Tamara L. Whited

Nature and Power through Multiple Lenses

This contribution focuses on analyses of specific themes in the encyclopedic Nature and Power, *by Joachim Radkau. The analysis is shaped by insights derived from pairing individual chapters from the book with related readings. Examples will include traumatic environmental experiences, early modern colonialism and colonial "ghost acreage," industrialization and uses of the forest, and manipulations of the hydrologic cycle. The structure of the contribution is explicitly comparative.*

"All simple pictures of environmental history are open to challenge" is Joachim Radkau's (2008: 313) own dictum that comes amply illustrated in *Nature and Power: A Global History of the Environment*. Never presenting "simple pictures," Radkau inevitably opens the door to challenge by virtue of his myriad examples and case studies. In the article that follows I will limit myself to observations and critiques that emerged from having read and thought about *Nature and Power* alongside additional (and much shorter) texts. This personal user's manual is perhaps an obvious way to come to grips with any magisterial work of synthesis. I found it particularly useful in engaging with four themes: traumatic experience; European exceptionalism; forestry, industrialization, and sustainability; and hydraulic engineering. This abstemious selection cannot begin to do justice to *Nature and Power*, for Radkau's book is nothing if not kaleidoscopic, the patterns always shifting within an overall symmetry. My greatest pleasure in reading *Nature and Power* came from seeing the kaleidoscope transform itself into both the telescope and the microscope, with not only Radkau's taste for comparative his-

Social Science History 37:3 (Fall 2013)
DOI 10.1215/01455532-2209411
© 2013 by Social Science History Association

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

tory but also his insistence on the primacy of the small-scale institution and the local condition.

Traumatic Experience

Environmental historians have analyzed a depressing number of cases that point to the ways that societies have struck fatally at the ecological underpinnings of their ways of life. On balance, however, human societies would appear to be more affected by natural forces that, whether by virtue of their sudden ferocity or their long-term effects, have challenged the human ability to adapt: the serviceable phrase "human-assisted disaster" can describe the intersection of these two themes. More fodder for this line of analysis is in chapter 2 of *Nature and Power*, "The Ecology of Subsistence and Tacit Knowledge" (Radkau 2008: 36–85), and in a portion of chapter 4, "Colonialism as a Watershed in Environmental History" (ibid.: 152–94), material that can be fruitfully read alongside Jared M. Diamond's (2005: 79–119) chapter "Twilight at Easter" in *Collapse*. This juxtaposition of texts allows the direct application of Radkau's term *traumatic experiences* to the case study of Easter Island. His framework for chapter 2 is the "primeval" economy of self-sufficiency that, though temporally undefined, would seem to include both hunter-gatherer and small-scale agricultural societies. Not infrequently did these societies endure "primeval experiences of a traumatic kind—of drought and cold, hunger and thirst, floods and forest fires" (Radkau 2008: 37). These experiences conditioned awareness of environmental constraints and fragilities. Radkau (ibid.: 38) extends the point by arguing that self-sufficient communities are more likely to wrest a living from the earth in a sustainable manner: "Preserving the environment is most easily accomplished where preservation does not need to be organized from above but is inherent in a particular way of life, where the environment that is affected by human activity remains small and easy to survey, and where those who cause environmental damage must bear the consequences themselves." This important argument begs engagement with debates over "Pleistocene overkill," the "tragedy of the commons," and the relative sustainability of extensive versus intensive pasturing and farming. Radkau treats all three in the chapter and is prepared to qualify his thesis, in the end judging rather harshly the ecological legacies of "subsistence" hunting and slash-and-burn agriculture. But here, as at numerous junctures in his text, it is the qualification of

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

the qualification that provides the force and subtlety in *Nature and Power*. With reference to Paul Martin's "overkill" thesis, Radkau (ibid.: 49) queries: "The extent to which one sees the decimation of wildlife as a loss to nature depends on how one defines 'nature.' Tree growth benefited from the decline of the megafauna."

