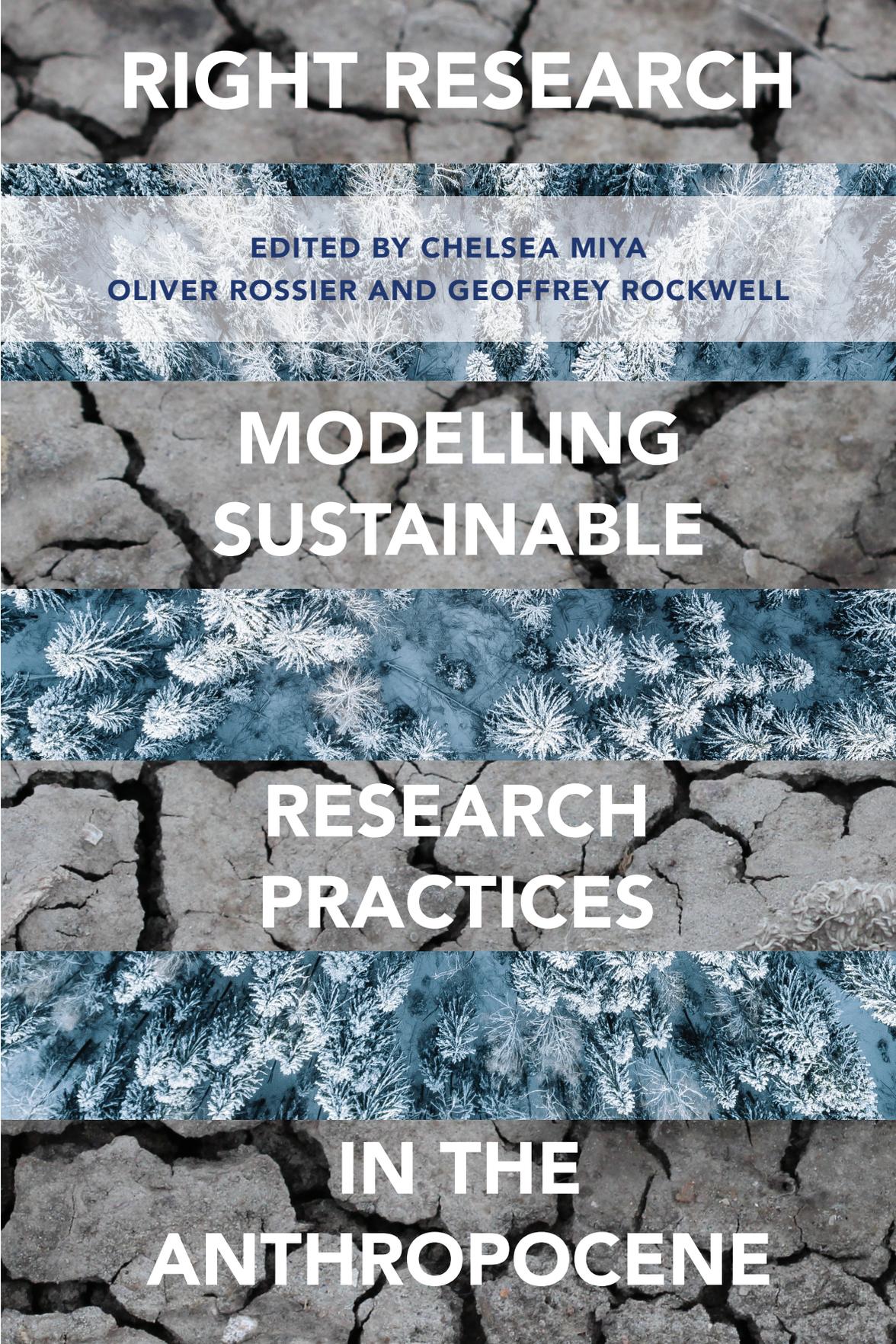


RIGHT RESEARCH



EDITED BY CHELSEA MIYA
OLIVER ROSSIER AND GEOFFREY ROCKWELL

MODELLING SUSTAINABLE

RESEARCH PRACTICES

IN THE ANTHROPOCENE



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2. Sustainability in the Anthropocene

