the history of the ship (from the shipyard to the sea). They also show up much about the timber, shipbuilding, goods, and trade routes and function as time capsules, providing a complete snapshot of the life on board at the time of sinking.

From the end of the fifteenth century, travel to the Indies was a hard and dangerous adventure. A shipwreck was the worst part, because it was usually synonymous with death, especially when it happened away from the coast.[34] The causes of these disasters were diverse. The most frequent were storms and incompetence of the pilots, followed by grounding, collision with obstacles, overload, and fire. Sometimes, the causes were due to the poor condition of the ships. In addition, there were shipwrecks caused by pirates, and, in time of war, enemy attacks. Although these were random accidents, sometimes they were deliberately caused. Details and numbers of shipwrecks have been collected from different primary sources, literature, and other databases. This information has been collated, recording basic identification data, location, chronological data, additional information, documentary information, imagery, and related documents. The *ForSEADiscovery* database currently registers 698 historical shipwrecks in this way.

One of the main objectives of the *ForSEAdiscovery* project is the development of a GIS-oriented database to integrate and share data (both structured and unstructured), metadata, and cartography through web mapping. Information is collected through interdisciplinary collaboration on the part of archaeologists, historians, and wood-provenance scientists. A current challenge is the need to develop complex data models

in order to integrate data, to visualize by mapping geo-localized data, and also to contribute to the implementation of new tools of analysis. Specific subchallenges relate to: firstly, the development of a data model for integrating, managing, storing, and analysing all kinds of structured and unstructured Big Data and associated metadata referring to coastal archaeological remains and underwater cultural heritage (including submerged landscapes and settlements), and associated historical and intangible cultural information; secondly, the creation of new tools for the integration and sharing of historical and archaeological information with data from the life sciences; and third, the creation of new models for integrating data from the human and social sciences to identify maritime cultural heritage, meeting the standards of Spatial Data Infrastructures (SDI).

GIS is an integrated collection of computer software and data used to view and manage information about geographic places, analyse spatial relationships, and model spatial processes. GIS software combines computer-mapping functionality with a database management system. It is a spatially referenced database, enabling visualization and analysis.[35] The process of working with Big Data and GIS in interdisciplinary studies involving historical archaeology and dendrochronology involves three initial phases. Firstly is the pre-processing phase—which is mechanical, and if not done correctly all subsequent results will be invalid. Researchers work with the data in their purest form as they come from different sources. Data can be physically found on servers or in databases with different locations, and comes in a variety of formats, both structured (tables and databases) and unstructured (free text, images, audios, videos). Often the information that is really useful for evaluating a model is relatively small, and it is necessary to extract it considering what type of analysis needs to be carried out. The data must be standardized, and sometimes a particular field is empty (null), meaning the data have been lost or do not appear in the documentation.

In the second phase, models are built to support the desired tasks, through a combination of statistical, mathematical, and programming methods to take the already clean data, create and experiment with a model, and evaluate its efficiency before applying it. This 'data model' is oriented to the type of analysis to be carried out. In the third phase, it is important to be able to transmit the information obtained in the data analysis effectively. Visualization of the data in the form of graphs, tables, or maps is essential and involves the creation of a web viewer. For example, it is possible to use a website and map processes to collect information from public databases and present it in a way that enables specific socioeconomic analyses to be carried out.

Other currently available historical GIS projects on the circulation of goods do not extend their data models to the analysis of commodities in the early-modern period.[36] Nevertheless, it is a methodology that is facilitating a new 'spatial turn' in early-modern and global history. In the *ForSEAdiscovery* project, the construction of the relational database and GIS has involved integrating knowledge tools, bringing together analytical tools such as cartographic viewers, 3D representation, photogrammetry, and the integration of information from various databases, underwater archaeological charts, or documentary repositories. This enables the relational analysis of quantitative and qualitative data, as well as spatial-temporal constructions and a conceptual framework

oriented to geospatial knowledge that allows us to carry out research beyond what has been collected in databases.

The objective of such a GIS-oriented data model is to develop a system capable of integrating data with different characteristics and information, with different levels of metadata (a description of the informational content of an object), organized in layers and related tables. It is also capable of collating information from other databases, and provides a framework for gathering and organizing spatial data and related information, so allowing its management, visualization, spatio-temporal analysis, and relationships between entities. The data are structured according to existing knowledge on shipbuilding during the Iberian global expansion, its evolution taking into account how the agent networks functioned, and the timber trade that provided the resources for the emerging naval industry. Sharing and visualizing data and maps also provide a spatio-temporal knowledge and relationships between geographic entities using GIS, which offers great potential for any future research in these disciplines. Further, the visualization of spatial statistical analysis in GIS helps us understand patterns and models.

ForSEADiscovery is indebted to a line of research carried out in two previous projects within the same research team, especially with regard to the integration of data and models. The *DynCoopNet*[37] and *GlobalNet*[38] projects—focused on defining interdisciplinary and epistemological frameworks—enabled a deeper understanding of trade, merchant networks, and maritime expansion by combining information about agents, cooperation, sailing, maritime trade, routes, ports, and other essential entities for the research. In both projects, a large amount of structured and unstructured data was collected and was the subject of careful pre-processing work: broadly speaking more than 13,000 registers of ships of all nationalities, of which 1,362 were Spanish ships of the *Carrera de Indias*. These previous databases and other unstructured collected data (such as images and maps) have been integrated into a data model capable of integrating information with great potential for GIS to be able to answer questions related to not only ships but especially merchant's networks as well as all other activities related to the Atlantic trade between the sixteenth and the eighteenth centuries. The database and GIS application were developed with a central focus on Iberian ships travelling from Spanish ports, mostly Seville and Cádiz, but also including another nodal point in northern Spain (Bilbao in the Basque Country, and Guarnizo in Cantabria).