At first glance, that most haunting of environmental parables recounting the ecological, cultural, and demographic implosion that occurred at Easter Island would seem to allow for the easiest possible swipe at any construct of self-sufficient sustainability. Environmental trauma there surely arose in the form of creeping deforestation that was to leave the island barren, eroded, and desiccated prior to the arrival of the Dutch explorer Jakob Roggeveen in 1722. Diamond's explanation of the Easter Island tragedy situates a socially and politically driven improvidence in a set of nine physical factors that make Easter Island a place of particular environmental fragility. Factors ranging from latitude, altitude, and aridity to the relative age of Easter's volcanoes and its far remove from Asian dust plumes conspired to inhibit the regeneration of forest once clearances accelerated unsustainably. Used principally for fuel and "canoe ladders" for the transportation of colossal statues and their platforms and cleared for plantation agriculture, the varieties of palm, tree daisy, and toromiro disappeared on Easter Island between the early 1400s and the 1600s (Diamond 2005: 107, 116–18). Whereas Diamond (ibid.: 114) himself suggests the possibility of "awareness" ("What did the Easter Islander who cut down the last palm tree say while he was doing it?"), clearly the experience of self-inflicted trauma did not change behavior until trauma intensified into deeper crisis and forced a new set of adaptations—alongside cannibalism and population crash.

It was this second Easter Island culture, sustaining a fraction of the island's former population, that was in turn nearly done in by European, Peruvian, and Chilean exploitation. Radkau focuses his own, extremely brief discussion on this very late phase of Easter Island's history. "The inhabitants must have destroyed the forests knowing full well what they were doing, for the island is small enough that one would have known that one was cutting down the last tree," Radkau (2008: 166) reasons,[1] yet he immediately shifts the discussion to the effects of European contact: "Or is the true story of Easter Island not one of suicide but of murder?" Radkau appears to seize on Roggeveen's observations of "flourishing agriculture" (ignoring the admiral's more damning commentary) in an effort to suggest that

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

all was well on Easter Island until the eighteenth and nineteenth centuries. Unfortunately, his fleeting pass at the evidence does not convince: his assertion that the island's treeless condition existed "more than a thousand years ago" (ibid.) challenges but does not weaken Diamond's argument based on more meticulous references to the radiocarbon dates attributed to recovered palm nuts and core samples. These dates show that deforestation not only coincided with human occupation of the island following AD 900 but also peaked at around the same time, c. AD 1400, that the platform- and statue-building practices of the Easter Islanders were reaching their zenith (Diamond 2005: 97, 106–7). Radkau (2008: 373n32) has welded together the "island-ecological collapse paradigm" (which would relegate the importance of human interaction with small island ecosystems to epiphenomena) with European exploitation of more recent centuries in a fashion that appears more contrarian than persuasive.[2]

European Exceptionalism

The idea that Europeans were creating "exceptional"—meaning noticeably sustainable—relationships with their resource bases emerges in chapter 4. Portions of John F. Richards's (2003) *Unending Frontier* provide a sound basis for the evaluation of this discussion. The only hint of a possible exceptionalism in Richards's analysis of early modern colonialism lies in his vision of European rapaciousness, epitomized in his formulation of the "world hunt"—the systematic overhunting of often large communities of wild mammals, birds, and fish for sale in increasingly far-flung markets. Richards (ibid.: 9) captures the essence of the early modern "world hunt" as follows: "Humans voraciously and systematically located, extracted, processed, packaged, shipped, priced, sold, and consumed wild animals in ever greater quantities over ever greater distances." To this lucrative commercial predation Richards attributes "a new ruthlessness and ferocity" on the part of the hunters. Though he writes almost exclusively of the hunting practices of Europeans and their North American descendants, he does mention Japanese and Siberian whaling. Radkau, by contrast, refers only obliquely to early modern colonialism itself: his Europe comes to be characterized by environmental exceptionalism through the possibility of long-term, sustainable agriculture at home. For this possibility, on which, in Radkau's view, European farmers have largely made good, Europeans owe thanks to their soils that are