From Forests to the Globe

Petra Dolata

Various meanings of sustainability emerged at specific historical times shaped by different prevailing energy systems. Even though sustainability in the Anthropocene always included views that saw nature as resource and hence linked sustainable practices to profit-making (yield), there are qualitative differences in the very meaning of sustainability and the ways it related to eighteenth-century forestry practices, nineteenth- and twentieth-century conservation efforts and twentieth-century environmental activism and global development goals. Some of these meanings may have been building on each other, others developed in opposition to previous understandings of sustainability. There is no straightforward, linear evolution of the term and it may be misleading to relate past meanings teleologically to today's definitions as this may overshadow different meanings that were prominent at different times in history. A comparison over time and throughout the Anthropocene shows that the concept needs to be understood within its specific historical context.

The Anthropocene¹ has become an accepted term to denote the multiple ways that humans have impacted the earth system on a scale that justifies

1 Paul J. Crutzen and Eugene F. Stoermer, 'The Anthropocene', *IGBP Global Change Newsletter*, 41 (2000), 17–18; Paul J. Crutzen, 'Geology of mankind', *Nature*,

introducing a new geological epoch reflecting this enormous human geophysical footprint. As climate change poses the most daunting challenge to today's high-energy, polluting and wasteful societies, sustainability is an important 'buzzword'² that is discussed within the Anthropocene. Yet, sustainability has pervaded language in ways that rendered the concept almost meaningless. In corporate talk it is used to signal good business practice which somehow respects nature, while marketing strategies include the attribute 'sustainable' to advertise green products. Sustainability has turned into a normative label that indicates consideration of the environment and is used to 'greenwash'³ corporate approaches and products. Indeed, it has come a long way since its first alleged appearance as a concept to guide forestry practices in the German publication of Hans Carl von Carlowitz in 1713.⁴ Situated at the very onset of the Anthropocene in the eighteenth century, this early modern publication addressed the sustainable use of forests in very localized circumstances of silver mining and metallurgical smelting, which relied on firewood. Over the next couple of centuries, these practices were refined and applied as sustainable forestry management plans creating 'engineered forests'.⁵ They informed North American debates on conservation in the late nineteenth and early twentieth century and even found their way into regulatory practices in the oil and gas industry in Texas and Oklahoma in the first half of the twentieth century. Increasing pressure on eco and earth systems after 1945 due to accelerated economic growth, fossil fuel use and urbanization,⁶ led to a renewed discussion of sustainability in the late 1960s and 1970s, when various publications

415.6867 (2002), 23, <https://doi.org/10.1038/415023a>; Dipesh Chakrabarty, 'The climate of history: Four theses', *Critical Inquiry*, 35 (2009), 197–222, <https://doi.org/10.1086/596640>.

- 2 Jeremy L. Caradonna, *Sustainability: A History* (Oxford: Oxford University Press, 2014), p. 137.
- 3 Ulrich Grober, *Sustainability: A Cultural History*, trans. by Ray Cunningham (Totnes: Green Books, 2012), p. 18.
- 4 Hans Carl von Carlowitz, *Sylvicultura Oeconomica, oder Hauswirtschaftliche Nachricht und Naturgemäße Anweisung zur Wilden Baum-Zucht* (Leipzig: Braun, 1713).
- 5 Paul Warde, *The Invention of Sustainability: Nature and Destiny, C. 1500–1870* (Cambridge: Cambridge University Press, 2018), p. 314, <https://doi.org/10.1017/9781316584767>.
- 6 J. R. McNeill and Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge: The Belknap Press of Harvard University Press, 2014), <https://doi.org/10.4159/9780674970731>.

