

# Ecology and Power in the Age of Empire

*Europe and the Transformation of  
the Tropical World*

COREY ROSS

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## Preface

This book has been quite some time in the making. In some ways its origins reach back over a quarter-century, when I was torn between undergraduate degrees in Biology and History, and ended up studying both. Against the odds, it was History that eventually gained the upper hand, though I always retained a keen interest in environmental issues that was first kindled in my childhood and was strongly reinforced while I was a student. Looking back, it seems almost inevitable that these two interests would eventually merge. Around eight years ago, when I was pondering what to do next after completing my last project, the decision to move into environmental history was an easy one—far easier, as I found out, than the actual work that it required. Here, at long last, is the result.

One of the best, and simultaneously worst, aspects of moving into a new sub-field of history is the steep learning curve that goes along with it. In my case, climbing the curve would have been far more difficult were it not for the generous advice and encouragement of numerous colleagues and friends. A special word of thanks goes to Frank Uekötter, who has not only read and critiqued the entire manuscript, but who has also been an invaluable and almost frighteningly knowledgeable conversation partner on nearly all matters relating to environmental history. He, Max Bolt, Francesca Carnevali, Reginald Cline-Cole, Peter Coates, Matthew Hilton, Simon Jackson, Sabine Lee, Su Lin Lewis, and Tom McCaskie all read parts of the manuscript in some form or other, and are likewise owed a big favour for their help. I wish that I could repay my debt to Francesca, for this and for many other things; it is now more than three years since she died, and her absence is still keenly felt by all of us who had the privilege of her friendship.

There were many others who (knowingly or unknowingly) helped my thinking along the way, among them Gareth Austin, Paul Betts, William Gervase Clarence-Smith, Geoff Eley, Bernhard Gissibl, Hugh Gorman, Tait Keller, Miles Larmer, Tim LeCain, John MacKenzie, Stuart McCook, John McNeill, Jean-François Mouhot, Simon Pooley, Julia Adeney Thomas, Richard Tucker, and Kim Wagner. My thanks to all of you, and to my colleagues in the History Department and the College of Arts and Law at Birmingham for providing such a stimulating place to work. Of course, historians cannot live on advice alone, so I would also like to express my gratitude to the British Academy for its generous financial support for the project. In addition, some of the ideas and arguments were presented at various forums in Oxford, London, Munich, Turku, Guimarães, Geneva, Paris, and Versailles, and I am grateful for the suggestions that I received there.

I would also like to thank the editors of the *Journal of Global History* for permission to reproduce sections of 'The Plantation Paradigm: Colonial Agronomy, African Farmers and the Global Cocoa Boom, 1870s–1940s', *Journal of Global History* vol. 9, no. 1 (Mar. 2014), 49–71; the editors of *Environmental History* for allowing me to reproduce parts of 'The Tin Frontier: Mining, Empire and

Environment in Southeast Asia, 1870s–1930s, *Environmental History* vol. 19 (2014), 454–79; and the editors of *Past & Present* for permission to reproduce sections of 'Tropical Nature as Global Patrimoine: Imperialism and International Nature Protection in the Early Twentieth Century', in: Paul Betts, Corey Ross (eds), *Heritage in the Modern World: Historical Preservation in Global Perspective* (supplement of the journal *Past & Present*, 2015), 214–39. All of this material is acknowledged in the chapters where it appears. Illustrations are reproduced with the permission of the Nationaal Museum van Wereldculturen, the National Archives Image Library, and Oxford University Press. For those illustrations where no credit is indicated, every reasonable effort has been made to contact all copyright holders, and any omissions will be rectified in subsequent printings if notice is given to the publishers.

My final thanks go to my parents, Charles and Charlotte, for first instilling in me a curiosity about the natural world and our place within it, and to Deborah, Alex, and Tessa for cheerfully (most of the time, anyway) indulging my interest in talking about such things.

Birmingham  
July 2016

Corey Ross

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## Introduction

### Ecology, Power, and Imperialism

Since the turn of the twenty-first century, the world has been witnessing what most commentators have called a 'global land grab'—that is, a wave of large-scale land acquisitions, primarily in the global South, by corporations and by states eager to gain control over resources beyond their own borders. Just how much land has changed hands is difficult to pin down due to the dearth of firm data, uncertainty about ownership status, and ambiguity surrounding the types of transactions that are counted. But in any event, it is clear that the area involved is huge. Since 2000, the Land Matrix (an independent monitoring coalition of NGOs, academics, and sponsoring agencies) has recorded over 1,230 separate land deals covering nearly 44 million hectares worldwide.<sup>1</sup> This equates to an area approximately the size of Sweden, but observers are in no doubt that it represents only the tip of the iceberg. Other estimates, for what they are worth, suggest that the tally might well exceed 200 million hectares, which is roughly equivalent to the surface of Western Europe. Although most of the purchases have taken place in sub-Saharan Africa, large areas of Southeast Asia and Latin America have also been bought up by foreign governments and investors. And although the global food insecurities that stimulated many of these acquisitions have somewhat subsided since the acute food crisis of 2007/8, on current trends the transactions are not likely to slow down any time soon.<sup>2</sup>

It is clear what has been driving this process: above all the spectre of worldwide food shortages, growing water shortages, and international commitments to raise the proportion of plant-based biofuels, with further acquisitions arising from mining interests, tourism, and even conservation initiatives (so-called 'green grabbing'<sup>3</sup>).

<sup>1</sup> Estimate as of July 2016: <<http://www.landmatrix.org/en/>>.

<sup>2</sup> There has been a huge outpouring of literature on the subject. For recent overviews, see Mayke Kaag and Annelies Zoomers (eds), *The Global Land Grab: Beyond the Hype* (London: Zed, 2014); Marc Edelman, Carlos Oya, and Saturnino M. Borras Jr (eds), *Global Land Grabs*, special issue of *Third World Quarterly*, vol. 34 no. 9 (2013); Alexander Reid Ross (ed.), *Grabbing Back: Essays Against the Global Land Grab* (Oakland, Calif.: AK Press, 2013); Lorenzo Cotula, *The Great African Land Grab? Agricultural Investment and the Global Food System* (London: Zed, 2013); Wendy Wolford, Saturnino M. Borras, Jr, Ruth Hall, Ian Scoones, and Ben White (eds), *Governing Global Land Deals: The Role of the State in the Rush for Land* (Chichester: Wiley, 2013).

<sup>3</sup> James Fairhead, Melissa Leach, and Ian Scoones, 'Green Grabbing: A New Appropriation of Nature?', *Journal of Peasant Studies*, vol. 39 no. 2 (2012), 237–61; Benjamin Gardner, 'Tourism and the Politics of the Global Land Grab in Tanzania: Markets, Appropriation and Recognition', *Journal of Peasant Studies*, vol. 39 no. 2 (2012), 377–402.

It is likewise fairly clear who has been driving it: chiefly international agribusinesses, investment banks, sovereign wealth funds, and forestry corporations hungry for land. And it is abundantly clear that, despite all the assurances of economic benefits and corporate social responsibility, many deals are done secretly, local groups are often not consulted, compensation is frequently lacking or less than what had originally been promised, and people are losing land as a result.

By no means is this all a matter of 'North-South' exploitation. China, India, various Gulf States, and 'Asian Tigers' also number among the main investor countries alongside Europe and the United States, which reflects the increasingly multipolar framework of the global economy. Nor is it simply a case of external versus internal interests, since many of the resources that are changing hands have long been the subject of competing local claims. Throughout the developing world, political and economic elites keen to attract outside investment in order to 'modernize' their rural economies argue that the land in question is underused, idle, or uninhabited, which is very often not the case. Since the purchases generally involve relatively fertile tracts with adequate water availability and transport connections, the impact on local livelihoods is disproportionately large. In a curious twist of the concept of 'economic development', vast territories in countries receiving food aid are now used to grow crops (both food and non-food) destined solely for export to wealthier countries. Furthermore, since the acquired tracts are generally earmarked for intensive production, they commonly end up being degraded by the familiar problems of deforestation, mono-cropping, and agrochemical usage.<sup>4</sup>

In short, the world has been witnessing a process of ecological imperialism in which powerful countries and organizations have tapped huge resource subsidies in other parts of the world as a means of overcoming the ecological limits that their own territories place on economic growth and commercial activity. Political and economic power has remade global ecology, and ecological constraints have profoundly shaped global politics and economic arrangements. It is a worldwide lesson in the subject of 'political ecology'—that is, the study of how wealth and power are produced and distributed (the focus of classical political economy) and how ecosystems constitute the ultimate source of both.<sup>5</sup> Seen from this perspective, wealth and power are based not only on the social construction of human productive activity, but also on the ability to modify the rest of the biosphere and harness its productivity for human purposes. Whenever this power is used to establish, maintain, or assist a regime in which foreign actors control, exploit, and seek to benefit from the natural assets of other, less powerful territories, there is good reason to regard it as a form of imperialism.<sup>6</sup>

<sup>4</sup> Kaag and Zoomers (eds), *The Global Land Grab*, 201–16 and *passim*.