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

on average well watered by precipitation, thus at little risk of salinization, and to topographical features and forests that have spared soils from massive erosion (if we look north of the Mediterranean basin). Overall, European landscapes appear far less prone to desiccation and desertification than those of the Near East and parts of Africa and East Asia. Radkau overreaches in constructing a Europe also characterized by sustainable population growth, citing the well-known demographic features that include patterns of late marriage, contraception, and clandestine infanticide. Yet from the very next paragraph, and with barely a transition, we have the overseas territories functioning as "a safety valve for the population pressure at home" (Radkau 2008: 188). Population pressure is now implicit in the analysis. We know that from the perspectives of many settlers, shortages of land but also of fuel hastened their departures from Europe.

A concept linking colonialism to sustainable economics in the metropole is "ghost acreage," the reliance on alternative food and other resources imported from the colonies or colonial waters that lessened the subsistence pressure on acreage at home.[3] Radkau does not employ the phrase, yet it applies well to his analysis of colonialism and European ecology. In short, did the availability of ghost acreage undercut sustainability at home or reinforce it? As always, the argument is subtle in *Nature and Power.* The two great colonial powers, Spain and England, developed, respectively, transhumant sheep raising and intensive agriculture through enclosure, yet neither of these widespread practices was as ecologically detrimental as one might surmise. The highland sheep pastures of Spain produced impressive biodiversity. Radkau notes that environmentalists have touted the old transhumant routes as a "connected biotope." However, he is not blind to the deforested state of large areas in central Iberia; he embraces the "suspicion that Spanish colonialism, which led to the neglect of the Spanish economy, also entailed the neglect of the environment" (ibid.: 189).

England seems to offer a more clear-cut case for metropolitan sustainability. According to Radkau (ibid.: 193), farming on enclosed estates reinforced—until the commercially driven specialization of English agriculture—the balance between arable and pasture: "It was easier to collect the valuable sheep dung on the enclosed land, and the hedges, which became more than ever a characteristic element of the English landscape, delight nature lovers to this day and provided wood." If his equation of enclosure with sustainability does not jolt many an environmental historian, then his

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

reference to the Scottish Highlands surely will: acknowledging the social crime of the Highland clearances, Radkau asserts that the ecological degradation of the Highlands themselves is at best controversial. Here as elsewhere, Radkau (ibid.: 192) seeks to highlight counterexamples that belie an easy congruence of injustice and ecological catastrophe: "A development that is socially scandalous is not necessarily ecologically ruinous." But counterevidence abounds. James Winter (1999: 68–71) refers to a consensus that the transformation of the Scottish Highlands into vast sheep runs promoted soil acidification, erosion, and the spread of mat grass and bracken. T. C. Smout (2000: 124–30) shows that whereas evidence of long-term mineral loss in upland soils is inconclusive, the loss of floral and insect diversity is clearer.

In light of his Spanish and English-Scottish evidence, Radkau's example of German forestry presents less of a counterargument than a subtle complementarity. The German states, lacking overseas colonies in the early modern era, pioneered in scientific forestry aimed at sustainable wood production. The three cases together show that neither the presence nor the absence of colonies was the key factor in promoting sustainability in Europe. In sharp contrast lies Richards's portrait of ecological degradation during the "golden age" of the Dutch Republic. The world's leading commercial power saw resource use at home intensify concurrently with maritime trade's "cascading effects on landscapes and peoples throughout the early modern world" (Richards 2003: 47). By 1550 virtually no wood was left for fuel; in the next century natural lakes in peninsular North Holland and their aquatic ecosystems were drained away; and overtapped peat bogs were simultaneously filling with water, some of these territories to be reclaimed for agriculture (ibid.: 53–55). One is left wondering not only about the variousness of Europe's environmental history but also about the questionable representativeness of examples in such a broad study as *Nature and Power*. His European optimism notwithstanding, Radkau's overall conclusion is admonitory: the European model, which eventually became an industrial model, with its intensive agriculture and heavy use of water and energy, did not and could not transfer well to other, especially more arid, regions of the world. And in Europe itself the ecological consequences of takeoff economic growth were merely "postponed and concealed" (Radkau 2008: 194).