warned of the limits of global growth, overexploitation of resources and population increases.⁷ Following these decades, in which sustainability was used to address global ecological challenges and describe practices beyond forestry management, the 1980s saw the introduction of ‘sustainable development’, popularized through the 1987 Report of the World Commission on Environment and Development, better known as the Brundtland Report.⁸ Originally pioneered as a scientific concept to deal with a visible crisis (wood shortages in Europe in the seventeenth and eighteenth centuries), sustainability was now a term used to address the combined global challenges of environmental degradation, mainly resulting from exponential fossil fuel use, and poverty caused by lack of development in parts of the world. Sustainability bridges the early phase of the Anthropocene, in which fuels of the organic regime⁹—wood—were foundational to life,¹⁰ with the current phase of accelerated use of fuels of the mineral regime—petroleum—which is equally foundational to today’s societies, fittingly described by some observers as petrocultures.¹¹

The meanings of sustainability emerged at specific historical times shaped by different prevailing energy systems. As will be argued below, even though sustainability in the Anthropocene always included views that saw nature as resource and hence linked sustainable practices to

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- 7 Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962); Paul Ehrlich, *The Population Bomb* (New York: Ballantine Books, 1968); Garrett Hardin, ‘The tragedy of the commons’, *Science*, 162 (1968): 1243–1248, <https://doi.org/10.1126/science.162.3859.1243>; Dennis Meadows et al., *The Limits to Growth* (New York: Universe Books, 1972), <https://doi.org/10.1349/ddlp.1>; E. F. Schumacher, *Small Is Beautiful: A Study of Economics As If People Mattered* (London: Blond & Briggs, 1973).
 - 8 United Nations, *Our Common Future: Report of the World Commission on Environment and Development* (New York: United Nations, 1987), <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>.
 - 9 For the concept of organic and mineral energy regimes see E. A. Wrigley, *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press, 2010), <https://doi.org/10.1017/cbo9780511779619>.
 - 10 Ulrich Grober, ‘Eternal forest, sustainable use: The making of the term ‘Nachhaltig’ in seventeenth- and eighteenth-century german forestry’, in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 96–105, <https://doi.org/10.4324/9781315543017-7>.
 - 11 Petrocultures Research Group, *After Oil* (Edmonton: University of Alberta, Department of English and Film Studies, 2016); Sheena Wilson, Adam Carlson and Imre Szeman, eds., *Petrocultures: Oil, Politics, Culture* (Montreal: McGill-Queen’s University Press, 2017); Imre Szeman, *On Petrocultures: Globalization, Culture, and Energy* (Morgantown: West Virginia University Press, 2019).

profit-making (yield), there are qualitative differences in the very meaning of sustainability and the ways it related to eighteenth-century forestry practices, nineteenth- and twentieth-century conservation efforts and twentieth-century environmental activism and global development goals. Some of these meanings may have been building on each other, others developed in opposition to previous understandings of sustainability. There is no straightforward, linear evolution of the term and it may be misleading to relate past meanings teleologically to today's definitions as this may overshadow different meanings that were prominent at different times in history. In addition to the diverse historical time periods in which they were coined, the various incarnations of sustainability (sustained yield, conservation, environmentalism, sustainable development) differ in the scales of the related economic activities (forests, oil fields, the global environment and economy) and the increasing complexity of the energy systems in which these occurred. Wood and oil are not interchangeable energy resources; the latter is a subterranean fuel not limited by the land space demands of the former.¹² A comparison over time and throughout the Anthropocene shows that the concept needs to be understood within its specific historical context. In light of current discussions on the Anthropocene and the 'Great Acceleration'¹³ after 1945, sustainability needs to be historicized even further in order to understand its historically contingent meaning which is closely related to scale and type of energy system.¹⁴ It is equally imperative to acknowledge the chronology of these conceptualizations, since once certain meanings have become accepted and ubiquitous, it is very difficult to go back to earlier, contrasting definitions and consider them on their own terms. Sustainability is an idea, a discourse; it 'was invented, not discovered'.¹⁵ It tells us a lot more about how societies thought about the relationship between nature and humankind. At the same time, all these specific historical meanings of sustainability in the Anthropocene, which are situated within stories of industrialization and increasing exploitation of resources, share a connection to a political economy that is characterized by treating nature as resource