<sup>5</sup> Richard Peet, Paul Robbins, and Michael Watts (eds), *Global Political Ecology* (London: Routledge, 2011); Paul Robbins, *Political Ecology: A Critical Introduction* (Chichester: Wiley, 2012); Philip Stott and Sian Sullivan (eds), *Political Ecology: Science, Myth and Power* (London: Arnold, 2000).

<sup>6</sup> For our purposes, 'imperialism' can be elementally defined as a form of domination imposed by one society over another in which the two are incorporated in a differentiated hierarchy that works to the advantage of the dominant party.

Despite the peculiarities of the twenty-first-century 'global land grab', in many respects it is not entirely new. Far from it: defining other people's land as underused, alienating it for purportedly more productive purposes, forging alliances between external and internal interests in order to exploit a territory's resources, and presenting it all as a contribution to human progress have an extremely long historical pedigree.

Our concern in the pages that follow is to explore the relationship between ecology and imperial power in the past, and to consider how earlier changes have come to shape the global biosphere today. This is a topic that could take us to many different times and places; empires are, after all, among the most persistent features of human history, and contests over natural resources are more pervasive still. But when seeking to understand the world in which we currently live, it makes sense to start with the last great imperial expansion in human history, indeed the largest one ever seen, when a handful of European powers extended the territory under their control by no less than 23 million km<sup>2</sup>—around one-fifth of the entire world land surface—during the late nineteenth and early twentieth centuries. Together, these empires connected disparate peoples over vast areas; they redrew political maps on a global scale; they crafted much of the architecture of worldwide trade; and, in the process, they helped create and amplify inequalities of wealth and power that are still visible today. Without a doubt, European imperialism was a central feature of modern world history. Few aspects of the contemporary world are untouched by its legacies.

At the same time, the spread of European power was also a central feature of global environmental history.<sup>7</sup> The unprecedented appetite for raw materials in the industrial metropolises generated enormous demands on natural resources in the rest of the world, from croplands and forests to mineral and energy deposits. It spawned a range of different methods for extracting wealth from nature, from plantations and mining complexes to new forms of agriculture and 'rational' land management systems. It stimulated a huge increase in the traffic of living organisms around the globe. At the heart of European imperialism was an attempt to transform forests, savannahs, rivers, coastal plains, and deserts into productive and legible spaces, all of which brought hefty environmental consequences: deforestation, erosion, siltation, pollution, disease, and habitat destruction. Eventually these consequences encouraged the formation of extensive counter-attempts to conserve soil, woodlands, game, and other resources. European imperialism thus engendered not only new ways to exploit the physical environment, but also new anxieties about the human impact on the rest of nature.

Reordering environmental relationships and altering ecosystems was an integral part of modern imperialism, and the basic aim of this book is to examine how this process unfolded during the late nineteenth and twentieth centuries. It considers the efforts of colonizers to transform nature for human purposes, as well as the constraints that moulded this endeavour and the unintended consequences that

<sup>7</sup> On the relationship between global and world history (as well as other types of history), see Diego Adrián Olstein, *Thinking History Globally* (Basingstoke: Palgrave, 2015).

often resulted. It not only focuses on intensive exploitation by rapacious entrepreneurs and revenue-hungry political elites (though there is plenty of this), but also investigates the ambivalent motivations of colonial conservation efforts and the outcomes of attempts to place production regimes on a more sustainable footing. Despite the huge and often destructive environmental transformations that it charts, it does not provide a narrative of inexorable degradation at the hands of European imperialists, since Europeans were by no means the sole agents of change, and not all change can be regarded as despoliation in any event. The story therefore features a range of different groups, motives, and interests, from international corporations to indigenous smallholders and from plantation owners to conservation advocates. Most importantly, perhaps, it is not just about people but about their relationship with the ecosystems in which they were themselves embedded: the soil, water, plants, and animals that were likewise a part of Europe's empire.<sup>8</sup>

### ECOLOGY AND IMPERIAL HISTORY

Such ecological entwinements were a fundamental feature of the imperial past—so elemental, it would seem, as to be easily overlooked. Despite the pervasive presence of ecological dynamics in the history of empire, the physical environment has often gone unheeded or been relegated to the role of raw materials, climatic events, or the incentive for new forms of bio-political governance. But human activity always has an ecological dimension, regardless of whether historians choose to focus on it. Given the manifold biophysical interconnections that were involved in the global spread of European power, it is useful to conceive of colonialism not so much as a social project with ecological consequences, but as a socio-ecological project (or better: series of projects) in and of itself. In essence it was a process of modification and subjugation that sought to reorder nature–society arrangements across large parts of the globe.<sup>9</sup> How this process unfolded throughout the colonial world, and the transformations that it entailed, are the central concern of this book.

Although ecology rarely occupies centre stage in histories of empire, the role of imperialism in reshaping the biosphere is hardly unknown territory. Ever since the appearance of Alfred Crosby's *Columbian Exchange* (1972) and *Ecological Imperialism* (1986), it has been widely recognized that Europe's overseas expansion powerfully reordered global ecology since the early modern period, just as environmental factors played a central role in the process of European conquest.<sup>10</sup> There

<sup>8</sup> On Europe and the colonial encounter generally: Dipesh Chakrabarty, *Provincializing Europe: Postcolonial Thought and Historical Difference* (Princeton: Princeton University Press, 2000); Jane Burbank and Frederick Cooper, *Empires in World History: Power and the Politics of Difference* (Princeton: Princeton University Press, 2010).

<sup>9</sup> I draw here on Jason W. Moore, "Amsterdam is Standing on Norway" Part II: The Global North Atlantic in the Ecological Revolution of the Long Seventeenth Century', *Journal of Agrarian Change*, vol. 10 (2010), 188–227.

<sup>10</sup> Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood, 1972); Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986).

is an excellent though hardly copious literature that surveys the manifold environmental ramifications of Europe's maritime empires, including the inter-continental transfer of plants, animals, and microbes; the imperial origins of conservationist thought; as well as the rise of scientific networks and 'imperial improvement' efforts in the eighteenth and nineteenth centuries.<sup>11</sup> By comparison, the relationship between imperialism and environmental change during the late nineteenth and twentieth centuries has been studied in a more piecemeal fashion, despite the fact that this period marked the apogee of Europe's global dominance, and despite the important role played by environmental factors—climate, disease, flora, fauna, natural resources—in shaping the geography of European empire.

This is all the more striking when one considers the changes that were under way at the time. The final third of the nineteenth century saw the convergence of four interrelated developments that together unleashed an unprecedented transformation of the global environment. Innovations in transportation and communications (submarine telegraph cables from the 1860s, the Suez Canal in 1869, the huge proliferation of steamships thereafter) laid the foundations for an explosive growth in worldwide trade and commodity production.<sup>12</sup> The key engine behind this growth was the spread of industrialization and new technologies in Europe (the so-called 'second industrial revolution'), which created an enormous demand for plant and mineral resources, many of them from overseas. In turn, lower shipping and production costs led to higher living standards and a sharp rise in European consumer demand, including for many 'exotic' goods previously regarded as luxuries. At the same time, a string of military and medical advances—the so-called 'tools of empire'<sup>13</sup>—were making the tropics a far safer place for Europeans to operate. Together, this bundle of interrelated factors, in the context of intense rivalry between European states, helped propel the rush for overseas territories during the late nineteenth century—above all in sub-Saharan Africa and Southeast Asia—and ushered in a new phase of global political and economic reorganization under European aegis.

