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Introduction

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Abstract

The development of environmental studies is at the core of this Introduction to the Environmental Impact of the Portuguese Empire. The historical approaches based on Environmental Studies are here followed in their main lines. The purpose is to established the context in which are placed the present contributions to the volume. Their innovative work is then highlighted.

Keywords

Environmental History – Environmental Impact – Extractivism – deforestation – soil exhaustion - Portuguese Empire – enslavement – Indigenous communities

"The death of one living thing becomes life in another. An ecosystem is the aggregate of many species' habits of transformation, their ways of moving energy from its origin in the sun across space and condensing it over time. To be alive is to take place in a chain of conversion".[1] This is one of the most brilliant books I have read in recent years. Demuth places the transfer and exhaustion of energy at the centre of her analysis, in line with the teachings of Rolf Peter Sieferle. She examines the environmental history of both sides of the

1 Demuth, Bathsheba. *Floating Coast. An Environmental History of the Bering Strait* (New York: W. W. Norton, 2019), 4.

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Bering Strait from the mid-nineteenth century to the present, with particular attention to Indigenous communities and the impact of both capitalism and communism. It is a fascinating account of the traditional management of whales, walruses, and reindeer, contrasted with the industrial extraction of resources, which extended underground in search of gold and tin. It is also a story of the limits of the tundra and the richness of the sea, the convergent effects of opposing political projects in the destruction of local communities and ecosystems, the establishment of Gulag concentration camps on the Soviet side, and the spread of forced migration.

Historians have long been interested in the environment; the idea that climate and natural conditions contribute to explaining political, economic, and social developments is well established. In the late 1940s, Braudel considered the natural environment an agent in history, as evidenced by his study of the Mediterranean in the Age of Philip II.[2] Kirti Chaudhuri's work on the Indian Ocean and Bernard Bailyn's on the Atlantic contributed to the expansion of this approach; comprehensive histories of oceans, seas, rivers, estuaries, and distinct ecosystems followed.[3]

The debate on the global seventeenth-century crisis, triggered by climate change (with temperatures below average and volcanic eruptions in different parts of the world), has centred on local economic impacts and political responses.[4] John McNeill examined the role of local diseases in the Caribbean, such as yellow fever and malaria, to understand the advantage of local resistance against newcomers.[5] This reasoning helps explain the success of immune mixed-race Brazilian troops in seventeenth-century Angola and the contrasting experiences of Europeans in the New World and West Africa.[6]

In the early 1970s, Alfred W. Crosby introduced a novel approach that focused on European migration worldwide, which led to the transfer of plants, animals, and pathogens across continents after 1492.[7] This opened the way for a reversed

2 Braudel, Fernand. *The Mediterranean and the Mediterranean World in the Age of Philip II* (1949–66), transl. Syân Reynolds 2 vols. (Berkeley: University of California Press, 1995).

3 Chaudhuri, Kirti. *Asia Before Europe: Economy and Civilization of the Indian Ocean from the Rise of Islam to 1750* (Cambridge: Cambridge University Press, 1990); Bailyn, Bernard. *Atlantic History: Concept and Contours* (Cambridge Mass.: Harvard University Press, 2005).

4 Parker, Geoffrey. *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century* (2013) abridged and revised (New Haven: Yale University Press, 2017).

5 McNeill, J. R. *Mosquito Wars: Ecology and War in the Greater Caribbean, 1620–1914* (Cambridge: Cambridge University Press, 2010).

6 Alencastro, Luiz Felipe de. *O trato dos viventes. Formação do Brasil no Atlântico Sul* (São Paulo: Companhia das Letras, 2000).

7 Crosby, Alfred W. *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood, 1972); *Idem. Ecological Imperialism: The Biological Expansion*

perspective, concentrating on human intervention in the environment and its impact on other human beings through the dissemination of epidemics, particularly in the Americas, where Indigenous people lacked immunity against European diseases.