The preparation of the shipwrecks database has been an arduous task since documentary evidence in the Archivo General de las Indias—in particular relating to incidents on the voyage, especially shipwrecks—is widely dispersed, and is sometimes scarce and unclear. In the PARES web search engine, we used the advanced search and input on the Spanish Archives Portal, entering the following Spanish terms, in order to locate registers about shipwrecks among all available and digitized documents: '*naufragio*' (shipwreck), *pérdida* (loss), *hundimiento* (sinking). These were combined with the known name or alias of the ship with specific vessel types (*nao*, *galleon*, etc.). Moreover, we reviewed secondary sources relative to shipwrecks during transatlantic voyages and in the Mediterranean between the sixteenth and eighteenth centuries, and these were also added to the shipwreck database. Historical information was complemented

with information from other existing databases. For example, the *ShipLAB* database[39] contains data on sixteenth- and seventeenth-century shipwrecks, including the main features of each set of hull remains.

It is important to highlight that there is barely any information available regarding commercial matters, such as ship cargoes, but a wealth of it regarding the structural details of the ships, most of them already geolocated. This database comprises 757 archaeological shipwrecks with geographic coordinates. In addition, archaeological information has been collected from reports of excavated wrecks and during the campaigns that were organized within the project in the North West of Spain, Portugal, and the United Kingdom, where timber has been collected in situ for further analysis. The *ShipLAB* database has produced the Nautical Archaeology Digital Library (NADL), with the purpose of sharing the knowledge acquired with both the domain experts and the general public.[40]

The main trade routes and ports (hot spots) are displayed through maps. The main routes across the Atlantic Ocean, following the Trade Winds, can be seen in Fig. 29.1.

Information is collected in the *ForSEAdiscovery* database on what we have called the 'spectrum' of ships on their journeys along routes and at their various scales of commercial operation. Each spectrum is a biography of the life of a ship, from the time it leaves the shipyards until its effective life ends, including all the corresponding scales and connections, such as social agents intervening in its historical journey. These spectra can be visualized in the GIS on a base cartography, and related to each spectrum we can locate information on the social and economic exchanges in each port or plaza, and events related to scale (careening, commercial cooperation) or at sea (shipwreck, hurricane). Some events are implicitly related to the subsequent evolution of a ship once its spectrum, or active life, has ended. The information collected refers to the particular history of each vessel but also includes important cross-linked data on the identification of archaeological sites as well as the probable chronological intervals in which maritime accidents occurred prior to the formation of the site; the construction and activity in which the ship was used; the state of the woods and the species used (offering important information about its origin); and the characteristics and dimensions of the ship, as well as any data related to the ship's architecture.

It has been said that 'dendrochronology is the default method for dating wooden shipwrecks'.[41] The use of wood-provenance techniques and dendrochronology, dating from the growth rings of trees, introduces a further interdisciplinary perspective to the project. Dendrochronology enables cross-referencing of historical-archaeological information with the analysis of the origin and characteristics of the wood that was used in the construction of historical ships. Thanks to this, it has been possible to identify, date and analyse wood samples taken from submerged ships. Based on the ring-growth pattern, dendrochronology analyses spatial and temporal patterns of biological, physical, or cultural processes. One of the aims of the GIS-oriented database is to create a methodology also capable of handling so much differing data. Two types of basic information are present in the database: first, a cartography of the origin of the wood in the Iberian Peninsula, recreating the marine mountains that were established by royal

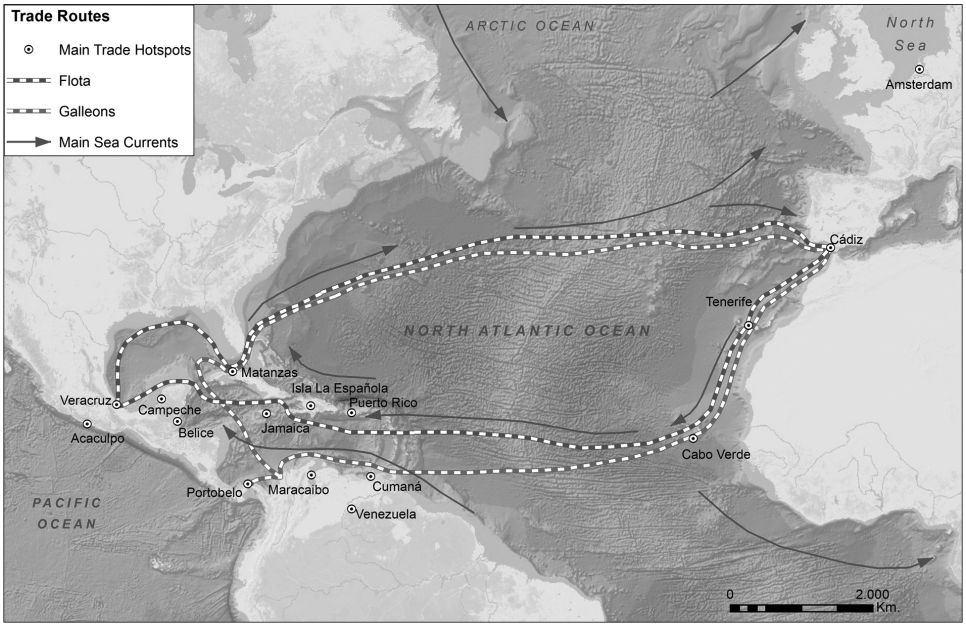


FIGURE 29.1 New Spain Fleet (Flota) and Tierra Firme Fleet (Galleons) travelled from Spain to West Indies across the Atlantic Ocean.

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order since the sixteenth century and were consolidated from the 1720s; secondly, integrated dendrochronologies carried out on wood samples from living trees and historical buildings in order to compare the information with samples collected in localized historical wrecks.