Many aspects of this story have been told before, from the economic penetration of hitherto remote areas to the rise of indigenous resistance movements to the cultural (re)orientations that fuelled, moulded, and emerged out of Europe's

<sup>11</sup> Richard Drayton, *Nature's Government: Science, Imperial Britain, and the 'Improvement' of the World* (New Haven: Yale University Press, 2000); John R. McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620–1914* (Cambridge: Cambridge University Press, 2010); Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge University Press, 1995); Lucile H. Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979); Alan Mikhail, *Nature and Empire in Ottoman Egypt: An Environmental History* (Cambridge: Cambridge University Press, 2011).

<sup>12</sup> Valeska Huber, *Channelling Mobilities: Migration and Globalisation in the Suez Canal Region and Beyond, 1869–1914* (Cambridge: Cambridge University Press, 2013); Daniel R. Headrick, *The Invisible Weapon: Telecommunications and International Politics, 1851–1945* (Oxford: Oxford University Press, 1992).

<sup>13</sup> Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (Oxford: Oxford University Press, 1981); Daniel R. Headrick, *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850–1940* (Oxford: Oxford University Press, 1988).

imperial projects. Yet amidst the vast literature on modern empire one still finds relatively little about the far-reaching ecological transformation of the tropical world and how it both shaped and was shaped by these other developments. To be sure, there are many excellent studies of the environmental history of particular areas and topics, and the following pages draw on them extensively and appreciatively. But this specialist literature is, for one thing, remarkably uneven, with some themes and regions (such as forestry in India) receiving vastly more attention than others (such as mining in Southeast Asia). Furthermore, there has so far been little attempt to draw together these disparate strands and to situate them within the wider context of global environmental change. This book accordingly follows a twofold rationale: to deepen our understanding of some of the less-familiar sides of the story, and to integrate them into a broader synthetic framework.

Both of these aims require us to transcend the confines of individual empires, and in particular to look beyond the dominant imperial power of the period. Like so many aspects of the history of modern imperialism—and probably more than most—research on its environmental dimensions has centred overwhelmingly on the British experience. To some extent this mirrors the sheer size and significance of the British Empire, but it also partly reflects the inevitable boundaries of linguistic and regional expertise. To date, the only wide-ranging overview is William Beinart and Lotte Hughes's *Environment and Empire*, which surveys a broad array of topics over several centuries but is solely devoted to the British Empire.<sup>14</sup> Much the same applies to the bulk of edited collections on the subject.<sup>15</sup> By contrast, this study expressly includes the other major European empires—above all those of France, Germany, the Netherlands, and Belgium (with Portugal, Spain, and Italy featuring more on the margins)—whose environmental histories have attracted far less scholarly attention to date. It draws on the literature available in English, German, French, and Dutch, and makes extensive use of contemporary material from a range of different sources. Its focus on the colonies of Western European states is not to deny the importance of other imperial projects, whether Russian, Ottoman, Japanese, or American (all of which feature below), but is simply intended to reflect their predominant collective reach during the nineteenth and early twentieth centuries.<sup>16</sup>

<sup>14</sup> William Beinart and Lotte Hughes, *Environment and Empire* (Oxford: Oxford University Press, 2007).

<sup>15</sup> James Beattie, Edward Mellillo, and Emily O'Gorman (eds), *Eco-Cultural Networks and the British Empire: New Views on Environmental History* (London: Bloomsbury, 2015); Deepak Kumar, Vinita Damodaran, and Rohan D'Souza (eds), *The British Empire and the Natural World: Environmental Encounters in South Asia* (New Delhi: Oxford University Press, 2011); John M. MacKenzie (ed.), *Imperialism and the Natural World* (Manchester: Manchester University Press, 1990); Richard H. Grove, Vinita Damodaran, and Satpal Sangwan (eds), *Nature and the Orient: The Environmental History of South and Southeast Asia* (Delhi: Oxford University Press, 1998); Tom Griffiths and Libby Robin (eds), *Ecology and Empire: Environmental History of Settler Societies* (Edinburgh: Keele University Press, 1997); an exception is Christina Folke Ax, Niels Brønnes, Niklas Thode Jensen, and Karen Oslund (eds), *Cultivating the Colonies: Colonial States and their Environmental Legacies* (Athens, Oh.: Ohio University Press, 2011).

<sup>16</sup> See also Robin Butlin, *Geographies of Empire: European Empires and Colonies c.1880–1960* (Cambridge: Cambridge University Press, 2009); for an interesting critique, Jordan Sand, 'Subaltern Imperialists: The New Historiography of the Japanese Empire', *Past & Present*, vol. 225, issue 1 (2014), 273–88.

Such a multi-empire approach has a number of advantages, quite apart from helping us explore areas of relative neglect. One is that it allows for comparisons.<sup>17</sup> Just as individual empires tended to structure their colonial policies somewhat differently (with varying degrees and forms of centralization) and sought to mobilize subject labour somewhat differently (with varying degrees and forms of coercion), there were also diverse patterns of resource exploitation and land management. A more important benefit is that it enables us to trace linkages, shared assumptions, aspirations, and consequences among different empires and colonies. Biophysical processes and ecological interrelationships showed little respect for political or linguistic boundaries, and nor could imperial frontiers contain the effects of commodity booms, exotic species introductions, or population pressures. Like their predecessors in the early modern period, Europe's nineteenth- and twentieth-century empires are best understood not on their own terms but in connection with one another. For all the rivalry between them, these empires were fundamentally inter-active entities whose commonalities constantly opened up spaces for cross-border coordination.<sup>18</sup> Colonial authorities faced many similar problems in their bid to capitalize on the resources of subject territories, and ideas about how to manage productive environments and safeguard natural assets were among the key realms of such trans-imperial overlap.

Our main focus will be on what is commonly called the era of 'high imperialism' or 'modern colonialism', from around the 1860s/70s to the process of decolonization between the 1940s and early 1960s. These temporal parameters will be handled flexibly and will vary according to the subject in question, since many of the changes can only be understood by placing them within a longer chronological context. Given the enormous ecological repercussions of imperial trade structures and resource management practices, we will also explicitly reflect on the environmental legacies of colonialism for the half-century or so that followed formal decolonization. One can, of course, imagine different chronological possibilities, perhaps especially for the beginning of the story. The question of whether the late nineteenth century marked the advent of a genuinely 'new' form of imperialism is as old as the events themselves. Clearly there were many continuities—political, cultural, economic—with older imperial formations, and recent research has emphasized the multiple parallels with processes of empire-building in other times and places.<sup>19</sup> Yet there were nonetheless a number of factors that gave the imperial politics of the period a peculiar dynamic.

<sup>17</sup> On comparing empires: Pierre Singaravélou (ed.), *Les Empires coloniaux six<sup>e</sup>-xx<sup>e</sup> siècle* (Paris: éditions Points, 2013); Miguel Bandeira Jerónimo and António Costa Pinto (eds), *The Ends of European Colonial Empires: Cases and Comparisons* (Basingstoke: Palgrave, 2015).

<sup>18</sup> See, generally, Volker Barth and Roland Cvetkovski (eds), *Imperial Co-operation and Transfer, 1870–1930: Empires and Encounters* (London: Bloomsbury, 2015); Jeremy Adelman, 'Mimesis and Rivalry: European Empires and Global Regimes', *Journal of Global History*, vol. 10, issue 1 (March 2015), 77–98.

<sup>19</sup> For an overview, see Burbank and Cooper, *Empires*, 1–22, 287–329.

To begin with, the sheer scale of these empires was extraordinary. By the turn of the century, a handful of Western European states governed (however unevenly)<sup>20</sup> more than half of the land surface of the entire globe, with the British Empire alone accounting for around a quarter of the world's population. Moreover, in the wake of the 'Great Divergence' of economic growth between the West and the rest of the world after 1800, the vast wealth of the European powers also meant that they had more resources than their imperial predecessors for the purpose of dominating subject landscapes and populations.<sup>21</sup> This was, in turn, closely related to the unprecedented technological differential that had opened up during the nineteenth century, which enabled Europeans for the first time to control large swathes of Africa and Asia beyond the coastal enclaves to which they had largely been confined in the past. Although the ensuing encounters were never quite as one-sided as some historians have suggested, the fundamental disparity was tersely captured by Hilaire Belloc's oft-quoted couplet from *The Modern Traveller* (1898): 'Whatever happens, we have got | the Maxim gun, and they have not.' Furthermore, new technologies not only allowed the penetration of regions previously beyond grasp, they also encouraged the application of European capital, knowledge, and management techniques as a means of utilizing the natural wealth of conquered lands for human ends. If the shift from trade-based imperialism towards a more territorial form of domination was made possible by technology, it was also motivated by a desire to secure important resource flows and to ensure that no rival power monopolized control over them.