The next significant step was taken by Paul Crutzen, the Dutch atmospheric chemist who won the Nobel Prize in 1995 for discovering the depletion of the ozone layer in the stratosphere. He argued that a new stage in the Earth's history had emerged, one defined by humankind as a major factor of change in global ecology. He placed this shift in the late eighteenth century with the rise of fossil fuels as a major source of energy, first coal, followed by oil and natural gas. It was Crutzen who introduced the concept of the *Anthropocene*, defining a world shaped by humans at a geological level.[8]

Meanwhile, the question of energy consumption in history started to be addressed more systematically. Rolf Peter Sieferle played a pivotal role in this shift, drawing attention to the impact of human action on nature and to the growing energy demands imposed by the Industrial Revolution in its various stages.[9] This line of inquiry was expanded through the concept of *social metabolism*, which refers to the set of material and energy flows between nature and society. It enabled a better understanding of the biophysical structures of human societies, highlighting population growth, the search for new resources, and colonial extraction. This field, shaped by Marina Fisher-Kowalski and Helmut Haberl, among others, opened new horizons.[10]

The use of chemistry in the industrialisation of food, dating back to the mid-nineteenth century, has played a crucial role with the introduction of

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of Europe, 900–1900 (Cambridge: Cambridge University Press, 1986); *Idem. Children of the Sun: A History of Humanity's Unappeasable Appetite for Energy* (New York: W. W. Norton, 2006).

8 Graedel, T. E. and Paul J. Crutzen,. *Atmosphere, Climate and Change* (New York: Scientific American Library, 1995); Hans Günther Brauch, ed., *Paul J. Crutzen: A Pioneer on Atmospheric Chemistry and Climate Change in the Anthropocene* (Cham: Springer, 2016) with Crutzen's most important scientific publications.

9 Sieferle, Peter Rolf. *Rückblick auf die Natur: Eine Geschichte des Menschen und seiner Umwelt* (Munich: Luchterhand, 1997); *Idem. The Subterranean Forest: Energy Systems and the Industrial Revolution* (Cambridge: Cambridge University Press, 2001).

10 Fisher-Kowalski, Marina and Helmut Haberl. 'Metabolism and Colonization: modes of production and the physical exchange between societies and nature', *Innovation: The European Journal of Social Sciences Research* 6, no 4 (1993), 415–442; *Idem*. 'Social Metabolism: a matrix for biophysical growth and degrowth'. In: *Handbook of Ecological Economies*, ed. Martinez-Alier, J. and R. and J. Muradian (Cheltenham: Edward Elgar, 2015), 100–138; Fisher-Kowalski, Marina, F. Krausmann and I. Pallua, 'A Sociometabolic Reading of the Anthropocene: modes of subsistence, population growth and human impact on Earth', *The Anthropocene Review* 1, no 1 (2014), 8–33.

pesticides, toxic elements such as arsenic, and antibiotics into the metabolism of plants, animals, and humans. The contamination of food by soil, air and water pollution, including the dissemination of microplastics, lead, and acidification of the oceans, is now widely recognised, yet legislation to protect the minimal integrity of food and water has been slow to pass. Only recently, on 28 July 2022, did the UN General Assembly declare access to a clean, healthy, and sustainable environment a universal human right.[11] However, there remains a long way to go in curbing the entrenched practices (and interests) of the polluting industries that continue to harm the planet.

The concept of the Anthropocene is now relatively consensual among scientists, yet its chronology and defining features remain open to debate. John McNeill and Peter Engelke would date its beginning to the mid-twentieth century, owing to the global impact of the combined carbon, sulphur and nitrogen cycles. In their view, the human impact on the Earth and the biosphere escalated after this turning point, giving rise to what they term the *great acceleration*. The number of motor vehicles increased from 40 million in 1950 to 800 million in 2015; plastic production increased from 1 million to 300 million tonnes; synthetised nitrogen (mainly for fertilisers) climbed from 4 million tons to 85 million tonnes; and the number of people living in urban areas tripled from 700 million to 3.7 billion. Moreover, the world's population grew from approximately 2.5 billion in 1950 to over 7.5 billion in 2015. Although marine fish capture, stratospheric ozone loss, large dam construction, and deforestation have slowed, and the rate of population growth, as well as the use of fossil fuels, which accounted for 80per cent of global energy in 2015, is expected to decline, the effects of these processes, along with continued mining, will impact the Earth's systems for millennia.[12]