At the moment, these information tables, or layers, refer to oak and pine from the Iberian Peninsula, but the inclusion of other arboreal species is proposed as well as a reference cartographic visualization for timber that arrived in Spain and Portugal from outside the Iberian Peninsula. The problem with oak is that there are more than six hundred species worldwide, of which there are nine in the Iberian Peninsula, which causes problems when it comes to provenance analyses, which requires strict chronologies to date the wood that we do not always have.[42] Collected timber samples from shipwrecks, but also from buildings and living trees, were analysed with several wood-provenance methods (dendrochronology, wood anatomy, and geo/dendrochemistry). Wood-analysis results will also be integrated in the geodatabase.

In order to date wood samples taken from wrecks, sampling was carried out in Spanish historical buildings and forests in the North (Basque Country, Cantabria), Centre (Sierra de Guadarrama), and South (Andalusia). The resulting tree-ring chronologies have developed some reference datasets for stable strontium isotopes at the same locations (Fig. 29.2), which is 'related to the signature of the local bedrock'.[43] Different approaches were used to study wood provenance, but strontium isotopes have

been recently introduced as an analytical tool to trace the provenance of archaeological wood and especially wood from shipwrecks. Furthermore, the organic chemistry and DNA of the wood collected has been analysed and characterized in order to complete the set of reference material to provenance the wood retrieved from the shipwrecks.

The archaeological and forestry information collected has been integrated into the *ForSEAdiscovery* database and will also be included with the results obtained from dendrochronological methods and the investigation of tree rings, anatomy of wood, and dendrogeochemical analysis. Furthermore, historical and archaeological data have been cross-referenced to find a common link in the historical events.

The *ForSEAdiscovery* data model links information by layers of historical, archaeological, and dendrochronological data aimed at identifying behaviour patterns of agents dispersed in commercial cooperation networks, the arrangement of routes and maritime routes, as well as the events that occur between maritime and port nodes, in the city and on the ship, as centres of human activities. The dendrochronological data and analysis of provenance of the wood identify patterns in the design of the ship, its construction, and the wood used in its structure. This GIS also includes maps of the ocean



FIGURE 29.2 Timber sampling from the North (Basque country and Navarra), Centre (Guadarrama) and South of Spain, Sierra de Segura (Andalucia).

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floor, with important information that influences the formation and evolution of the archaeological site, the coastal zones, intertidal areas, and all the information that has influenced the evolution of the marine and submerged zones. At the moment, it includes more than seventeen hundred ship records with historical-archaeological information in a geo-database that maps areas of the Iberian Peninsula, the Mediterranean, and the Atlantic, with special links to the Caribbean and the Antilles. The primary intention is to integrate information for combined analysis and pattern detection on routes, ships, and agents.

The *ForSEAdiscovery* research and database thus attempt to create a model of analysis to solve problems related to the study of timber located on archaeological sites: dendrochronology helps connect history and archaeology, and GIS facilitates the integration of historical and archaeological data with the analysis resulting from dendrochronology. Combined, they enable us to explain the origin of a particular vessel in order to learn more of these 'floating forests'—the ships of the early-modern globalization.

Future Research Perspectives

The historiography of the 'age of discovery' has highlighted the importance of the nautical revolution and the opening of new routes, but there are not many theories explaining the evolution of these ships according to the social, economic, and political background in which they were thought, conceived, and built. No two boats were exactly alike, and sometimes different traditions converged, linking Mediterranean, Basque-Cantabrian, North-European, and Portuguese construction techniques. As a result, the analytical intersection of historical documentation and archaeological evidence is currently offering even more enigmas than answers. As Felipe Castro has commented, ships are 'like fingerprints: they share conceptual characteristics, but each differs slightly; producing a unique construction set with distinctive sailing and handling qualities'.[44]

Although current research has already demonstrated the connection between naval innovation and social change,[45] we still need an explanation of the functionality and evolution of ships from the perspective of the social anthropology of technology, material culture, and especially environmental history. Many of the answers are resting on the seabed, or forgotten on coasts and in waterlogged areas. Shipwrecks have not been extensively studied archaeologically, and, unfortunately, much of this historical heritage has been destroyed by treasure hunters. This challenge has been especially relevant in the case of Iberian ships.

The management of maritime historical and archaeological Big Data should also contribute to documentation, surveillance, and data monitoring leading to better governance of this heritage. The importance of collecting and processing Big Data with historical-archaeological information could also be an opportunity for a better understanding of the use of natural resources or technological development.

The conversion of forest resources into a commodity capitalized by the state substantially altered the nature of the forest and also its administration, which turned from a communal good to an object of exploitation and large-scale commercialization. The development of the naval industries related to the construction of the ship—the main mechanism, and also an important ideological symbol, of imperial expansion—produced a high traffic of wood as a commodity. The impact of this global timber market is still an open line of research, which will not be completed without interdisciplinary collaborations between history, archaeology, and wood-provenance techniques.

The study of maritime routes, the behaviour of social networks, and the ship as a historical-social entity and a submerged heritage, framed in an interdisciplinary perspective, gives rise to an adequate organization for the collection of materials, the concrete processing of data, the visualization of such data, and their dissemination. In addition, working with these tools gives scientists the ability to propose and introduce changes in the methodologies of types of analysis that we want to do, expand interdisciplinary possibilities, and, therefore, write new projects to advance research.

The potential of databases and the use of GIS, as exemplified by *ForSEAdiscovery*, will make it possible to collate information on different layers of forests and their situation in the past and present in order to identify and relate deforestation and industrial development processes. Collated information in a geo-database and its implementation in a GIS can be accessible on the internet, making it easy to formulate questions, analyse data, and visualize the results on maps or graphs. The GIS application provides a valuable resource for accessing spatial data sets and promoting research collaboration. Web mapping can use open-source software and be hosted on a server of the institution, facilitating data accessibility and interoperability; thus, on the client side of the application, a web browser and network access is all that is needed.