12 Vaclav Smil, *Energy Transitions: History, Requirements, Prospects* (Santa Barbara: Praeger, 2010).

13 McNeill and Engelke (2014).

14 For general histories of the term see Caradonna (2014); Grober (2012).

15 Warde (2018), p. 334, see also pp. 356–357.

and proposing monetary exploitation. Throughout the duration of the Anthropocene, sustainability is often linked to ideas of growth, progress and profit reinforcing a market-driven capitalist economy. And even those conceptualizations that call for more ecological and anti-consumerist attitudes and propose alternative political economies do so to contest the dominant embedding of sustainability into capitalist systems and to resist prevailing growth paradigms and economic understandings of natural resources.

Sustained Use/Yield

In an attempt to establish a clear lineage to earlier concepts of sustainability, scholars point to the seventeenth and eighteenth centuries and in particular to Hans Carl von Carlowitz, who is considered the father of the idea of sustainability.¹⁶ In his 1713 publication *Sylvicultura Oeconomica, oder Hauswirtschaftliche Nachricht und Naturgemäße Anweisung zur Wilden Baum-Zucht (Sylvicultura oeconomica or Economic Report and Instruction on the Cultivation of Wild Trees according to Nature)*, von Carlowitz, a mining administrator and cameralist in Freiberg, Electorate of Saxony, addressed the unsustainable use of forest resources. He warned the Saxon ruler of a severe economic crisis in the region if deforestation were to continue. Originally proposed to ensure the supply of timber for silver mining and smelting purposes, his concept of sustainability relied on the idea to limit cutting timber in forests to a rate that allowed for the equal regrowth of this renewable resource. His proposal to manage the use of forests in order to sustain the commercial viability of silver mines in Saxony is seen as an early version of sustainable development as spelled out by the 1987 Brundtland Commission. Already in the seventeenth century, thinkers like Jean-Baptiste Colbert in France, John Evelyn in England and Baruch Spinoza in the Netherlands philosophized about the relationship between nature and economic activity to address overexploitation of forests.¹⁷

16 Grober acknowledges the instrumental role of von Carlowitz but also dates the idea of sustainability back much earlier and calls it 'our primordial cultural heritage' (2012, p. 15).

17 Ibid.; Roman Sandgruber, 'Korreferat zu Matthias Asche', in *Wirtschaft und Umwelt vom Spätmittelalter bis zur Gegenwart Auf dem Weg zu Nachhaltigkeit?*, ed. by Günther Schulz and Reinhold Reith (Stuttgart: Franz Steiner, 2015), pp. 77–87.

Like von Carlowitz they developed new ways to manage resources creating what has later become known as sustained yield forestry. The early discussions of unsustainable practices were in response to fear of severe regional wood supply shortages due to mining activities in Europe. Trees were foundational to life in early modern Europe, in fact they were as significant as today's fossil fuels are for industrialized societies and any crises in the provision of wood impacted the economic well-being of entire societies.¹⁸ When von Carlowitz criticized the use of the 'insatiable lumber ax' (unersättliche Holtz-Axt) and warned of deforestation due to human behaviour, he was describing a local crisis that was visible to everyone.¹⁹ The lack of infrastructure to transport timber long ways and the high local demand for this organic renewable energy resource in (silver) mining areas led to overexploitation and a wood crisis seemed imminent. Even though this scarcity affected all of Europe, it only did so on a local or narrow regional scale. Also, awareness often remained local, "connected" thinking about the environment *avant le mot* only emerged later.²⁰ This is far removed from the global scale that its successor concept, sustainable development, claims to cover in the twentieth century.