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

Industrialization, Forestry, and Sustainability

Takeoff growth comes back into play in chapter 5, "At the Limits of Nature," where Radkau (ibid.: 195–249) suggests that the Industrial Revolution emerged ex nihilo from a foundation of sustainability. Sounding a strong note in the melody of European exceptionalism, Radkau also provides a distinct thesis about industrialization itself. He argues that European industrialization began with quantitative and necessarily decentralized growth, because it was based on traditional sources of energy. This pattern of development led to a grasping for resources "into the depths of the forest, at the limits of nature" (ibid.: 196). Accelerated extraction did not lead inexorably to fateful shortages, however, due to the "very interaction of a multitude of interests," that is, diverse parties interested in access to sources of wood and water who worked to check one another (ibid.: 201). Thus Radkau (ibid.: 195) adopts E. A. Wrighley's portrait of early industrialization as that of an advanced organic economy based on solar energy with regard to agriculture and wood production and a population aware of the limits to growth and apparently willing to move toward sustainability. That was, at least, *one* trend: so far, so good. Radkau qualifies the deforestation thesis of the Industrial Revolution—that an absolute shortage of wood for heating and industrial uses fundamentally drove the transition to coal—by arguing that localized wood shortages were felt later in the process of industrialization rather than serving as a catalyst. Radkau does, after all, emphasize that the new economic model based on maximizing "regenerative resources" did not always achieve ecological balance.

The difficulty here is that Radkau's (ibid.: 204) Industrial Revolution is one that has no specific origins: it "upset promising trends" toward a sustainable economy. At most we have the problem of multiple users of wood and water trying to manipulate customary rights and legal prohibitions in their favor. As for the preindustrial period: "The presumed ecological crisis of premodern civilization was at its core often a regulatory crisis" (ibid.). This regulatory theme, with the effects of regulation at times intended and at times fortuitous, has surfaced again, echoing Radkau's (ibid.: 86–151) vivid portrayal of Venice in chapter 3, "Water, Forests, and Power," where sixteenth-century power politics led to both reclamation of the terra firma and preservation of the lagoon. Here, however, his vision ignores another, amply documented trend, that is, prior to the final third of the eighteenth

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

century the use of pit coal was very much on the rise in Great Britain in various forms of production, such as lime burning, dye making, and brewing, and for domestic heating. The familiarity with pit coal, so often located near navigable water in Britain, takes us back centuries.

Other specialists concur that absolute wood shortage is a simplistic construct, yet they argue that wood supplies stagnated with respect to an expanding economy. Edmund Burke III (2009: 41–44) adheres to the idea of an energy crisis affecting "Western Europe, Japan, much of China, and parts of the Americas" by or before 1800, producing economic stagnation short of collapse. The economic advantages in transitioning to coal proved overwhelming in the British case, with the liberating effect on many millions of acres that could now be put to agricultural uses rather than devoted to coppice.[4] Radkau agrees with Rolf Peter Sieferle's (2001: 114) portrait of the tight links between ironworks and the preservation of coppice: iron production had not devastated the forest per se but had rather transformed high forest into an "energy plantation with short cycles of cultivation." Nonetheless, the demand for energy in late eighteenth-century Britain was on the rise to the extent that manufacturers would soon have been stymied by the limited coppice available for charcoal-based metallurgy. Sieferle (ibid.: 115) cites the expansion of iron production only "at the moment when a more accessible, i.e. less expensive, energy provider could be obtained and employed—coal."