Interdisciplinary analyses offer an opportunity to build new historical and archaeological narratives. Their wider application within commodity history, bringing together the techniques and insights of a variety of disciplines, is likely to enable us to develop a completer and more accurate picture to more fully understand the processes underlying the cultivation, extraction, processing, and movement of these resources across geographical and temporal divides. By combining the written evidence to be found in historical archives with scientific examination of the available material, we have the prospect of delving deeper than ever before, in ways that were previously not possible.

Notes

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CONCLUSION

Towards a Multi-Centred Approach to Commodity History

WILLIAM GERVASE CLARENCE-SMITH
AND JELMER VOS

Commodity history is concerned not only with raw materials but also with semi-processed goods, with an emphasis on the ways in which these are produced, exchanged, and consumed. In theory, finished products are also commodities, but scholars usually treat them separately as manufactures. Due to the significance of trade in raw and semi-processed commodities, their history is inherently global and thus invites reflection on the causal connections, or interdependencies, between different parts of the world, stretching back to the Neolithic Revolution in farming.[1] In practice, however, most historians write about commodities in the early-modern and modern periods, often within the context of European imperial expansion.

In many commodity-history accounts, unprocessed goods flow from tropical parts of the world, or the Global South, to temperate areas in the Global North.[2] The assumption is that these flows intensified with the development of industrial capitalism in the Global North, which created a greater demand for raw materials from the South. This dynamic then fundamentally structured relations between South and North. Such narratives ignore a wide range of other commodity flows—south-south, north-north, and north-south—and reproduce, consciously or unconsciously, the core-periphery model of world-systems theory.

In this conclusion to the *Handbook*, we propose an agenda for new approaches to commodity history, which not only seeks to sidestep the pitfalls of core-periphery thinking, but also questions the related issues of economic exploitation and environmental degradation. We recommend an approach that promotes an understanding of global relationships from non-Western viewpoints, while recognizing the structural inequalities that have often shaped commodity chains. Indeed, like global history in general, commodity history embeds interdependencies between different actors and places in global commodity chains in what Sebastian Conrad calls 'processes of

structural transformation'. As he puts it, 'Failure to note power structures confers agency on everyone who is involved in exchange and interactions, and by celebrating mobility runs the danger of ignoring the structures that control it'.[3] In contrast to world-systems theory, however, we argue that these larger structures are not necessarily equivalent to a European-centred capitalist world economy. Instead, we propose that south-south, north-north, and north-south commodity flows should be integrated into the narrative, which forces historians to reconsider the power dynamics behind these flows. We further suggest that historians take a more nuanced view of the economic and environmental consequences of the production, trade, and consumption of commodities.

Core-Periphery Relationships

Despite critiques, world-systems theory's signature core-periphery distinction continues to shape the analytical frameworks of many commodity historians. World-systems theory argues that, from around 1450, Western societies used their financial and technological might to exploit other parts of the world for the extraction of raw materials. This relationship then structurally divided the world economy into a developed capitalist core versus a series of underdeveloped and only partially capitalist peripheries.[4] Moreover, world-systems theory postulates that changes in global networks of commodity production, trade, and consumption have generally emanated from the Global North.[5] From its inception, scholars from different disciplines have criticized this theory, notably for its structuralism.[6] Historians of Africa, for example, have rejected it for its unidirectional causation, for overemphasizing the transformative power of capitalism, and for underestimating agency in the periphery.[7]

In the past two decades, area specialists have been at the forefront of a shift in global history from planetary approaches and universal theories, like world-systems theory, to a greater emphasis on local agency and variation in explanations of historical change.[8] They have also questioned Eurocentric notions of capitalism, pointing out that it was not always Western capital that called the tune. For instance, the rise of the English East India Company in the eighteenth century was based in great part on funds borrowed from South Asian capitalists.[9] In 1918, the members of the Indian Industrial Commission were surprised to discover that there was more South Asian than British capital invested in India's precocious manufacturing sector.[10] Indeed, numerous studies have shown that non-Western diasporic and local entrepreneurial communities often played a much greater, and more effective, part on the periphery than capitalists from colonial metropoles.[11] Moreover, even in areas where Western capital was dominant, it was not for that reason necessarily the determining framework for everyone living and working there.

Nevertheless, historians of the Global South, including those studying commodities, are still struggling to produce general narratives that do not privilege Western empires and capitalists, or for that matter the Atlantic slave trade, as primary forces of change. In African history, for example, older theoretical frameworks stressing structural

or external sources of change, like world-systems theory, continue to shape historical analysis, despite the growing popularity of bottom-up perspectives. According to Gareth Austin, 'Eurocentric' explanations have remained dominant 'partly because the revisionist research has tended to be relatively local in focus, whereas the older views have been restated at a general level'.[12] The core-periphery binary in commodity history is an instance of such historical modelling, in which the actions and perspectives of people in Africa, Asia, Oceania, and Latin America appear to have little significance on a global scale.