Dipesh Chakrabarty proposes a distinction between the *globe*, as a human-centric construction, and the *planet*, or the Earth system, which has been profoundly affected by humans but also possesses a life of its own, with vast, inhumanly long timescales of deep natural history. His reasoning, as a historian, acknowledges the connection between the globe and the planet, yet employs the notion of a *planetary age* to decentre humanity while simultaneously underlining its responsibility for the technosphere. He concurs with the idea of a recent turning point to the Anthropocene, noting that the world economy increased fifteenfold, energy use fourteenfold, freshwater use ninefold, and

11 The human right to a clean, healthy and sustainable environment (accessed 26 June, 2025).

12 McNeill, J. R., and P. Engelke. *The Great Acceleration: An Environmental History of the Anthropocene from 1945* (Cambridge, Mass.: Harvard University Press, 2016), 4.

irrigated areas fivefold in the twentieth century. He emphasises the impact of mining, quarrying, oil platforms, pipelines and urban development on the upper continental crust, earth-moving activities were estimated in 2001 at 57 billion tonnes per year, combined with the billions of tonnes of sediment carried annually into the oceans by the world's rivers. This represents a genuine geological and biological transformation, affecting the atmosphere, soils, and waters, with an enormous loss of biodiversity at all levels that threatens the basic conditions for life.[13] We might add that the construction industry produces billions of tonnes of concrete each year, with significant emissions. Urban expansion is exponential, and the ecological impact of war and military industries must be taken seriously, particularly given the data restrictions imposed by major powers.

Although the scale of human intervention in the planet has been overwhelming in the past century, producing new social, economic, and health inequalities, including heightened pressure on Indigenous communities with alternative historical relationships to nature, Chakrabarty insists that we must look further back in time to better understand the causes and motivations of extractive practices across different parts of the world, particularly in colonial contexts. In his view, the modern developmental model represents a continuation of a new scale of long-term practices such as mining, deforestation for agriculture, timber, and energy, early forms of soil exhaustion, water exploitation, fur hunting, extensive livestock breeding, and hide processing, all of which have profoundly affected ecosystems and local populations.

Richard H. Grove has underscored the role of European empires in transcending boundaries and creating interconnected spaces that reshaped nature and exposed the limitations of global resources. The rapacious process of reducing nature to resources for extraction and sale on the global market, later termed *extractivism*, has blurred the dichotomy between metropole and colony.[14]

The studies of Dorceta E. Taylor on environmental racism, although centred on the United States in the last century, raise important issues regarding the location of noxious and hazardous facilities near minority and low-income communities, as well as the dumping of hazardous waste.[15] This issue can be

13 Chakrabarty, Dipesh. *The Climate of History in a Planetary Age* (Chicago: The University of Chicago Press, 2021), 3–8.

14 Grove, Richard H. *Green Imperialism, Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge University Press, 1995); *Idem. Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400–1940* (Cambridge: White Horse, 1997).

15 Taylor, Dorceta E. *Toxic Communities: Environmental Racism, Industrial Pollution and Residential Mobility* (New York: New York University Press, 2014).

extended to the premodern world, where the strategic seizure of land and the degradation of areas controlled by Indigenous people consistently featured in colonial projects. Max Liboiron follows a similar line of reasoning in their study of plastic pollution and its connection to the violent enactment of colonial land relations.[16] Environmental degradation, which predominantly affects marginalised classes, has also been addressed by Rob Nixon, who highlights the slow violence inherent in many economic enterprises.[17]

The emerging consensus in long-term historical analysis is that we must consider both the natural conditions enabling human activity and the impact of humans on the environment. As John McNeil and Alan Roe have pointed out, the interactions between humans and nature are reciprocal, entailing change and adaptation but also shaping policy, before, we might add, the change in scale imposed by the Anthropocene.[18] The long-term perspective helps us to understand the background of large-scale extractivism and how the separation between humans and nature, which emerged in seventeenth-century Europe, contributed to this process.