For what it is worth, many contemporaries certainly believed that they were witnessing a new age of empire-building. Imperialist advocates such as the economist Paul Leroy-Beaulieu, the sociologist Benjamin Kidd, or the theologian-publicist Friedrich Fabri were all, in their different ways, firmly convinced of the superiority of European civilization over the supposedly backward societies of the colonial world, and propounded the idea of an enlightened modern colonialism in which soldiers would be replaced by engineers and scientists, and where brute force and exploitation would give way to mutual benefit and civilizational uplift.<sup>22</sup> As things turned out, the actual outcomes fell far short of the rhetoric. While entrepreneurs raced to extract resources, colonial territories received only a fraction of the foreign investment that poured out of Europe.<sup>23</sup> Instead of introducing resolutely progressive forms of government, colonial states were generally under-resourced and heavily

reliant on indigenous elites to help govern colonial territories, which dampened their enthusiasm for social reform. New technologies did not automatically lead to more rational forms of colonial rule, and in the worst cases they simply provided more efficient means of plundering and subordinating conquered lands and peoples. In practice, modern colonial regimes drew on a host of older methods, habits, and frames of mind from the long history of overseas expansion, and individual states deployed a variety of different strategies—formal versus informal authority, cultural assimilation or the maintenance of indigenous 'customs', direct or indirect mechanisms of rule—as part of the 'imperial repertoire' of modern European colonialism.<sup>24</sup>

In many respects, the conceit of bringing civilization to supposedly benighted peoples and underused wastelands was therefore hardly new in the late nineteenth and twentieth centuries, but instead grafted onto much older discourses of imperial providence and 'improvement'. Nonetheless, an important difference was the decidedly technocratic ethos that animated the process of empire-building during this period. If the conquistadores were convinced that they had God on their side, modern imperialists believed they had unlocked many of his secrets.

By the end of the nineteenth century, the extraordinary accomplishments of European science and industry had spawned a widespread sense that these societies were extricating themselves from 'nature'. Modern civilization, it seemed, was capable of liberating humankind from the tyranny of material constraints that had previously restricted its endeavours. The European claim to mastery over nature was a central legitimacy prop of modern imperialism—one that not only resonated with contemporary notions of racial hierarchy and societal evolution, but that also nourished a belief in the right, even duty, of Europeans to govern those who were less capable of controlling the world around them.<sup>25</sup> 'It is neither natural nor just that Western civilized peoples amass indefinitely and suffocate within the limited spaces that were their initial home, that they accumulate the marvels of science, art and civilization ... and leave perhaps half of the world to ignorant and powerless groups of people', remarked Leroy-Beaulieu in 1891. Civilization, in this view, essentially meant 'the domination of Man over himself and over matter', colonization 'the methodical effect of an organized people on another people whose organization is defective'.<sup>26</sup>

Ideally, at least, the task of the modern colonial power was not simply to govern and tax the economies of such 'defective' areas, but to develop them through the application of scientific knowledge and technology. During the first half of the twentieth century such notions gave rise to a distinctly interventionist form of

<sup>24</sup> Burbank and Cooper, *Empires*, 3–8, 287–90; also Boris Barth and Jürgen Osterhammel (eds), *Zivilisierungsmissionen. Imperiale Weltverbesserung seit dem 18. Jahrhundert* (Konstanz: UVK, 2005).

<sup>25</sup> Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca, NY: Cornell University Press, 1989).

<sup>26</sup> Leroy-Beaulieu, *De la colonisation*, 4th edn (Paris: Guillaumin, 1891), 842, 845; such sentiments remained widespread over the following decades, finding clear expression in, for instance, the works of Albert Sarraut, *La Mise en valeur des colonies françaises* (Paris: Payot, 1923); *Grandeur et servitude coloniales* (Paris: Éditions du Sagittaire, 1931).

<sup>20</sup> Lauren Benton, *Law and Colonial Cultures: Legal Regimes and World History, 1400–1900* (Cambridge: Cambridge University Press, 2002).

<sup>21</sup> Kenneth Pomeroy, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2000); Jürgen Osterhammel, *Die Verwandlung der Welt. Eine Geschichte des 19. Jahrhunderts* (Munich: Beck, 2009); Eric Jones, *The European Miracle: Environments, Economies and Geopolitics in the History of Europe and Asia*, 3rd edn (Cambridge: Cambridge University Press, 2003); Prasanna Parthasarathi, *Why Europe Grew Rich and Asia Did Not: Global Economic Divergence, 1600–1850* (Cambridge: Cambridge University Press, 2011).

<sup>22</sup> Paul Leroy-Beaulieu, *De la colonisation chez les peuples modernes* (Paris: Guillaumin, 1874); Benjamin Kidd, *The Control of the Tropics* (London: Macmillan, 1898); Friedrich Fabri, *Bedarf Deutschland der Colonien? Eine politisch-ökonomische Betrachtung* (Cötha: Perthes, 1879).

<sup>23</sup> George Kenwood, *The Growth of the International Economy, 1820–2000* (London: Routledge, 1999), 27–30.

colonialism that spanned the realms of agriculture, forestry, resource extraction, conservation, and public hygiene.<sup>27</sup> In practice, such interventions resulted more from short-term improvisation than from any master plan, and were in any event tightly circumscribed by the pressure to cover their costs. But if the actual commitment to this development agenda only occasionally lived up to its billing, it nonetheless became a vital centrepiece of colonial policy after the First World War, and played a crucial role in both the maintenance and eventual decline of imperial power after the Second. Indeed, it continued to be the core aim of independent governments long after decolonization. Throughout the colonial period and beyond, the central thrust of development efforts was to raise economic production through the more effective domestication of the biophysical environment.

There was, in other words, an important ecological dimension to the rise, legitimization, and operation of modern colonialism, one that was tightly interwoven with the political, cultural, and economic aspects of imperial power. Understanding these socio-environmental dynamics is therefore crucial for understanding the history of colonialism itself.

## EMPIRE, INDUSTRY, AND THE GLOBAL ENVIRONMENT

One of the central issues facing any history of European imperialism is how to situate it within longer patterns of historical change. Towards this end, the book makes three basic propositions: that modern imperialism marked a seminal period for the ecosystems of the colonial world, that the transformations of the colonial era commonly built on longer histories of escalating human intervention, and that the overall balance of change was—for all the socio-ecological hybridity of even the most 'natural' looking landscapes—one of considerable harm to the biophysical environment. In some respects these are fairly uncontroversial arguments, and in other respects less so. Although historians generally agree that the wave of formal empire-building during the late nineteenth and early twentieth centuries reshaped economic, political, and ecological relationships across large parts of the globe, the nature and scale of the changes have nonetheless been interpreted quite differently.

Many scholars have regarded the spread of European imperialism as a singular milestone for the environments it colonized, a clear watershed in their natural history. This was certainly the view of an older imperialist historiography that celebrated the European conquest of tropical nature. Oddly enough, it also has its mirror image in diametrically opposed radical and subaltern-studies accounts of imperialism, which have often painted an apocalyptic picture of colonial-era devastation

<sup>27</sup> On interventionist colonialism and development: Frederick Cooper and Randall Packard, 'Introduction', in Frederick Cooper and Randall Packard (eds), *International Development and the Social Sciences: Essays on the History and Politics of Knowledge* (Berkeley: University of California Press, 1997), 6–9; for an excellent recent overview of international development, Joseph M. Hodge, 'Writing the History of Development', Parts 1 and 2, *Humanity*, vol. 6 no. 3 (Winter 2015), 429–63, and vol. 7 no. 1 (Spring 2016), 125–74.

and occasionally traced the origins of today's ecological woes to the interferences of European rule. The shift from communal landownership to private property, the enclosure of resources that were once freely available, the alienation of land to concessionary companies or European settlers, the suppression of itinerant modes of agriculture, the commodification of natural resources, and the industrial scale of exploitation—all of these imperial incursions overturned older socio-ecological arrangements that were purportedly (and sometimes undoubtedly) more sustainable than what replaced them. Such accounts have provided an important critical perspective on colonial-era impacts. They are, however, less useful for gauging the overall extent of change insofar as pre-colonial arrangements are often taken for granted and occasionally appear, at least in the rosier variations on this theme, as an implausibly harmonious state of equilibrium between locals and their natural surroundings, a kind of Edenic myth that most environmental historians have long since abandoned.<sup>28</sup>