Several chapters in this *Handbook* begin to challenge the framework of relating economically dominant regions in the world ('cores') to less powerful regions ('peripheries'). For instance, Corey Ross (Chapter 20) and Leonardo Marques (Chapter 10) both emphasize ways in which local environments—the biophysical world—together with the knowledge of people living in these environments have shaped the extraction of primary commodities for global markets. Ulbe Bosma and Eric Vanhaute (Chapter 4) introduce the concept of the 'global countryside' as an analytical device to study the exploitation of land, labour, and nature for resource extraction within the global economy from the bottom up. Hanne Cottyn (Chapter 16) applies the concept in her analysis of century-old conflicts over land rights in the Carangas province of Bolivia. Such a bottom-up perspective on commodity production, shared with the *approches filières* of francophone social scientists treated by François Ruf, Franziska Ollendorf, and Enrique Uribe Leitz (Chapter 2), challenges top-down views that prevail in some forms of commodity-chain analysis.[13]

Nevertheless, the core-periphery distinction remains visible in often-applied divisions between Global North and Global South, industry and agriculture, manufactured goods and raw materials, prosperity and poverty, and conservation and degradation. It is also apparent in the analytical tension that marks some of the most exciting recent studies in commodity history, which present a view of the world in which industrial centres in the West, in their thirst for raw materials, exert relentless social and environmental pressures on peripheral regions.[14] In this new historiography, a seemingly unstoppable world-economic logic of commodity production emanating from the core collides—analytically—with the agency ascribed to peoples and environments in the Global South.

The influential Commodity Frontiers Initiative, which aims to create a new paradigm for researching commodity history, also exhibits a tendency to core-periphery thinking.[15] Commodity Frontiers builds on the work of Jason Moore, who modernized world-systems theory by 'rethinking early-modern capitalist expansion as a socio-*ecological* process'.[16] By concentrating mainly on resource extraction for the benefit of modern capitalist societies, Commodity Frontiers also links with the New History of Capitalism, which has made cotton plantation slavery and its global tentacles an integral part of the story of Western economic development.[17] Its ambition to integrate peoples and events in the Global South into narratives of worldwide networks of commodity production has helped embed commodity history more deeply in the field of global history, displaying some of the benefits gained from studying the past through the lens of commodities.[18]

At a more abstract agenda-setting level, however, a number of problems surface in such approaches, which have also hampered commodity history more generally. Firstly,

the Commodity Frontiers literature seems to suggest that resource extraction happens predominantly in the Global South. It is not alone in this. For example, of thirty-six working papers published by the Commodity of Empire project from 2007 to 2022, twenty-three examine south-north commodity flows. That only five of the eleven papers published from 2017 consider south-north flows, however, suggests this trend is slowly changing.[19]

Secondly, by adopting 'global capitalism' as the principal explanatory concept, the Commodity Frontiers approach diminishes the analytical significance of the 'global countryside'. Despite privileging rural areas as principal sites of empirical study, capitalist development in urban Europe and North America is seen as the main source of historical change in these areas. Thirdly, following Jason Moore, it assumes that commodity production has been fundamentally unsustainable, with frontiers continuously moving into new extraction zones after exhausting all available natural and human resources. Albeit unintentionally, this replicates the centre-periphery model of world-systems theory, with all its complications. Moreover, a penchant in this literature to turn commodity production into a story of global 'impact' and local 'resilience, resistance, and accommodation' creates an unnecessary opposition between global and local dynamics.

Binary divisions of the world economy into core and periphery are problematic for several reasons. Firstly, there are many examples of commodity chains that did not flow from southern periphery to northern core, including the nineteenth-century Canadian-British timber trade studied by Jim Clifford, Joshua MacFadyen, and Stéphane Castonguay in this volume (Chapter 28). Indeed, the Global North has long been a large producer of primary commodities in its own right. In the early-modern era, the grain, fish, furs, hemp, timber, and copper of North America and the Baltic, produced with non-slave labour, may have been of greater significance to Europe's economy than the spices, sugar, tobacco, and cotton of tropical zones.[20] In the modern era, most of the coal that powered the industrial revolution came from capitalist heartlands, and sugar and tobacco came to be widely grown in temperate zones.[21] Moreover, some commodities moved from north to south, like European iron and copper alloys in the Atlantic slave trade.[22]

The Indian and Atlantic Oceans were sites of substantial south-south trades in goods such as textiles, rum, vegetable oils, ivory, and tobacco.[23] Tobacco was not only an important Brazilian export to West Africa in the era of the slave trade but also a commodity traded through Iberian imperial networks connecting the Americas and Asia, as Santiago de Luxán Meléndez, João de Figueiroa-Rego, Vicent Sanz Rozalén, and Jean Stubbs (Chapter 7) make clear. This shows that not all imperial commerce was oriented to metropolitan centres. In fact, in the early-modern era, European East India companies learned to adjust to inter-Asian commerce as a larger and more profitable business than the trade with their home markets.[24] For Portugal, the Macau-Nagasaki trade in Chinese silks, exchanged for Japanese silver, saved the Estado da Índia from economic collapse in the second half of the sixteenth century.[25]

As Roger Knight and Steven Ivings have shown, the salience of Asian 'country trade' persisted into the modern era.[26] Japan was arguably the main beneficiary of the commercial system imposed by British force and threats of force in the Indian Ocean.[27] Despite being subjected to more constraining forms of 'gunboat diplomacy', China was also able to exploit the 'pax britannica' to its own advantage, sometimes to the detriment of British commercial interests.[28] Likewise, Indian merchants profited greatly from the new imperial dispensation in the western Indian Ocean.[29] While perhaps less significant in the Atlantic arena in modern times, south-south commercial flows continued and developed there, too. One significant example was the reorientation of a large part of the sizable overland mule exports from the Río de la Plata to Potosí and beyond, which began to reach seaborne markets in the Caribbean, northern Brazil, and the Indian Ocean.[30]

Furthermore, some forms of commodity production supported regional economies and did not lead to world-spanning flows. For example, many Atlantic and Indian Ocean economies specialized in producing foodstuffs for nearby markets, which often focused their own production on commodities for global consumption.[31] In the Indian Ocean, some types of trade in live animals were hardly at all connected to Western markets.[32] As the late Kaori O'Connor suggested, such cases force us to reconsider the extent to which commodity history is necessarily 'global'.[33]