The Portuguese Empire offers a diverse subject of analysis, spanning from 1415 to 1975 across four continents. Although there exist numerous important studies on deforestation for timber extraction, the collection of dyestuffs, and the impact of the plantation system, as well as on the consequences of large-scale mining, hunting, fishing, naval construction, railways, dams, electricity generation, water pollution, soil erosion, and the silting of harbours and rivers, there remains a need for reflection on the long-term intersections among these lines of inquiry.

Local informants and international exchanges must be integrated into the study of places and networks to gather information and generate knowledge on environmental ideas and practices. Legislation for the protection of forests and the environment should also be examined in comparison with other imperial experiences. The integration of local populations into this analysis is crucial, as dispossession and the privatisation of communal property are directly linked to the disruption of ecological systems. Indigenous rights, accordingly, form an integral part of the debate on environmental rights. Human migration and travel facilitated the transfer of plants and animals; all possessed specific and interconnected agencies that must be studied within their precise contexts.

16 Liboiron, Max. *Pollution is Colonialism* (Durham: Duke University Press, 2021).

17 Nixon, Rob. *Slow Violence and the Environmentalism of the Poor* (Cambridge Mass.: Harvard University Press, 2011).

18 McNeill, John R. and Alan Daniel Roe, eds. *Global Environmental Reader: An Introductory Reader* (London: Routledge, 2013), xiii-xviii.

The first generation of scholars working on the environmental impact of the Portuguese Empire, led by José Mendes Ferrão and John Russell-Wood, was followed by some of the contributors to this special issue, particularly José Augusto Pádua, Diogo de Carvalho Cabral, and Amélia Polónia.[19] There is now a much broader interest in the history of the environment and the effects of human activity. A new generation of scholars has been emerging in the Portuguese-speaking world. This was the motivation behind organising a symposium on the subject. The results were extremely encouraging, revealing a wealth of new and outstanding research. The present collection of articles is the outcome of that process of discussion and exchange of ideas.

The alignment of the articles reflects the wide geographical range of interests. Part I, on Brazil, begins with the work of Diogo de Carvalho Cabral, Ana Lanara Morais, Jorun Poettering, Cristine Barreto and Tiago Luis Gil on 'Placing the empire: the environmental geographies of Portuguese America'. They bring together three projects: the planetary quest for tropical products and the search for complementary biomes absent in Europe; the appropriation of Brazil's Atlantic Forest for the creation of a slave-based agro-export economy; and the construction of Rio de Janeiro's aqueduct to supply drinking water. The issue of low biodiversity in Europe is linked to the various levels of ecological extraction in Brazil, ranging from rural to urban projects and needs, all of which depended on enslaved labour. The articulation of private property, land choice by colonists, deforestation and reforestation following epidemics and Indigenous population decline, all reinforced by the labour regime, is particularly effective.

Joana Sousa, Ricardo Ventura, and Miguel Carmo examine the colour of rice, rice production policies and agrodiversity loss in colonial Brazil. They demonstrate how rice genetics reveal the circulation of several species between West Africa, Europe, the Caribbean, and the Americas. The eighteenth-century Portuguese policy of favouring so-called white rice, or *Carolina*, over pre-colonial "homeland" or red rice, with its great diversity of local origins but