Von Carlowitz criticized the way that human behaviour was devoted to making quick economic gains through exploiting wood for mining and producing silver. However, as Daniela Gottschlich and Beate Friedrich have convincingly argued, this does not readily translate into an economic understanding of the forest as material resource.²¹ While *Sylvicultura Oeconomica* emphasized the profit-making aspect of using the forest as an economic resource, von Carlowitz did not portray nature as an inanimate object that needed to be dominated but as exhibiting agency and beauty as 'mother earth'. Furthermore, his entire oeuvre shows a more complex and nuanced understanding of sustainable forest management practices which not only provided continuous yield but also qualitatively improved forests as animate spaces. Thus, the economization of sustainability did not come with von Carlowitz nor

18 Caradonna (2014); Grober (2017); Warde (2018).

19 Von Carlowitz (1713), p. 74.

20 Warde (2018), p. 325.

21 Daniela Gottschlich and Beate Friedrich, 'Das Erbe der Sylvicultura oeconomica: Eine kritische Reflexion des Nachhaltigkeitsbegriffs', *GAIJA*, 23.1 (2014), 23–29, <https://doi.org/10.14512/gaia.23.1.8>.

is there a clear link between von Carlowitz's use of the German word *nachhaltend* and twentieth-century discussions of sustainability.²² He did not use the term sustainability (or its German translation *Nachhaltigkeit*) in his publication. Etymology of the German term *Nachhaltigkeit* dates it back to von Carlowitz because he used the adjective 'nachhaltend' (later changed to 'nachhaltig') to talk about natural forest management practices in Freiberg, Saxony.

But as the earth's underground has through labor and expenses revealed its ores, we are confronted with a scarcity of wood and charcoal, that needs to be remedied, therefore the greatest technical skills, science, diligence and management of this country must address how such a conservation and cultivation of wood can be achieved so as to make possible a continual, steady and *sustainable use*, as this is an indispensable matter, without which the country cannot maintain its Being.²³

Based on this quotation, Ulrich Grober has made a compelling case for differentiating between von Carlowitz' suggestion of sustainable 'use' versus later conceptualizations of sustainable monetary 'yield.'²⁴

Industrialization overcame the spatial limitations of an energy system based on wood that needed land as it tapped instead into subterranean fuels such as coal and later oil and gas. This increased use of fossil fuels created unsustainability, but Enlightenment also facilitated its criticism and conceptualization of sustainability in the first place. However, as fossil fuels replaced wood as the fuel of economies, thinking of sustainability detached itself from the visible connection to land and soil and these early discussions of sustainability only survived within forestry over the next century.²⁵

Conservation/Sustainable Yield

In the North American context, the idea of sustainability survived beyond forestry through discussions of conservation. European conceptualizations of sustained yield were adapted to the American spatial and social experience. In the late nineteenth and early twentieth

²² *Ibid.*, pp. 25–27.

²³ Quoted in Grober (2017), p. 102.

²⁴ Grober (2012), p. 142.

²⁵ *Ibid.*, p. 140; Warde (2018), pp. 265–266.

centuries, conservation took on various meanings. There were those, chief among them naturalist John Muir, who wanted to preserve wilderness and the pristine state of nature, especially forests. To that effect, three national parks were already created in the United States before 1900, Yellowstone (1872), Yosemite and Sequoia (1890). Another four were established in Canada (Banff 1885, Glacier 1886, Yoho 1886, Waterton Lakes 1895). At the same time, a more utilitarian practice gained a foothold in North America, sustained yield forestry, which combined 'constant maximized yield from the forest and [...] rational forest management'.²⁶ Influenced by forestry methods in continental Europe, especially in France, Switzerland and Germany, this kind of forest management would allow exploitation of nature or monetize the pristine beauty of nature through, for example, tourism.²⁷ Gifford Pinchot, an American forestry administrator, who travelled to continental Europe in 1890 to study various approaches to forest management, advocated for 'wise use' or sustained yield in American public forestry upon his return. He had studied both the German and Swiss versions of sustained yield forestry and preferred the latter as it was less rigid. In contrast, German forestry methods would regulate every little detail.²⁸ While wise use echoed the German concept of sustainability (*Nachhaltigkeit*), Pinchot emphasized the generational component of the concept long before the 1987 Brundtland Report inserted such an intergenerational time aspect. According to Grober, he defined wise use as 'the use of natural resources for the greatest good of the greatest number for the longest time'.²⁹ Wise use became an integral part of the conservation movement in the United States, pitting it against Muir's preservationist philosophy. This created a 'utilitarian/spiritual divide in the wilderness/renewable resource literature'³⁰ and explains why the protection of wilderness was often considered preservation and not conservation. Conservationists saw forests as a renewable resource that should be utilized economically.