Secondly, studies on commodity trading in the Global South have thrown traditional hierarchies of industrial development into doubt. As David Pretel (Chapter 11), Jonathan E. Robins (Chapter 13), and others have shown, commodity production in the South often involved substantial industrial processing of raw materials—including for local consumption.[34] Similarly, East Asian techniques of production of silk and porcelain, or South Asian brass technologies, were quite industrial, and Western countries struggled mightily to replicate them.[35] In the same vein, Suraiya Faroqhi (Chapter 5) demonstrates the continued vitality of both Ottoman and Persian silk manufacturing for early-modern regional markets. Moreover, techniques developed on the 'periphery', like Caribbean sugar mills, provided models for industrial development in Europe.[36]

Thirdly, commodity history would benefit from adopting multiple global angles that intersect traditional core-periphery divides. As Cátia Antunes and Jelmer Vos (Chapter 6) argue, African ports like Luanda functioned as 'gateways' in much the same way as European port cities, eliminating the need to hierarchically separate North from South in terms of urban and maritime history. In addition, the 'centre' itself has always been much more diverse than Wallerstein portrayed it. Clearly not all 'cores' were fully fledged capitalist economies. As Anne Dietrich (Chapter 9) shows, the Socialist Bloc was an integral part of the Global North, and functioned as a 'core' in relation to several socialist-leaning countries in the Global South, at the same time turning some of its own rural hinterlands into agricultural peripheries. To take another example, to what extent has Portugal really ever been part of any centre, even in the sixteenth century? Brazil may have been a periphery in the Portuguese colonial imagination, but it was an

autonomous centre in the Atlantic world, generating the capital, supplies, and equipment required for the slave trade largely independently from Portugal.[37]

In the modern era, Brazil remained a major supplier of raw materials, but, as Paul S. Ciccantell, David A. Smith, and Steven C. Topik (Chapter 1) make clear, as the world's largest coffee producer, the Brazilian government possessed the power to shape an important global commodity chain. At the same time, coffee wealth led to uneven industrialization in Brazil, with São Paulo state emerging as a 'core' to a 'periphery' of north-eastern states within Brazil.[38] Indeed, just as the core disintegrates when a wider range of commodity flows comes into view, it is equally difficult to maintain the notion of a single periphery. Japanese scholars have written about 'flying geese', probing the order in which non-Western societies became wealthier and more productive.[39] From this perspective, putting China into the same category as Africa makes little sense. Even placing all of sub-Saharan Africa into a single zone seems perverse. What do the Kalahari and Yorubaland really share, or the Ethiopian Highlands and the Central African Copperbelt?[40] Adding a 'Fourth World' to a 'Third World' to account for diversity is no more than a sticking plaster.[41]

A multi-centred approach could build on recent advances in micro-history, life history, and place history, embedding global connections in 'deep, local history', as John-Paul Ghobrial puts it.[42] For example, in this volume, Elizabeth Zanoni (Chapter 24) employs micro-historical family trajectories of migration to illustrate the spread of culinary systems from southern Europe to South America. Similarly, Marieke van Erp and Ulbe Bosma (Chapter 27) draw on apple pie recipes to deduce wider patterns of consumption. In general, micro-historical, life-history, and prosopography approaches have improved our understanding of the agency and viewpoints of local actors in larger global dramas, and helped to focus scholarly attention on trans-imperial, sub-imperial, and subaltern connections in global history, away from the top-down perspectives of traditional world history and imperial history.[43]

Historians may not yet have sufficiently explored the possibilities that these new approaches offer to the study of global commodity flows.[44] Where micro-history has been applied to commodity history, it has tended to focus on 'movers' in the chain—traders, shippers, manufacturers, and the like—who have left visible traces in the archival record.[45] Among movers whose archives are accessible, dealers, brokers, commission-agents, distributors, and similar intermediaries have received much less attention. Even worse, the people most affected by commodity production and consumption, or those whose collective cultures have shaped processes, have generally remained in the shadows. Moreover, micro-history has still not resolved the question of how to link the micro to the macro, which is mainly due to the problematic representativeness of micro-studies.[46] Place histories might help with this conundrum, as in the well-developed field of port histories.[47] For instance, historians Donald Wright and Randy Sparks have examined the coming together of different global commodity flows in supposedly 'peripheral' locations in the Atlantic world, on the West African coast.[48] Such analyses provide a better understanding of how local actors viewed and shaped their interactions with foreign influences.

From Exploitation and Resistance to Prosperity and Local Agency

A common assumption behind the core-periphery model, often rooted in critiques of global capitalism, is that commodity production has, almost without exception, been exploitative and has impoverished the Global South. From this assumption it follows that the most common, or at least the most rational, form of local agency in the South has been resistance.[49] In reality, commodity frontiers based on small producers have often benefited the societies involved, leading to a rise in income and welfare. Rather than resistance, evasion, or some other form of rejection of world-market pressures, the agency of producers in the Global South involved their active participation in the making of commodity frontiers. A true bottom-up perspective, we argue, does not oppose the local to the global.

There have been many examples of smallholder initiatives, often opposed by colonial officials in the early stages, which resulted in surges of material prosperity. One classic case was the cocoa boom in the Gold Coast, today Ghana, ably studied by Polly Hill.[50] Rubber smallholders in Malaya and the Dutch East Indies form an equally model case in the economic historiography.[51] This does not mean that cocoa and rubber growers did not oppose colonialism but, rather, that they often did so as part of a revolution of rising expectations.[52]

Critics may argue that such were not real success stories, because they created a dependency on volatile world commodity prices. However, as Alexander Engel has shown (Chapter 8), hedging, notably in futures markets, could correct the problem of price instability. While smallholders themselves may not have been able to intervene effectively in futures markets located in major Western cities, traders, dealers, brokers, and manufacturers did so fairly consistently to dampen down price changes. Moreover, there were other hedging mechanisms available, notably for commodities that did not benefit from futures markets, such as forward contracts. Even smallholders could engage in these, for example, by agreeing in advance to sell their crop at a particular price. As long as purchasing structures were competitive, this could be greatly to the advantage of cultivators.