By contrast, some accounts have emphasized instead the brevity and tenuousness of European rule across large swathes of nominally colonized territory, and accordingly treat the era of modern colonialism as a mere episode within much longer patterns of social and environmental change. In sub-Saharan Africa in particular, the fact that colonial rule lasted barely seventy years makes the environmental impact of imperial conquest appear less decisive than is often assumed.<sup>29</sup> The same point can also be made, somewhat differently, about colonial Asia. Although the European presence in many Asian territories was longer and stronger than in Africa, the existence of dense agrarian populations and powerful states made a deep imprint on the landscape long before the onset of colonial rule.<sup>30</sup> By relativizing the impact of imperial incursions, such perspectives provide a valuable corrective to overblown notions of a sudden ecological calamity and to Euro-centric narratives in which the colonizers are the sole or dominant agents of environmental transformation. Yet approaching the colonial era as merely a stage within longer cycles

<sup>28</sup> Seminal interpretations in this vein include: for Africa, Helge Kjekshus, *Ecology Control and Economic Development in East African History: The Case of Tanganyika, 1850–1950* (London: Heinemann, 1977); for India, Madhav Gadgil and Ramachandra Guha, *This Fractured Land: An Ecological History of India* (Berkeley: University of California Press, 1992); more generally Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso, 2001). Cf. the critical comments in Mahesh Rangarajan, 'Environment Histories of India: Of States, Landscapes, and Ecologies', in Edmund Burke III and Kenneth Pomeranz (eds), *The Environment and World History* (Berkeley: University of California Press, 2009), 229–54, here 231–2; on the parallel North American context, Shepard Krech III, *The Ecological Indian: Myth and History* (New York: Norton, 1999). On 'apocalyptic' and other schools of thought: John M. MacKenzie, *Empire and the Ecological Apocalypse: The Historiography of the Imperial Environment*, in Griffiths and Robin (eds), *Ecology*, 215–28.

<sup>29</sup> See John Iliffe, *Africans: The History of a Continent* (Cambridge: Cambridge University Press, 1995); Andrew Roberts, *The Colonial Moment in Africa: Essays on the Movement of Minds and Materials, 1900–1940* (Cambridge: Cambridge University Press, 1990); also William Beinart, 'Beyond the Colonial Paradigm: African History and Environmental History in Large-Scale Perspective', in Burke and Pomeranz (eds), *The Environment*, 211–28, esp. 218; Burbank and Cooper, *Empires*, 21.

<sup>30</sup> See, generally, Victor Lieberman, *Strange Parallels: Southeast Asia in Global Context c.800–1830*, 2 vols (Cambridge: Cambridge University Press, 2003, 2009); John F. Richards, *The Mughal Empire* (Cambridge: Cambridge University Press, 1993); C. A. Bayly, *Indian Society and the Making of the British Empire* (Cambridge: Cambridge University Press, 1988).

of environmental variation runs the risk of downplaying the exceptional scale and far-reaching consequences of the alterations that occurred.

Cutting across these two viewpoints is a more recent emphasis on the widely shared 'developmentalist project' since around the sixteenth century, one just as evident in Mughal India, Qing China, or Asante-ruled West Africa as in Europe. Broadly speaking, what this refers to is a deliberate process of state-building, the expansion of settlement frontiers, the sedentarization of itinerant groups, and the intensification of revenue and resource extraction, all of which entailed significant and long-lasting socio-ecological changes across many parts of the world.<sup>31</sup> Since the early 2000s this perspective has become particularly influential among historians working on a global scale, whose research has increasingly questioned the idea that there was much that was specifically 'colonial' (or even European) about the way in which nineteenth- and twentieth-century colonial states approached the biophysical world. Rather, colonial regimes regularly built upon existing strategies for mobilizing resources and organizing landscapes, and their fundamental aims often coincided more closely with those of their predecessors, as well as many of their subjects, than either contemporaries or some historians have imagined.<sup>32</sup>

This book broadly endorses this approach, albeit with certain qualifications. Clearly, it works much better for some parts of the world than others: better, for instance, in the intensively farmed rice paddies of Tonkin than in the sparsely inhabited forests of Borneo. Equally clearly, it is important not to lose sight of the racial and social specificities of European colonialism, as well as the fact that some groups bitterly opposed the upheavals that it brought to their lives and to the lands they inhabited. Yet on balance the notion of a shared 'developmentalist project' is highly useful for placing colonial-era changes within a longer chronological context and a broader global framework of environmental transformation. In addition, by transcending visions of a colonial fall of Man, it also captures a broader spectrum of human agency and thus helps to avoid the Euro-centric implications of an apocalyptic imperial intrusion. Instead of viewing colonial-era changes in strict isolation from preceding socio-ecological modifications, it situates them as part of the wider expansion of managed landscapes over natural ecosystems in many parts of the world. This was, after all, a process that transcended European colonialism both spatially and temporally, and that eventually reached a crescendo only after the Second World War.

Seen in this light, the era of 'high imperialism' appears less as a fundamental shift of direction than as an acceleration of overarching trends. The huge extension of European political, economic, and military power contributed mightily to the ongoing project of domestication in the colonial world, both during and after its

<sup>31</sup> Kenneth Pomeranz, 'Introduction: World History and Environmental History', in Burke and Pomeranz (eds), *The Environment*, 3–32, esp. 7–14; John F. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley: University of California Press, 2003), 17–24. See also Frederick Cooper, *Africa in the World: Capitalism, Empire, Nation-State* (Cambridge, Mass.: Harvard University Press, 2014), esp. ch. 2.

<sup>32</sup> A point that applies even in relatively unexpected parts of the world: see e.g. Pekka Hämmäläinen, *The Comanche Empire* (New Haven: Yale University Press, 2008).

heyday. When placed in this wider context, what made modern colonialism distinctive was more the quantity than the quality of change that it wrought.

Above a certain point, however, quantity has a quality all its own, and it is at this point that the idea of an ongoing 'developmentalist project' no longer fully captures the dynamics at work. Despite the continuities with earlier modes of extraction and frontier expansion, when one considers the extent of human-induced environmental change since the nineteenth century it is difficult to escape the conclusion that modern imperialism marked a decisive and largely negative milestone for the ecosystems of the colonial world. To understand why this was so, it is necessary to relate the changes in the colonies to the momentous socio-ecological shifts that were concurrently taking place in Europe itself.

Among many other things, imperialism was, to borrow from Richard Drayton, a 'campaign to extend an ecological regime: a way of living in Nature'.<sup>33</sup> A crucial point to recognize is that, over the course of the nineteenth century, societies in Western Europe had developed a very peculiar way of living in Nature, one that, for the first time in human history, transcended the constraints of what Braudel famously called the 'biological old regime'.<sup>34</sup> Briefly, what this term denotes is a system of production that draws its essential energy needs from the sun, or more precisely from the process of photosynthesis: that is, wood serving as the principal fuel, and mechanical power deriving mainly from human or animal muscles that acquired their energy, either directly or indirectly, through the ingestion of plant matter. Because solar energy is diffusely distributed, and because harnessing it in the form of fuel, food, and fodder places competing demands on land resources, the operation of this regime imposed tight limits on population sizes and economic growth, which for most of human history rose slowly and erratically if at all. Over the centuries, agriculturists made many refinements to this system in order to maximize their energy harvest, but moving beyond its outer limits could only happen by tapping subsidies from elsewhere, either from other places (importing raw materials) or from another time (using fossil fuels).<sup>35</sup>

Before the nineteenth century, European societies tapped some of both, but eventually it was the time subsidy that really changed things. The momentous implications of the shift towards fossil fuels are why environmental historians, perhaps more than any other subset within the discipline, tend to see industrialization as a crucial watershed in human history. The massive use of fossilized energy, buttressed by the growing trade subsidies from 'ghost acres' abroad, signalled a

<sup>33</sup> Drayton, *Nature's Government*, 229.

<sup>34</sup> 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, 101–8.