With ironworks perhaps in the forefront of his thinking, Radkau (2008: 204) claims that industrialization began in regions whose ecology was "increasingly stabilized." I find this intriguing idea hard to square with the low afforestation rates in the British Isles as a whole and the agricultural marginality of Lancashire and the West Riding of Yorkshire, neither area originally a center of metallurgy but both heartlands of the Industrial Revolution in textiles (Pollard 1997: 221–54). Unfortunately, Radkau does not provide evidence for that assertion. His related point in chapter 3, that "it is precisely when the forest is needed that it is preserved" (Radkau 2008: 149), seems to fly in the face of the British case overall, ironworks and coppice preservation notwithstanding. Richards (2003: 221–27) provides a useful synopsis of the depletion of forest resources in the British Isles during the early modern centuries. Winter's analysis emphasizes Victorian insouciance with regard to forest resources. Broadly speaking, free trade provided Great Britain with wood from the far corners of the earth (again, ghost acreage) for the entire nineteenth century and thus allowed the British government to put off developing

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

a professional forestry service. Only World War I sounded the alarm about Britain's lack of softwood; the newly perceived shortage quickly became an issue pertinent to national security (Winter 1999: 100–103). It bears recalling that the "forest history" of the Industrial Revolution shows not a decline in absolute demand for wood but the triumph of softwood over hardwood and, with it, the rise of professional forestry. Whether we look at the preindustrial demand for hardwood for ships and fuel or the midindustrial demand for softwood for cheap building materials and paper pulp and hardwood for railroad ties, the British case presents something less than Radkau's image of "stabilized" ecology.[5]

I am more comfortable with Radkau's warning that claims of wood shortage and forest devastation should be taken critically when voiced by state representatives, for these claims provided the preeminent justification for state intervention. But now we are in central Europe, not the British Isles. One of his arguments about the forest is that forest awareness was generated from both above and below and that uses of forest resources were in central Europe "put on a legal footing," a fact that militated in favor of sustainable use. The conflicts that the copious forest restrictions inevitably created worked to "sharpen forest consciousness and give rise to a competition as to who [was] the best protector of the forest" (Radkau 2008: 141). He nods to the ecological literature that has given European peasants high marks for maintaining forest and forest pasture and goes on to portray an almost steady-state urban economy that made judicious use of forest resources in the early modern era. Radkau (ibid.: 139) does recognize historical wood shortages, though only local ones. These observations provide a synthetic contribution to our understanding of uses of the European forest.

Radkau's crowning counterexample, setting the European example in high relief, is of course China, but it is important to specify what precisely he is arguing for in the Chinese case. This is not about pinpointing the fateful moment of irreversible deforestation but about showing the lack of connection between "dominion over the forest" and state power. We learn that Chinese rulers were, overall, more interested in arable land; that naval construction rarely pushed forest conservation or reforestation; that "sovereign hunting" was a small factor; that the slighter extent of animal husbandry in China did not therefore incite the peasants' interest in forest pasture; and that a much weaker link existed between the forest and metallurgy, given the use of pit coal from the Middle Ages. Admittedly, all these points support his

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

contention that the "needed" forest is the "preserved" forest, but they also reinforce one of Radkau's (ibid.: 106, 114–15) leitmotifs: that smaller-scale rules and institutions are the real connective tissue between human societies and their material world, not, in this case, the too-vast Chinese state or the force of Taoist or Confucian ideas. His Chinese example bolsters, in a converse manner, his case for the forest consciousness of the central European peasant.

Hydraulic Engineering

In a similar vein, chapter 3 seems to warn against the explanatory force of large agroecological structures, such as irrigation systems and terracing. Neither one determines a set of predictable ecological outcomes, nor are they determined by sociopolitical features, such as centralized bureaucratic power. Radkau alludes here to Karl August Wittfogel's (1981 [1957]) theory of the hydraulic society, but he nuances it considerably.[6] As Radkau (2008: 102) concludes with regard to terracing, "The ecology of the terraces is contingent on local conditions, cultural as well as natural." His treatment of such transformative projects is usefully examined alongside the first two chapters of David Blackbourn's (2006: 21–119) *Conquest of Nature*. They treat, respectively, the eighteenth-century Prussian state's reclamation of the Oderbruch, a roughly 35-mile stretch of marshland along the west bank of the lower Oder River, and the correction of the "Wild Rhine" by the engineer Johann Gottfried Tulla in the employ of the state of Baden. The ecological outcomes of both projects were indeed anything but predictable.