In contrast, the 'anti-commodity' literature surveyed by Sandip Hazareesingh and Harro Maat (Chapter 3) has argued that withdrawing from the world market has been beneficial to peasant communities. As Joyce A. Madancy (Chapter 23) and others have shown, however, small producers were often profit-oriented and able to increase their standard of living by purchasing necessities, and more, with the profits earned from their export-oriented initiatives.[53] According to the Indian economist, Amartya Sen, withdrawing into autarkic self-sufficiency can result in a fall in living standards, while simultaneously increasing vulnerability to natural disasters.[54]

Knowledge of local ecologies gave many indigenous smallholders in colonial economies a competitive edge over foreign-owned estates. However, even where large

estates predominated, it would still be incorrect to assume that Western scientific knowledge determined productive processes. In servile societies, there was considerable input by direct labourers, as shown by Leonardo Marques (Chapter 10), Michael Zeuske (Chapter 14), and Leida Fernández-Prieto (Chapter 17). Indeed, scholars have increasingly stressed the vital contribution of enslaved people to modes of cultivation.[55]

More widely, indigenous knowledge has been crucial in the development of plant inventories and production methods.[56] For instance, tobacco planters in East Sumatra left cultivation to Chinese sharecroppers, who practised extremely long fallow periods.[57] Similarly, Ghulam A. Nadri (Chapter 12) shows how methods of cultivation of indigo in Bengal were generally left to small producers under contract, while Karin Hofmeester (Chapter 15) details similar arrangements in Indian diamond mining. Indigenous knowledge was also important in animal husbandry, as colonialists were often at a loss as to what caused animal diseases. Thus, Griffith Evans, in India, discovered the trypanosomes that caused *surra* in horses and camels in part through close questioning of local people in Punjab.[58]

A fine example of local agency arose in the elaboration of modern maps. As Sabrina Joseph (Chapter 18) points out, to determine what commodities existed that businesses could extract, colonial governments often turned to mapping. Despite a triumphalist colonial discourse of superior scientific knowledge and techniques, colonial regimes relied heavily on local agency in the elaboration of early maps. They encountered surprisingly uneven practical local mapping cultures, ranging from highly developed ones in East Asia to rudimentary ones in pre-literate societies, but local knowledge was everywhere extremely important in the creation of colonial maps.[59]

Local agency in production was mirrored in the domain of consumption. New cultural history approaches have questioned the assumption that Western patterns of consumption determined the nature of commodity chains. Paul R. Mullins (Chapter 25) suggests that archaeological methods can illuminate differences in consumption patterns among groups defined by race in the United States, while Anna Arabindan-Kesson (Chapter 26) examines the consumption of textiles through art historical methods. To give another example, Marcy Norton has shown how Mesoamerican cultures of consuming cocoa and tobacco influenced the Iberian reception of these commodities.[60] In fact, peripheral food cultures in some cases conquered the 'core'. Notable modern cases are Bengali ('Indian') restaurants in the UK and beyond, Maghribi couscous in France, or 'Tex-Mex' food in the United States.[61] Meanwhile, Geoffrey Pakiam has shown how the taste for red unrefined palm oil persisted in Africa and the New World, whereas colonial attempts to foster it for health reasons in Maritime Southeast Asia came up against local culinary preferences.[62] Cultural histories have thus been instrumental in puncturing the illusion of absolute Western hegemony over imperial and subaltern lives.[63]

The Complex Impact of Commodities on the Natural World

One of the most problematic aspects of commodity history consists in assessing the impact of production on the environment. The past holds many cases where processes of commodity extraction and industrial processing have had a profoundly damaging effect on landscapes, ecosystems, and the communities depending on them. The removal of people and earth for phosphate mining in twentieth-century Banaba is one of the most dramatic stories in a vast historiography.[64] Helen Cowie's case study of Pacific fur-seal hunting in the nineteenth century (Chapter 22) is another example. In academia and beyond, such stories have created an impression of commodity production in the modern world as fundamentally unsustainable. However, as Ross suggests, in evaluating the ecological costs of resource extraction, historians should consider the capacity of environments to resist or regenerate, on their own, or through deliberate human choices.

Major examples are agroforestry and reforestation (or afforestation), to which historians have paid far less attention than to deforestation. To be sure, deforestation has been one of the most noticeable ways in which commodity extraction, both temperate and tropical, has affected environments. Agriculture is the usual culprit, though mining also contributes to some degree. Deforestation not only affects climate but also reduces biodiversity. Yet, an exclusive emphasis on clearing the forests of the world neglects some significant counter-currents, which need considerably more research.