<sup>35</sup> See esp. E. A. Wrigley, *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press, 2010); Rolf Peter Steferle, *The Subterranean Forest: Energy Systems and the Industrial Revolution* (Cambridge: White Horse Press, 2001); Paul Warde, *Energy Consumption in England and Wales, 1560–2000* (Rome: Istituto di Studio sulle Società del Mediterraneo, 2007); also Robert C. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge: Cambridge University Press, 2009); on refinements to pre-modern agriculture: Peter M. Jones, *Agricultural Enlightenment: Knowledge, Technology, and Nature, 1750–1840* (Oxford: Oxford University Press, 2016).

fundamental alteration of existing socio-ecological relationships on both a material level (by vastly accelerating the rate of economic activity) as well as a cultural level (by removing older caps on behaviour and expectations).<sup>36</sup> This is why most historians, and by no means just those who specialize on Europe, opt for early industrialization as the starting point of the so-called Anthropocene, the era of Earth's history shaped primarily by human activity.<sup>37</sup>

To be clear, the thoroughgoing industrialization of Europe was not a prerequisite for imperial expansion. Even the conquest of India during the late eighteenth and early nineteenth centuries had little to do with any far-reaching modification of energy regime, however important specific metallurgical and weaponry innovations undoubtedly were. Nor did it make imperial expansion in any way inevitable or 'natural'. As Greg Cushman has rightly emphasized, the deliberate efforts of European states and entrepreneurs to exploit the labour and natural resources of overseas territories were a crucial force behind modern imperialism and the global asymmetries that it helped to create, which no amount of biological or geographic advantages can adequately explain.<sup>38</sup> But once industrialization gathered pace, it radically changed Europe's capacity to project its influence and to transform the areas that it conquered. By the late nineteenth century, the power it conferred on those societies that made the shift was what enabled them to extend their global authority in the first place. It furnished the new 'tools of empire'.<sup>39</sup> Even more important from an environmental perspective, the spread of Europe's imperial reach also extended its new ecological regime to much of the rest of the world—not in the sense that subordinate territories made this transition themselves (indeed, many former colonies still have scarcely done so) but rather that they became more firmly enmeshed than ever before into an increasingly worldwide economic web that was based upon the needs and rhythms of the new industrial metabolism.

Put somewhat differently, Europe's expanding power also created an empire of new tools, new ways of bending nature to human designs (especially, but not exclusively, metropolitan ones) on a vastly greater scale than ever before.<sup>40</sup> This is emphatically not to suggest that Europeans introduced a measure of their own

<sup>36</sup> John R. McNeill, *Something New Under the Sun: An Environmental History of the Twentieth Century* (London: Penguin, 2000), 10–17; Marks, *Origins*, 95–121; ghost acres from Pomeranz, *Great Divergence*.

<sup>37</sup> See Gareth Austin (ed.), *Economic Development and Environmental History in the Anthropocene: Perspectives on Asia and Africa* (London: Bloomsbury, 2017); Christophe Bonneuil and Jean-Baptiste Fressoz, *L'Événement Anthropocène* (Paris: Seuil, 2013); Jens Kersten, *Das Anthropozän-Konzept. Kontrakt, Komposition, Konflikt* (Baden-Baden: Nomos, 2014); Fredrik Albritton Jonsson, 'The Industrial Revolution in the Anthropocene', *Journal of Modern History*, vol. 84 no. 3 (Sept. 2012), 679–96; for an interdisciplinary overview, Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill, 'The Anthropocene: Conceptual and Historical Perspectives', *Philosophical Transactions of the Royal Society A*, vol. 369 no. 1938 (Mar. 2011), 842–67.

<sup>38</sup> Gregory T. Cushman, *Guano and the Opening of the Pacific World: A Global Ecological History* (Cambridge: Cambridge University Press, 2013), 236–8, 342–3, critiquing Crosby, *Ecological Imperialism*, and Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (London: Jonathan Cape, 1997).

<sup>39</sup> Headrick, *Tools of Empire*.

<sup>40</sup> On the appropriation of these technological tools, see esp. James L. Gelvin and Nile Green (eds), *Global Muslims in the Age of Steam and Print* (Berkeley: University of California Press, 2014); Headrick, *Tentacles*.

dynamism to supposedly stagnant societies that were still subservient to nature, as many contemporaries liked to think. The point is rather that modern imperialism both fed the 'new ecological regime' and spread it, extending its footprint around the globe to tap even greater subsidies destined for even more consumers who were even further removed from the environmental and social consequences of production. The resulting connections soon generated a host of socio-ecological tensions. The pace and rhythms of Europe's industrializing economies were very different from those of the 'organic economies' that still prevailed in the rest of the world, and often drew in resources faster than they could be replenished. The new fossil-fuelled ecological regime may have released much of Europe's land surface from the requirements of energy production, but feeding its rapid metabolism still required far more land and resources from elsewhere.<sup>41</sup> For all of these reasons, the colonial period was—despite the continuities with earlier developmental practices—a pivotal phase for the ecosystems of the tropical world. By simultaneously provisioning and propagating Europe's new way of living in Nature, imperialism was as significant as industrialization for transforming the global environment.

Accordingly, some of the most important environmental consequences of imperialism stemmed not so much from the transformation of particular spaces as from the compression of space itself. European imperialists certainly did not invent long-distance trade and exchange networks in the regions they conquered, but they did reshape and expand them. In many respects, the 'imperial' helped forge the 'global' during this period—not in the sense that it stretched across the entire world or fully penetrated subject societies, let alone that its impact was always or consistently 'globalizing' (as ongoing rivalries and occasional atavistic tendencies attest), but rather that it operated on an increasingly global scale that directly or indirectly influenced economic and social developments nearly everywhere.<sup>42</sup> Europe's empires created institutions and forms of governance that were specifically designed to travel. They applied technical and scientific knowledge that claimed universal validity. Perhaps most importantly from an environmental perspective, they assembled markets and transport networks that spanned oceans and continents. The years from 1870 to 1914 are commonly regarded as the first era of trade globalization, a period in which trade growth averaged around 4 per cent annually and in which foreign investment, the vast bulk of it from Western Europe, rose more than sevenfold. Trade links were the vital sinews of European empire, and from 1870 to 1940 world trade more than quadrupled.<sup>43</sup>

<sup>41</sup> On 'organic economies', Wrigley, *Energy*, 9–24; on the need for distant resources, Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2011), 16–17.

<sup>42</sup> On the potential and limits of this perspective, see Tony Ballantyne and Antoinette Burton, 'Empires and the Reach of the Global', in Emily S. Rosenberg (ed.), *A World Connecting, 1870–1945* (Cambridge, Mass.: Belknap, 2012), 285–431; Frederick Cooper, *Colonialism in Question: Theory, Knowledge, History* (Berkeley: University of California Press, 2005), 91–112; Jürgen Osterhammel, *Geschichte der Globalisierung. Dimensionen, Prozesse, Epochen* (Munich: Beck, 2003); C. A. Bayly, *The Birth of the Modern World, 1780–1914: Global Connections and Comparisons* (Oxford: Blackwell, 2004), *passim*.

<sup>43</sup> Kenwood, *Growth*, 24; Steven C. Topik and Allen Wells, 'Commodity Chains in a Global Economy', in Rosenberg (ed.), *World Connecting*, 593, 618–19.

The overall result was a multitude of material teleconnections, and these connections had profound ecological implications. First of all, long-distance trade helped detach production from consumption, and consumption from its costs. This is important because the manner in which land is treated depends very much on whether those in control of it have to live with the consequences. Another upshot of far-flung markets is that they concentrated a spatially diffuse demand for particular goods onto spatially bounded supply areas that were best placed to produce those goods. Like sunlight through a magnifying lens, the effects were often intense. At the same time, the benefits of such changes were also concentrated through the mechanisms of unequal exchange, which functioned on an ecological as well as an economic level. By and large, the net flow of resources (energy, minerals, nutrients, fertility) worked very much in favour of the metropolises over their colonial suppliers.<sup>44</sup> Finally, imperial trade and investment reshuffled biota—cultivars, livestock, microbes, people—across vast distances, remaking entire ecosystems in the process. Like the new cultural amalgams in colonial port cities or the shifting traditions of diasporic merchant and labourer communities,<sup>45</sup> imperial exchange circuits also created new hybrid ecologies, new combinations of living organisms brought together from different regions and continents, that reflected the immense scope and variety of the environments connected by empire.