19 Ferrão, José Mendes. *A aventura das plantas e os descobrimentos portugueses* (Lisbon: Instituto de Investigação Científica Tropical, 1992); Russel-Wood, A. J. *The Portuguese Empire, 1415–1820: A World on the Move* (1992) (Baltimore: Johns Hopkins University Press, 1998), chapter V; McNeill, John R., José Augusto Pádua, and Mahesh Rangarajan. *Environmental History: As If Nature Existed* (Oxford: Oxford University Press, 2010); Cabral, Diogo de Carvalho. *Na Presença da Floresta: Mata Atlântica e História Colonial* (Rio de Janeiro: FAPERJ, 2014); Polónia, Amélia. 'Environmental impacts of the historical uses of the sea. The case of seaports'. In: *Seaports in the First Global Age* (*15th–18th Centuries*). *Portuguese agents, networks and interactions*, eds. Amélia Polónia and Cátia Antunes (Porto: UPorto Editora, 2016), 37–58. I have included only some of the main publications here.

classified as inferior, is thoroughly explored. The partial failure to eliminate red rice is highlighted and connected to traditional forms of subsistence that persist to this day. The authors also underline the importance of West African labour, whose expertise in rice cultivation was adapted to the Americas. The link between food production, environmental impact, and labour regime is cogently argued.

José Augusto Pádua, a pioneer of environmental studies in Brazil, discusses the history of the crucial concept of sustainability in Luso-Brazilian history. He critiques the Eurocentrism of Richard Grove's approach, which failed to integrate the discussion within the colonial context. Pádua highlights the innovative nature of the Luso-Brazilian debate, which presupposed the recognition of the unsustainability of the extractive colonial model. The main authors emerging in this area acknowledged the interdependence of forest extent, humidity, rivers, irrigation, and navigation, relating the burning of forests to soil degradation, as well as the depletion of flora and fauna through predatory hunting and fishing. Pádua focuses on the work of José Gregório de Moraes Navarro and José Bonifácio de Andrada e Silva.

Décio de Alencar Guzmán reflects on the environmental impact of the Portuguese empire on Amazonian Indigenous societies in the seventeenth and eighteenth centuries. He highlights the colonial extraction of resources, including deforestation for timber and agriculture, and the depletion of wildlife, particularly river turtles. At the same time, the disruption and displacement of Indigenous communities through forced labour contributed to ecological degradation by marginalising traditional ecological knowledge. Indigenous agricultural practices, especially the cultivation and genetic enhancement of plants by women, was partly lost in this process, reinforcing patriarchal structures. The loss of traditional knowledge of medicinal plants constitutes another dimension of this decline. The principal manuscripts on flora and fauna, compiled with Indigenous collaboration by Cristovão de Lisboa and André da Costa, are carefully analysed.

Part II, on Africa, also includes a rich set of new studies. Susana Münch Miranda and João Paulo Salvado address a significant issue: the extraction and trade of ivory in the Portuguese South Atlantic between 1723 and 1833. They have compiled new datasets from both revised and previously unknown primary sources on imports registered in Lisbon. Ivory played an important role in the Crown's finances as a state monopoly of trade rather than extraction. Although the scale of extraction was lower than that of the Dutch and English, the ivory trade from Luanda and Benguela ranked second only to the slave trade. The documented export of 1,000 tonnes of ivory from Angola between 1723 and 1833, covering only half the total period, corresponds to approximately

1,320 tusks, or 660 elephants killed each year. Documented imports to Lisbon between 1756 and 1807 (for which only thirty-eight years of data are available) show an average of 1,586 tusks or 793 elephants slaughtered per year, a higher figure due to the inclusion of trade from Cape Verde and Guinea. The Royal Comb Factory absorbed a substantial share of this ivory for the manufacture of combs, cutlery handles, piano keys, buttons, and billiard balls. The data reveal a steady increase in the ivory trade, with notable fluctuations; however, the period after 1840 witnessed the most intensive extraction, in line with international trends.