Firstly, not all methods of forest clearing are identical. Clear-felling vast areas, and burning the trees and shrubs, is typical of large estates and ranches. The immediate benefits are a 'forest rent', both from the fertility of uncropped soil and from the ashes added to it. However, the forest rent is soon squandered, especially if the forest is replaced by mono-cropping, which encourages the spread of pests and diseases.[65] Moreover, fires generated in peat lands, as in Maritime Southeast Asia, are virtually impossible to put out. In contrast, agroforestry, often practised by smallholders, is much less destructive. Patches of cultivation are dispersed through the forest, limiting the loss of biodiversity and the spread of pests and diseases. If the latter nevertheless appear, the plot is left to 'return to bush', naturally clearing infestations over time. Furthermore, large forest trees are often retained in cultivated areas, with the specific function of providing shade to small trees, such as cocoa and coffee. This leads to lower yields in the short term but to a much longer life for tree crops in the long term.[66]

Even when farmers entirely remove forest cover, the choice of crops and cultivation methods has further effects. Planting annuals, such as grains or cotton, leaves the soil open to the kinetic energy of rainfall, which tends to be particularly high in tropical areas. Long fallows, and the application of manure and chemical fertilizers, can help restore fertility. If farmers neglect such measures, the soil will erode, compact, and, in some cases, turn into a hard lateritic crust, which is a virtual desert. However, if they

plant tree crops (e.g. rubber or palm oil), after a few years they re-create a tree canopy, which, to some degree, mimics the forest that it replaces, breaking the force of rainfall. Such 'pseudo-forests' may last for decades, depending on how they are managed.[67]

Even more neglected in the literature is the long and chequered history of reforestation, which is touched upon in this volume by John L. Brooke, Eric Herschthal, and Jed O. Kaplan (Chapter 21), Rafael Chambouleyron, Luly Fischer, and Karl Heinz Arenz (Chapter 19), and Ana Crespo-Solana (Chapter 29). In one egregious case, scholars viewed the patchwork of forest and savannah in the African Sahel as evidence of deforestation, contributing to the southward march of the Sahara Desert. It took the pioneering research of James Fairhead and Melissa Leach to demonstrate that this was in fact evidence of local African reforestation, successfully slowing the menace of the Sahara.[68]

In fact, preservation of forested land dates back to the very origins of agriculture, when 'sacred groves' were created.[69] Reforestation was later undertaken for multiple purposes, such as King Diniz of Portugal's famous planting of pines in the Leiria region around 1300, to hold back the encroaching sand dunes and supply timber for shipbuilding.[70] The British in the early-modern Caribbean were particularly concerned with the dangers of climate change, or desiccation as they called it, and sought to reforest watersheds.[71] In modern colonial Southeast Asia, the purpose was mainly to enhance the production of valuable teak, considered to be the best wood for shipbuilding. There was a conscious attempt to apply scientific techniques developed by Prussian foresters in Europe. As a subsidiary activity, local people could produce food crops, while the teak seedlings slowly grew to maturity.[72] Learning from past attempts at reforestation would help to avoid the pitfalls that have afflicted many contemporary programmes, such as planting the wrong trees, at the wrong time, in the wrong place, and with insufficient aftercare. Some authors argue, in fact, that rewilding is the best method of reforestation, with natural processes tweaked rather than thwarted.[73]

While commodity historians have begun to explore how global economic processes interacted with the biophysical world, environmental historians have long emphasized the role of non-human agents of change.[74] In the literature on climate change, however, the balance between human and natural processes, as well as their complex interactions, still need to be properly determined. In this volume's contribution to the theme, Brooke et al. largely follow the currently dominant historical narrative, which argues that the world has entered into the geological era of the 'Anthropocene'. This stresses the human impact—in part through commodity extraction—on the climate.[75] They briefly mention natural processes also known to affect climate change, notably sunspots, volcanic eruptions, and ocean-atmospheric dynamics, and further note that the chronology remains hotly disputed. There are, in fact, many other natural processes potentially affecting climatic change.[76] For example, recent research has shown that fluctuating methane emissions from rotting vegetation in tropical swamps play a crucial role.[77] This suggests that some rebalancing in historical research would be in order, with a greater sensitivity to how human and non-human factors have interacted in processes of climate change.

This in turn raises the complex and much debated issue of autonomous animal agency, and of the relations of workers with animals. In this volume, Cowie demonstrates the many ways in which people have exploited domestic animals through history. However, the question remains as to whether human beings domesticated animals, or whether animals chose the greater security, and perhaps companionship, that human beings afforded them.[78] In addition, how did labourers, especially coerced ones, interact with animals—for example, the growing numbers of mules that substituted for increasingly expensive slaves in the eighteenth-century Atlantic world? These are some of the questions that commodity historians are beginning to ask about the role of animals in human societies and economies.[79]

Ways Forward

Instead of developing an alternative general narrative framework, or metanarrative, we advocate a multi-centred approach to commodity history. Such an approach accounts for a variety of causal relationships in the formation of commodity flows, and assesses the agency of humans, and perhaps non-human animals as well, within their local context. The main benefit of such an approach is that it allows historians to examine the contributions of different places and actors to commodity flows in terms that would have made sense to the people involved. It builds on our argument that commodification is neither necessarily imposed by the 'core' nor necessarily harmful.

As we have emphasized in this concluding chapter, a key question regarding the impact of commodity production on the 'global countryside' entails effects on the standard of living of local producers, and their ability to negotiate terms within a commodity chain. As proposed by Ruf et al., direct producers are rarely, if ever, merely victims, retaining a capacity to mould a commodity chain. In extreme cases, as set out by Hazareesingh and Maat, they can simply go on strike by withdrawing from the market. Historically, even slaves and serfs exercised the options of rebellion or flight, thereby gaining grudging concessions. Moreover, some commodity producers, especially in the Global North, gradually obtained political and social rights to buttress their positions.

Another crucial question stressed in this chapter concerns the impact of commodity production on the environment, for good or ill. Here, also, we caution against adopting a position that the effects of commodity production must be irremediably harmful. Again, there are choices to be made and agency to be exercised.

Overall, we consider that the commodity-chain approach, as discussed by Ciccantell et al. retains great explanatory value, as long as it is not confined to top-down analyses that take their starting point in the Global North and consider actors in that part of the world to be unquestionably dominant. Furthermore, other commodity trajectories need to be given back their history, whether north-south, north-north, or south-south. If agency is recognized all along a chain, with no a priori claim to hegemony at any point,

then commodity chain analysis has a proven capacity to illuminate some of the most recondite corners of human history.

Notes

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