#### COVERAGE, THEMES, ORGANIZATION

Clearly it is impossible to survey the full spectrum of this variety here. Our main focus is on what can loosely be called the 'tropics', and principally on those territories that lay under formal European control during the late nineteenth and early twentieth centuries. I use the term 'tropical' broadly yet cautiously: broadly for its capacity to link together disparate regions and to look across empires, and cautiously because of its ambiguity and historical baggage. It is not intended to denote a singular climatic zone, less still a rigidly defined geographic or cartographic space,

<sup>44</sup> Alf Hornborg, 'Ecosystems and World-Systems: Accumulation as an Ecological Process', in Christopher Chase-Dunn and Salvatore J. Babones (eds), *Global Social Change: Historical and Comparative Perspectives* (Baltimore: Johns Hopkins University Press, 2006), 161–75; Alf Hornborg, 'Introduction: Environmental History as Political Ecology', in Alf Hornborg, John R. McNeill, and Joan Martinez-Alier (eds), *Rethinking Environmental History: World-System History and Global Environmental Change* (Lanham, Md: AltaMira, 2007), 1–24; John Bellamy Foster and Hannah Holleman, 'The Theory of Unequal Ecological Exchange: A Marx-Odum Dialectic', *Journal of Peasant Studies*, vol. 41 no. 2 (2014), 199–233.

<sup>45</sup> This has been the focus of some of the most innovative recent work on the history of empire: e.g. Sunil S. Amrith, *Migration and Diaspora in Modern Asia* (Cambridge: Cambridge University Press, 2011); Andrew Arsan, *Interlopers of Empire: The Lebanese Diaspora in Colonial French West Africa* (Oxford: Oxford University Press, 2014); Sugata Bose, *A Hundred Horizons: The Indian Ocean in the Age of Global Empire* (Cambridge, Mass.: Harvard University Press, 2006); Thomas R. Metcalf, *Imperial Connections: India in the Indian Ocean Arena, 1860–1920* (Berkeley: University of California Press, 2007); Tony Ballantyne, *Between Colonialism and Diaspora: Sikh Cultural Formations in an Imperial World* (Durham, NC: Duke University Press, 2006); Claude Markovits, *The Global World of Indian Merchants, 1750–1947: Traders of Sind from Bukhara to Panama* (Cambridge: Cambridge University Press, 2000).

since many of the stories take us into areas that were technically in 'subtropical' latitudes (e.g. northern India, the Middle East, South Africa, the Maghreb). It certainly does not seek to evoke colonial-era connotations of tropical luxuriance and lazy natives, let alone of green hells and irretrievable barbarism.<sup>46</sup> I use it merely as a convenient shorthand for referring to those non-temperate parts of the world that were controlled by Europe during this period and that were, for the most part, not sites of large-scale European settlement (with some important exceptions, especially in Africa).

The term 'tropics' is employed here essentially as a socio-political concept in the sense that 'global South' is used nowadays. Common to all of the areas we will examine was the European attempt to control overseas lands and peoples and to harness their productivity for imperial purposes. While most of the tropical regions at the core of this book only came under European rule after 1870, some had been colonized for much longer (India, Java, the Caribbean). And while the main focus will be on formal colonies, we will also examine areas under various forms of protectorate and semi-autonomous status. Since most of the American tropics (apart from the Caribbean) fall under none of these categories, they will not be a central concern, despite the many trade and investment links to Europe. This is partly a matter of sheer practicality given how much ground we will already be covering, but it also has a certain historiographical rationale. From the 1890s the United States increasingly became the main 'imperial' power throughout much of Central and South America, and over the last two decades a number of fine studies have charted the ecological effects of US businesses, consumers, scientists, and engineers in the region.<sup>47</sup> In a sense, this book complements this literature by tracing the concurrent expansion of other imperial powers in other parts of the tropical world.

The fields of environmental history and imperial history have long shared points of overlap, and one of the aims of this study is to integrate them still further. The book offers a kind of two-way lens for examining how empires shaped

<sup>46</sup> On notions of 'tropicality': David Arnold, *The Problem of Nature: Environment, Culture and European Expansion* (Oxford: Blackwell, 1996), 141–68; David Arnold, *The Tropics and the Travelling Gaze: India, Landscape, and Science, 1800–1856* (Seattle: University of Washington Press, 2006); Paul S. Sutter, 'The Tropics: A Brief History of an Environmental Imaginary', in Andrew C. Isenberg (ed.), *The Oxford Handbook of Environmental History* (Oxford: Oxford University Press, 2014), 178–204; Nancy Leys Stepan, *Picturing Tropical Nature* (Ithaca, NY: Cornell University Press, 2001); Felix Driver and Luciana Martins (eds), *Tropical Visions in an Age of Empire* (Chicago: University of Chicago Press, 2005).

<sup>47</sup> e.g. Richard Tucker, *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World* (Berkeley: University of California Press, 2000); John Soluri, *Banana Cultures: Agriculture, Consumption and Environmental Change in Honduras and the United States* (Austin, Tex.: University of Texas Press, 2005); Steve Striffler, *In the Shadows of State and Capital: The United Fruit Company, Popular Struggle, and Agrarian Restructuring in Ecuador, 1900–1995* (Durham, NC: Duke University Press, 2002); Paul S. Sutter, 'Nature's Agents or Agents of Empire? Entomological Workers and Environmental Change during the Construction of the Panama Canal', *Isis*, vol. 98 no. 4 (Dec. 2007), 724–54; Greg Grandin, *Fordlandia: The Rise and Fall of Henry Ford's Forgotten Jungle City* (London: Icon, 2010); Sterling Evans, *Bound in Twine: The History and Ecology of the Hennequen-Wheat Complex for Mexico and the American and Canadian Plains, 1880–1950* (College Station, Tex.: Texas A&M University Press, 2007); in a partially related vein: Edward Melillo, *Strangers on Familiar Soil: Rediscovering the Chile-California Connection* (New Haven: Yale University Press, 2015).

the biophysical environment and how environmental factors influenced the development of empires. On the one hand, it argues for the central importance of nineteenth- and twentieth-century imperialism in remaking ecosystems on a global scale. As historians try to chart the material constitution of the world in which we currently live, imperialism must be regarded as a key process alongside industrialization, the explosion of world trade, and the rise of mass consumption. On the other hand, it also highlights the importance of socio-environmental interactions in the maintenance and eventual decline of imperial power. Tropical environments were by no means merely a picturesque stage on which human action took place, but were an essential part of the story, powerfully shaping and being shaped by the entire enterprise of modern empire.

Integrating these stories forces us to think about the inseparable interrelationships between cultural, social, and material factors in human history: how the biophysical environment set outer parameters within which human action could take place, and how human action, refracted as always through different social habits and cultural expectations, could nonetheless produce a wide range of outcomes. Time and again, people's physical surroundings opened certain opportunities while impeding or discouraging others, and as people pursued these opportunities for the sake of wealth, power, or convenience, they further transformed their surroundings in a mutual process of co-evolution. Such 'new materialist' visions of reciprocal entanglement raise some fundamental questions about our understandings of causality and non-human agency.<sup>48</sup> Although the ontological debates over these issues do not concern us here, instances of material agency will periodically crop up in this book—for instance, when considering how the different biological needs of particular cultivars or the specific physical characteristics of certain mineral deposits influenced the ways in which people took advantage of them as well as the social, economic, and ecological effects. Far from propagating a European 'mastery of nature', what imperialism effectively did was enlarge the spatial scale of such entanglements and broaden the cast of actors—or 'actants' in Bruno Latour's terminology—that were involved.<sup>49</sup>

Imperialism was, in this sense, a multi-polar enterprise, and this was true in other respects as well. In recent years it has become axiomatic to view empires less in terms of centralized hubs and spokes than as complex webs of interconnection and mutual influence, both within individual empires and across imperial boundaries. In place of an older diffusionist model of centres and peripheries, scholars have mapped out a much more complex geography of ideas and practices circulating

between metropolises, colonies, and various sub-imperial formations.<sup>50</sup> From this perspective, empire-building was not simply a matter of imposing external power over subject societies. Such a view is more a reflection of contemporary imperialist fantasies—the dream of remaking the world in Europe's image—than of the pragmatic compromises necessary for colonial rule to function on the ground. As Frederick Cooper has deftly put it, empire-states had 'long arms' but 'weak fingers'.<sup>51</sup> For all the power differentials and conflicts that were involved, imperial rule could only work by giving subject peoples, and especially indigenous elites, some kind of a stake in it. Modern colonialism was a system that bound lands and peoples together and that opened new prospects and incentives for non-Europeans too, including new possibilities for opposition.<sup>52</sup> As this book shows, this certainly applies to processes of ecological transformation, which were frequently—and in some cases predominantly—driven by indigenous producers or third-party groups (so-called 'foreign natives') rather than European colonialists, and that sometimes ran counter to colonial designs. Furthermore, although we can only touch on the reciprocal impact of imperialism on metropolitan environments, the resources that flowed in from around the world powerfully shaped rural and urban landscapes throughout Europe as well.