Exemplifying Blackbourn's regional approach, the case of the Oderbruch and eighteenth-century land reclamation contrasts with Radkau's comparative and sweeping ecological perspective. In chapter 3 and again in chapter 5 of *Nature and Power* one can readily identify the divergences between the two analyses—the global and the regional. Radkau (2008: 111), more attached to the global perspective, places various European agrarian projects alongside their counterparts in China, underlining for the eighteenth century the parallel desires to "use natural resources to their limits and to leave no more empty spaces, no quiet reserves." Land reclamation was a primary and, in Europe, a ubiquitous example of this trend: "The reclamation of moors, swamps, and river plains was a typical goal of the eighteenth century, from the Oder to the Campagna." For Radkau (ibid.: 197), the ecological conse-

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

quences of eighteenth-century reclamation were "epochal," for they rewrote the conditions for sustainable agriculture:

> Until then, the sustainability of agriculture was in many cases guaranteed not only by fertilizer and fallow, but also by the fact that one could make use, as needed, of semiwild outlying areas: commons, forests, heaths, moors, and swamps. The more these areas receded—and until the twentieth century that was a slow process—the more agriculture became dependent on an inherent, precisely calculated sustainability. Only now was it compelled to clarify exactly what sustainability meant.

If this is *the* qualitative shift in the history of modern agriculture, then one cannot fault Radkau for emphasizing effects over agency. Yet the power of the state merely lurks in the wings; beyond noting Frederick the Great's threatened use of the death penalty against saboteurs of the new dikes in the Oderbruch, Radkau (ibid.: 126) does not analyze the workings of the absolutist state, surprisingly in the overall context of "nature and power."[7] What stands out in Blackbourn's analysis, by contrast, is the role of violence and coercion on the part of the highly militarized Prussian state that effected the transformation of the Oderbruch. For Blackbourn (2006: 45), the wresting of order from "barbarous" corners of nature represented the "authentic voice of eighteenth-century enlightened absolutism." Wetlands represented uncertain borders and posed impediments to armies. Reclamation uprooted the marsh dwellers and ultimately eradicated their amphibious way of life based on both fishing and pasturing (ibid.: 58–61). Radkau's more cross-cultural reach and his telescopic view of the eighteenth century took him away, in this case, from politics and state-building.

If the awareness of water flow and distribution lie at the "beginning" as well as the "end" of political history, by which Radkau (2008: 89) alludes to both ancient and contemporary conflicts over water, then the case of the Oderbruch shows how Blackbourn's more focused study helps clarify that larger point. But an equally important difference between the two lies in Radkau's sense that an irrevocable change, one that marks the end of early modern environmental history, was under way; again, in his reference to the eradication of semiwild areas, his phrase "no quiet reserves" is evocative here. It is a portentous change, and Radkau's articulation of it recalls, paradoxically, his critique of the "tragedy of the commons" thesis earlier in the book.[8] The real tragedy, in other words, was the commons' disappearance

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

at the hands of modernizers. Blackbourn (2006: 75), on the contrary, takes the relativist approach to environmental history by insisting that the wetlands both before and after reclamation represented a dynamic imbrication of nature and culture: an ecosystem that had been marked for centuries by human habitation, hunting, upstream water control, and upland deforestation cannot provide a "baseline" for measuring the "world that was 'lost' during reclamation."

To conclude this admittedly disparate set of observations, *Nature and Power* remains for me an enormously productive book for the ways that the text surpasses what I would expect from a synthetic account of environmental history. The use of additional texts serves not only the cause of counterargument but also that of clarification, forcing both the recognition of where Radkau's evidence is occasionally sparse and the appreciation of his most penetrating points. We must thank Radkau for his provocative visions of environmental history that challenge the field's clichés and dominant narratives.