Marta Macedo addresses a markedly different issue that deserves attention in this volume: maroon ecologies in nineteenth-century São Tomé. The plantation regime on the island, centred first on sugar in the sixteenth and seventeenth centuries, and later on coffee and cocoa in the nineteenth century, consistently generated large numbers of runaway enslaved people. The transition from slavery to forced labour in the 1870s did not alter working conditions significantly, and marronage continued. Plantations in the north, separated from the south by steep mountains and dense forests, enabled the formation of maroon communities that endured for decades and maintained contact with colonial society through trade, notably in salt collected on the southwestern coast. Several cases of individual runaways are examined through reports by foreign naturalists, who also observed an even broader phenomenon of marronage on the island of Príncipe. The capacity of these communities to survive using traditional African agricultural techniques and clothing (such as garments made from tree bark), together with adapted forms of African political organisation, is a key element of the study.

Bernardo Pinto da Cruz investigates the largely unexplored case of the Cunene Development Scheme in Angola (1968–1974), which combined counter-insurgency objectives with a late colonial developmental project. This major initiative, paired with the Cahora-Bassa Dam in Mozambique, sought to irrigate vast areas of southern Angola and provide electricity to Namibia under South African management. The debates among engineers, technicians, and military personnel are analysed here in light of the tension between modernist and conservationist perspectives, while the political displacement of Indigenous populations form the broader context. Environmental impact was acknowledged, but resettlement and production were given priority.

José Pedro Monteiro situates Portuguese late colonialism within the context of international Indigenous politics (1945–1972). He examines the emergence of international Indigenous law after 1945 to understand the unusual zigzag of Portuguese international policy following the country's accession to the United Nations in 1955. During the 1950s, a clear distinction emerged

between Indigenous protection and the self-determination of colonial peoples. The 1957 International Labour Organization Convention on Indigenous and Tribal Peoples provide a legal framework for the protection of the customs, traditions, and land rights of Indigenous minorities within nation-states, while the 1960 UN Declaration for the Granting of Independence of Colonial Countries and Peoples promoted decolonisation and the right of peoples to determine their own destiny. The Portuguese dictatorship developed the fiction of a single country comprising Indigenous rather than colonial peoples, aligning itself under the ILO Convention, which required changes to colonial Indigenous law in 1961. However, this pretence ended in 1972, when the UN instructed the ILO to cease accepting reports from Portugal, deeming them absurd.

Part III, on South Asia, focuses on the work of José Miguel Ferreira, who presents innovative research on forest policies in colonial Goa. The long-term perspective reveals that the demand for naval construction and repairs justified the establishment of shipyards in Goa, Daman, and Bassein. However, extensive deforestation necessitated the importation of teak, the wood most resistant to fungi and marine deterioration. Following the New Conquests in the eighteenth century, teak was available in the regions of Satari, Embarbacem and Canacona; there was also a Jesuit plantation on the estate of Santa Rosália near Moula. The management of these limited resources and efforts to prevent overexploitation prompted successive regulations from the 1770s onwards and the creation of the Forest Administration in 1851. The demarcation of forests and the introduction of regulations governing exploitation conflicted with Indigenous practices and required considerable time to refine and implement.

Part IV concerns Portugal, although the concluding article also relates to the empire. Koldo Trapaga-Monchet examines the environmental footprint left by the sugar industry in Madeira and by the shipbuilding industry in Lisbon on woodland resources. The debate over the real impact of the sugar industry, in comparison with other forms of agriculture, especially the expansion of cereals and vineyards, is skilfully addressed through an analysis of the power of local elites, among whom the sugar lobby played a significant role alongside the king, who profited from taxes on sugar exports. This alliance secured regulations favourable to their claims on wood. Trapaga-Monchet highlights the substantial demand for timber to supply sugar mills, boxes, irrigation systems, and wine barrels. The expansion of plantations in the south of Madeira contrasted with the north, where forests were less depleted. Chestnuts and pine trees from the mainland were introduced as early as the 1520s. Data on the management of forests north of Lisbon, used to supply the city's shipyards, are also presented, underlining the continual dependence on imported timber.