Given the vast range of issues and spaces that we could cover, the book necessarily adopts an illustrative rather than a comprehensive approach. It is divided into three main parts that loosely blend a chronological and thematic format. The first and largest part will focus on the environmental impacts of imperial trade networks, and in particular on the colonial-era boom in commodity production as a key motor of environmental change. Throughout the period under discussion, a combination of infrastructural investment, administrative systematization, scientific research, and private initiative (in many cases indigenous initiative) was jointly geared towards boosting exports of colonial goods that were either coveted on world markets or deemed strategically and militarily important by metropolitan governments. Reconstructing these processes through the stories of particular commodities—rather than, say, by surveying the output from different geographic regions—brings a number of analytical advantages, above all the ability to explore changes at a local level while also shedding light on the many linkages between different producer areas as well as their connections with other parts of the world. The six chapters in this part examine six different commodities (three vegetal, three mineral) that collectively demonstrate the broad range of socio-environmental transformation wrought by burgeoning trade and consumption, but that individually highlight quite different themes—about smallholders versus plantations, about the interpenetration of labour systems and ecosystems, about the associations between race and technology, about indigenous and colonial agency—in the environmental history of empire. If the overall upsurge of imperial extraction brought huge ecological

<sup>50</sup> For a recent overview of the field: Heather Streets-Salter and Trevor Getz, *Empires and Colonies in the Modern World: A Global Perspective* (Oxford: Oxford University Press, 2016).

<sup>51</sup> Cooper, *Colonialism in Question*, 153–203, quote p. 197.

<sup>52</sup> On the intricacies of subject status and subjectivity, see Partha Chatterjee, *Nationalist Thought in the Colonial World: A Derivative Discourse?* (London: Zed, 1986).

<sup>48</sup> See esp. Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy* (Cambridge, Mass.: Harvard University Press, 2004); Tony Bennett and Patrick Joyce (eds), *Material Powers: Cultural Studies, History and the Material Turn* (London: Routledge, 2010); Hans Schouwenberg, 'Back to the Future? History, Material Culture and New Materialism', *International Journal for History, Culture and Modernity*, vol. 3 no. 1 (Apr. 2015), 59–72; Timothy J. LeCain, 'Against the Anthropocene: A Neo-Materialist Perspective', *International Journal for History, Culture and Modernity*, vol. 3 no. 1 (Apr. 2015), 1–28.

<sup>49</sup> Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005).

consequences, the stories were remarkably diverse and the effects were neither predictable nor inevitable.

The second part then investigates how colonial authorities tried to deal with these changes and manage colonial environments more 'rationally'. The two basic elements of this programme were to conserve resources and ecosystems, and to improve their productivity. Although both processes began long before the First World War, they quickly gathered momentum during the 1920s and 1930s amidst mounting fears of overexploitation and environmental crisis. What Adam Rome has called the 'environmental management state' in the United States had its counterparts (and in some respects its antecedents) in Europe's tropical colonies, where conservationists eagerly brandished the authority of state-based technical expertise in their campaigns to ensure the 'wise use' of nature's assets.<sup>53</sup> We examine three different aspects of this process in three interrelated chapters. The first will focus on efforts to preserve tropical 'nature' (especially wildlife), the second on the rise of colonial forest conservation, and the third on attempts to improve tropical agricultural. In all of these areas, colonial governments and officials frequently dictated environmental policy with scant regard for the needs and interests of the people directly affected. As a result, there has been much criticism of conservation *qua* 'colonial science' as fundamentally authoritarian and often startlingly myopic. But as this part shows, there was also a growing recognition of the bewildering ecological and social complexity in the colonial world, and conservation initiatives could sometimes act as an important brake against the unbridled exploitation of colonized environments and peoples.<sup>54</sup>

Part III focuses on the rapid acceleration of all these trends after the Second World War, an era of unprecedented socio-economic and ecological transformation throughout the tropics. Chapter 10 examines the environmental dimensions of the 'development' drives of the 1940s and 1950s, which in many respects marked the high point of colonial ecological intervention. Chapter 11 then explores the longer-term legacies of colonial rule by considering how the institutional arrangements, resource management practices, and trade patterns that emerged or expanded under

<sup>53</sup> Adam Rome, 'What Really Matters in History: Environmental Perspectives on Modern America', *Environmental History*, vol. 7 no. 2 (Apr. 2002), 303–18, here 304; also Paul S. Sutter, 'The World with Us: The State of American Environmental History', *Journal of American History*, vol. 100 no. 1 (June 2013), 94–119, here 100–5.

<sup>54</sup> On science and colonialism, see the special issue of *Isis*, vol. 96 no. 1 (Mar. 2005); Roy MacLeod (ed.), *Nature and Empire: Science and the Colonial Enterprise*, *Oriens*, vol. 15 (Chicago: University of Chicago Press, 2000); Brett M. Bennett and Joseph M. Hodge (eds), *Science and Empire: Knowledge and Networks of Science across the British Empire, 1800–1970* (Houndmills: Palgrave, 2011); for insightful reconsiderations of the issues involved, see William Beinart, Karen Brown, and Daniel Gilroy, 'Experts and Expertise in Colonial Africa Reconsidered: Science and the Interpenetration of Knowledge', *African Affairs*, vol. 108 no. 432 (May 2009), 413–33; Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950* (Chicago: University of Chicago Press, 2011), 1–30, esp. 10–11; Pierre Singaravélou, *Professor l'Empire: les sciences coloniales en France sous la IIIe République* (Paris: Publications de la Sorbonne, 2011); Marc Poncelet, *L'invention des sciences coloniales belges* (Paris: Éditions Karthala, 2008); Jens Ruppenthal, *Kolonialismus als 'Wissenschaft und Technik': Das Hamburger Kolonialinstitut 1908 bis 1919* (Stuttgart: Steiner, 2007); Peter Boomgaard (ed.), *Empire and Science in the Making: Dutch Colonial Scholarship in Comparative Global Perspective, 1760–1830* (Basingstoke: Palgrave, 2013).

colonialism continued to shape the relationships of human societies with tropical environments during the decades following formal decolonization. To an extent, the concluding part contextualizes the history of late colonialism and its after-effects within the so-called 'Great Acceleration', the most recent phase of the Anthropocene during which nearly all of the measures of human impact on the global environment—fossil fuel consumption, greenhouse emissions, waste nitrogen, water consumption, land conversion, species extinction, etc.—escalated rapidly, and in which we still, despite attempts at deceleration, find ourselves firmly fixed.<sup>55</sup>

Highlighting these links between the past and the present is important in view of the indelible mark that imperialism has left on the world in which we live. When we consider the rise of new modes of extraction and exploitation; the uneven structure of worldwide resource flows; the circulation of people, crops, microbes, livestock, and pests across oceans and continents; the advent of new understandings of the biophysical world; even the continual growth of anxieties about the impact that humans have had on it; we see the traces of empire all around us. By relating the story of Europe's imperial power to the momentous ecological shifts that it entailed, this book ultimately seeks to provide a historical perspective on the vital nexus of social, political, and environmental issues that we currently face. Clearly, historians cannot offer any ready answers to such questions, but if this book helps improve our understanding of how they have become so urgent, that will more than suffice.

<sup>55</sup> On the 'Great Acceleration': Steffen, Grinevald, Crutzen, and McNeill, 'The Anthropocene', 849–53; Will Steffen, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig, 'The Trajectory of the Anthropocene: The Great Acceleration', *Anthropocene Review*, vol. 2 no. 1 (Apr. 2015), 81–98.