26 Grober (2012), p. 149.

27 Roderick Nash, *Wilderness and the American Mind*, 5th ed. (New Haven: Yale University Press, 2014).

28 Grober (2012), p. 140.

29 Quoted in *ibid.*, p. 150.

30 John Robinson, 'Squaring the circle? Some thoughts on the idea of sustainable development', *Ecological Economics*, 48 (2004), 368–384 (p. 371), <https://doi.org/10.1016/j.ecolecon.2003.10.017>.

A couple of decades later, conservation was redefined in various new ways. Both the economic and social crisis of the 1930s as well as oversupply of oil and gas in Texas and Oklahoma generated conservation discourses, that were very specific to the United States. According to Grober, during the New Deal era, President Franklin D. Roosevelt launched policies to address the nationwide crisis, which included ecological considerations. For example, the Civilian Conservation Corps was involved in reforestation programs. Furthermore, American interest in German sustainability led Roosevelt to send a forestry delegation overseas. One of the experts was Aldo Leopold, who had criticized the way that Americans had exploited soil 'as a food factory'.³¹ Like Pinchot before him, he was not impressed with the highly regulated German forestry management. Instead, he proposed a more integrated approach to understanding land use and thus became 'one of the very first thinkers and writers worldwide who combined the traditional terminology of sustained yield forestry with the vocabulary of scientific ecology'.³² His writings, especially with regards to what he called land ethics,³³ influenced environmental thinking in the 1970s.

In the case of the oil and gas industry, conservation was a regulatory response to the oversupply of oil. Already in the first two decades of the twentieth century, conservation laws were passed in Texas that addressed the problem of rule of capture.³⁴ Since 1919, the Texas Railroad Commission (TRC) regulated oil and gas production. Rule of capture was a law derived from English Common Law which established that anyone who could access subterranean deposits of oil and gas could drill for it as long as they did so on their own land. Thus, whenever oil was found, adjacent land was quickly purchased to tap into the same oil deposit. In order to capture as much oil as possible, drilling would commence quickly to prevent others from draining the oil reservoir by accessing it from their property. This led to plummeting commodity prices as the market was flooded with oil, but it also depleted the

31 Grober (2012), p. 151.

32 Ibid, p. 152.

33 Aldo Leopold, 'The land ethic', in *A Sand County Almanac* (New York: Oxford University Press, 1949), 201–226.

34 Howard R. Williams, 'Conservation of oil and gas', *Harvard Law Review*, 65.7 (1952), 1155–1183, <https://doi.org/10.2307/1337050>; C. A. Warner, 'Texas and the oil industry', *The Southwestern Historical Quarterly*, 50.1 (1946), 1–24.

reservoir more quickly because the over drilling diminished the underground pressure and left more oil uncaptured. Conservation in this context meant two things; first, ensuring that all recoverable oil could be drilled and secondly, that oil prices could be stabilized in order to ensure a profit. In Texas, the Texas Railroad Commission introduced prorationing to conserve and stabilize the industry. During the Texas oil boom of the early 1930s, conservation legislation was an important instrument to stabilize prices and the industry. In the long run, instituting an exploitation rate that guaranteed profitable yield was to ensure the survival of the industry.³⁵