Notes

The idea of reading *Nature and Power* a chapter at a time and juxtaposing each manageable dose with additional readings occurred to me as I designed my syllabus for a graduate seminar in environmental history, which I taught at Indiana University of Pennsylvania during the spring semester of 2010. The efficacy of that approach showed in the class's tendency to circle back to previous discussions as the weeks progressed. I would like to thank my students in that seminar for helping me sharpen my own reactions to *Nature and Power*. I am also grateful for Robert M. Schwartz's wise recommendations for revising the first draft of this article.

1 This formulation is not likely an intentional echo of Diamond's question, for the German edition of *Nature and Power* was published in 2000.

2 Radkau has clearly engaged with a range of Easter Island studies. One wishes that he would bring more evidence to bear on his overall judgment, tucked into this endnote: "Easter Island seems to be a paradigm for the necessity of a critical stance toward deforestation-catastrophe scenarios" (Radkau 2008: 373n32).

3 The concept of "ghost acreage" was introduced by Georg Borgstrom (1965) in *The Hungry Planet* and was later taken up by Eric L. Jones (1981) in *The European Miracle* and others.

4 Kenneth Pomeranz (2000: 276) revises upward Anthony Wrigley's estimates of ghost acres of woodland that would have been needed to replace coal; he arrives at 21 million ghost acres needed by 1815.

5 The richness of Winter's analysis lies in his linkage of the very absence of professional forestry to the long-term preservation of traditional, "balanced" landscapes in rural Britain.

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press

6 A useful discussion of Wittfogel's thesis is in Worster 1985: 22–30.

7 Radkau's (2008: 199–200) references to the state (in this case, technically the Magistrat du Rhin established by Napoléon in Strasbourg) are slightly more explicit in his discussion of Tulla's rectification of the Rhine and the impotence of local fishermen in its face.

8 Radkau's (2008: 72) defense of the historical "commons," in response to both Garrett Hardin's rather abstract commons and the critiques made by early modern agrarian reformers, rests on two important facts: these territories were highly regulated by members of face-to-face communities, and their sustainable use depended on their remaining "within the framework of the subsistence economy."

References

Blackbourn, David (2006) The Conquest of Nature: Water, Landscape, and the Making of Modern Germany. New York: Norton.

Borgstrom, Georg (1965) The Hungry Planet: The Modern World at the Edge of Famine. New York: Macmillan.

Burke, Edmund, III (2009) "The big story: Human history, energy regimes, and the environment," in Edmund Burke III and Kenneth Pomeranz (eds.) The Environment and World History. Berkeley: University of California Press: 33–53.

Diamond, Jared M. (2005) Collapse: How Societies Choose to Fail or Succeed. New York: Viking.

Jones, Eric L. (1981) The European Miracle: Environments, Economies, and Geopolitics in the History of Europe and Asia. Cambridge: Cambridge University Press.

Pollard, Sidney (1997) Marginal Europe: The Contribution of Marginal Lands since the Middle Ages. Oxford: Oxford University Press.

Pomeranz, Kenneth (2000) The Great Divergence: Europe, China, and the Making of the Modern World Economy. Princeton, NJ: Princeton University Press.

Radkau, Joachim (2008) Nature and Power: A Global History of the Environment, trans. Thomas Dunlap. Cambridge: Cambridge University Press.

Richards, John F. (2003) The Unending Frontier: An Environmental History of the Early Modern World. Berkeley: University of California Press.

Sieferle, Rolf Peter (2001) The Subterranean Forest: Energy Systems and the Industrial Revolution. Isle of Harris: White Horse.

Smout, T. C. (2000) Nature Contested: Environmental History in Scotland and Northern England since 1600. Edinburgh: Edinburgh University Press.

Winter, James (1999) Secure from Rash Assault: Sustaining the Victorian Environment. Berkeley: University of California Press.

Wittfogel, Karl August (1981 [1957]) Oriental Despotism: A Comparative Study of Total Power. New York: Vintage.

Worster, Donald (1985) Rivers of Empire: Water, Aridity, and the Growth of the American West. New York: Pantheon.

https://doi.org/10.1215/01455532-2209411 Published online by Cambridge University Press