Amélia Polónia analyses the environmental impact of naval logistics on Portugal's seaports and its colonies during the sixteenth and seventeenth centuries. She examines technical interventions in harbours, mainly during the seventeenth and eighteenth centuries, including the construction of quays, breakwaters, jetties, banks, and dikes, as well as the destruction of reefs. Access to river mouths and bars was a central concern, yet the constant deposition of debris and ballast from ships contributed to silting. Connections with the hinterland, particularly for the supply of timber and flax for the rope industry, resulted in deforestation and sustained a continued reliance on imported wood. The importance of teak for shipbuilding and naval repairs in South Asia, along with the use of coconut fibre for caulking and flax from East Africa, is duly emphasised. The shipyards of Goa and Cochin, as well as those in Malacca, Macao, Mombasa, and Mozambique, mainly dedicated to repairs, played a significant role in this process.

To conclude, the impact of colonial extraction on both nature and human societies becomes particularly evident in this rich collection of articles, especially in relation to deforestation, biodiversity loss, and the destruction of ecological systems. The near disappearance of brazilwood, after which Brazil was named, from the South American coasts, once densely covered with this extraordinary tree used for textile dyeing, shipbuilding, and furniture, was largely accomplished by the late seventeenth century. The deforestation of Madeira for the sugar industry and the depletion of timber in central and northern Portugal for shipbuilding are highlighted in various studies. The decline of teak in the Portuguese colonies in India similarly demonstrates the impact of shipbuilding and repair, despite policies introduced in the late eighteenth century to slow this process. The absence of coordination with Indigenous populations, however, prevented sustainable management.

The reduction of biodiversity is addressed in the study of rice policies in Brazil, which promoted *Carolina* rice and excluded "red rice", or earlier Indigenous varieties. Red rice survived, but only in limited quantities. The extensive cultivation of *Carolina* rice had a long-term effect on biodiversity and contributed to climate change by increasing atmospheric methane levels. The long-term involvement of the Portuguese in the ivory extraction from elephants in Africa is also made clearer than ever for the period prior to the mid-nineteenth century. The scale of annual killings, combined with concurrent predation by the Dutch and English traders, is now well established through solid empirical research. The contradiction between the pursuit of biodiversity, which was relatively limited in Europe, and the political consequences of colonial dominion, including the reduction of biodiversity, is persuasively discussed. Notably, the debate on biodiversity loss in the colonial

world and the advocacy of sustainable policies from the eighteenth century are highlighted here in an innovative manner, challenging earlier Eurocentric interpretations.

The destruction of ecological systems for political purposes of colonial domination is documented through the expansion of the plantation system in Brazil, the provision of water, and urban development. As Max Liboiron has convincingly argued, the appropriation of land lay at the heart of all colonial projects. In the Amazon, deforestation was compounded by the depletion of wildlife, particularly river turtles, and by the loss of Indigenous ecological knowledge, especially that held by women. The impact of the plantation system in São Tomé and Príncipe illustrates the multiple layers of human exploitation in Angola, with severe demographic and social consequences, including the destruction of communities. At the same time, colonial domination in these islands encouraged runaway slaves to form independent maroon communities beyond the reach of the colonisers.

The long-term degradation of ecological systems is also evident in the studies on Portuguese ports and their overseas counterparts, which highlight processes of silting, pollution, the destruction of reefs, and the decline of marine life. The late colonial Cunene Development Scheme in Angola, based on hydropower and irrigation, and linked to Namibia, sought to replicate Mozambique's Cahora Bassa project. It serves as an exemplary case of modernisation and counterinsurgency pursued through ecologically destructive means. Although some awareness of environmental problems existed, it was largely disregarded, as the political use of technology driving these vast projects perpetuated a form of toxic colonialism. Finally, the political contradictions of the late colonial Portuguese state are laid bare in its untenable claim to protect Indigenous peoples who were simultaneously denied control of their own land.

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