This kind of conservation differed significantly from forestry as it was not aimed at allowing a renewable energy resource to regrow but sought to prolong the time a non-renewable energy resource could be exploited, in part to ensure the highest yield or profit possible. Another conservation approach was driven by national security consideration and included the creation of petroleum reserves for the navy to ensure that non-production of petroleum would guarantee access and availability of this strategic fuel in times of crises and during a war. Recognizing the strategic significance of petroleum, the idea of conserving by not producing was even scaled up beyond the nation and used to justify United States foreign oil policy in the 1940s and 1950s. When Secretary of the Interior Harold L. Ickes championed foreign oil production by American multinational oil companies, he argued that this was the best strategy to conserve domestic oil production and thus provide oil security.³⁶

Conservation in North America in the first half of the twentieth century and its underlying assumptions about sustainability exhibited a clear link to the economic exploitation of (energy) resources. With the exception of Muir's preservationist philosophy and Leopold's land ethic

35 Erich W. Zimmermann, *Conservation in the Production of Petroleum* (New Haven: Yale University Press, 1957); William R. Childs, 'The transformation of the railroad commission of Texas, 1917-1940: Business-government relations and the importance of personality', *The Business History Review*, 65.2 (1991), 285-344, <https://doi.org/10.2307/3117405>.

36 Richard H. K. Vietor, *Energy Policy in America since 1945: A Study of Business-Government Relations* (Cambridge: Cambridge University Press, 1984), pp. 29-31, <https://doi.org/10.1017/cbo9780511528057>. Stephen J. Randall, 'Harold Ickes and United States foreign petroleum policy planning, 1939-1945', *The Business History Review*, 57.3 (1983), 367-387, <https://doi.org/10.2307/3114049>.

approach, none of these discussions included ecological considerations. These were to become more prominent in the 1960s and 1970s.

Conservation/Environmentalism

The 1960s and 1970s saw the emergence of a new kind of environmental movement. Increasing pollution of air and water, hazardous waste as well as energy crises and nuclear energy risks redirected the conservationist focus away from the protection of wilderness and wildlife. Combined with the rise of civic engagement and activism in the 1960s, new environmental organizations were founded and old ones like the Sierra Club focused on these new threats to nature and human health while proposing a more holistic, ecological understanding of the interconnection between humans and nature. These connections were reinforced by new visual tropes. On Christmas Eve 1968, U.S. astronaut William Anders took a photograph of the Earth from Apollo 8, the first manned spaceflight mission to leave the Earth's orbit and circle the Moon. His famous shot, known as *Earthrise*, was the first color photograph of the Earth from space. Arguably, this extra-planetary view conveyed a sense of a closed but fragile planet. People began using Spaceship Earth as a popular metaphor to denote this new ecological thinking.³⁷ Rachel Carson's *Silent Spring* (1962), which drew attention to the detrimental effects of pesticides on the environment and human health, Paul Ehrlich's *Population Bomb* (1968) and Garrett Hardin's 'The Tragedy of the Commons' (1968) were all widely read testimonies of the environmental challenges of post-World War II modern and affluent life. Economic thinking of the time was questioning the sustainability of existing growth-fixated economic approaches. Apart from E. F. Schumacher's *Small is Beautiful* (1973) and Amory Lovins' *Soft Energy Paths* (1977) the most famous of these 'ecological economics'³⁸ publications was *Limits to Growth*, published in 1972 by the Club of Rome, a think tank founded in 1968 by an Italian industrialist. The authors

37 Erik W. Johnson and Pierce Greenberg, 'The US environmental movement of the 1960s and 1970s: Building frameworks of sustainability', in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 137–150, <https://doi.org/10.4324/9781315543017-10>.

38 Caradonna (2014), pp. 112–135.

were using computer modelling and systems theory to determine a 'state of global equilibrium'. The study was based on the understanding of a world system which should satisfy the basic needs of its population but also be 'sustainable without sudden and uncontrolled collapse'. It warned that projected growth rates in 'population, food production, industrialization, pollution, and consumption of non-renewable resources' were unsustainable.³⁹

Paul Warde reminds us that 'sustainability' is a fairly recent coinage, at least in the English language, going back to environmental discussions in the early 1970s. Rather than highlighting the idea of yield and profit it addressed the limits of human action and unsustainable ways of life: "'Sustainability'" is the idea that to endure, a society must not undermine the ecological underpinnings on which it is dependent. It must not degrade, to use a more archaic term, 'the Earth'". Warde further argues that '[t]he desire for a balanced economy and a sustained yield did not necessarily lead to a concern for the possible degradation of the Earth'. It was only through the life sciences and their discussions of life itself that these connections were made. Up until the nineteenth century, the realization that resources were wasted and 'society [was] undermining its environmental foundation' did not lead to the questioning of civilizational progress. Instead, rational and scientific solutions such as sustained yield forestry were propagated. However, these interpretations did not enter the mainstream at the time. Only when the concept of 'environment' was introduced, could all natural processes be seen together and connections been made.⁴⁰ Other scholars insist on differentiating between environmentalism and sustainability arguing that the two movements are intertwined but that sustainability would 'not have come into existence' without the 'new' environmental movement of the 1970s.⁴¹ In the United States, sustainability could equally reach back to early twentieth-century conservationism and to 1970s environmentalism. The latter focused on pollution applying an ecological systems approach. Of course, the ecologically refined concept of sustainability did not just emerge out of nowhere in the 1970s. It was

39 Dennis Meadows et al., *The Limits to Growth* (New York: Universe Books, 1972), pp. 2, 35, 158.

40 Warde (2018), pp. 5, 9–10, 328, 333–334.

41 Johnson and Greenberg (2017), p. 138.

based on previous ecological thinking by people like Aldo Leopold and decades of conceptualizing the environment as something that is all-encompassing and universal. However, it is easy to forget how new and radical some of the arguments and solutions were that were proposed during the 1970s.

Recycling was at the heart of some of the behavioural changes proposed by environmental groups. The famous 3Rs of 'reduce, reuse, recycle' was first introduced by Pollution Probe, a Toronto-based environmental NGO, which was founded by university students in 1969. As Ryan O'Connor has shown, it originally intended to ask people to '**reject**, re-use, recycle'. However, 'reject' was considered to be too extreme a term and quickly dropped. Pollution Probe was rather unique at the time as it worked with business and government in its early years and was thus worried about language that might have been too radical.⁴² It points to the existence of more wide-sweeping proposals to change existing growth paradigms. These proposals questioned whether supply-side solutions were enough to address the environmental challenges of overextending the Earth's resources. Not only were existing liberal market economies questioned but lifestyles were studied to find ways to change people's behaviours creating sustainable societies. It was suggested that people could change their behaviours and decrease their high-energy demands and waste production. This new focus on curbing demand for resources was highlighting conservation as one way of overcoming the insatiable thirst for energy and incontrovertible belief in growth. For example, in Canada the Science Council was instrumental in proposing a shift towards a 'conservator society'. Already in its 1973 report *Natural Resource Policy Issues in Canada*, this governmental advisory board cautioned 'Canadians as individuals, and their governments, institutions and industries should begin the transition from a consumer society preoccupied with resource exploitation to a conservator society engaged in more constructive endeavours'.⁴³ Combining respect for the biosphere with economy of design and concern for the future, the concept of the

42 Ryan O'Connor, *The First Green Wave: Pollution Probe and the Origins of Environmental Activism in Ontario* (Vancouver: UBC Press, 2015), p. 112.

43 Science Council of Canada, *Natural Resource Policy Issues in Canada* (Ottawa: Information Canada, 1973), p. 9.

consumer society foreshadowed some of the sustainable development discussion of the 1980s.

As the Canadian case shows, governments were involved in this new environmental thinking. Not only did they have to respond to environmental movements and their criticism of air and water pollution, but they also had to react to the energy crises of 1973/4 and surging energy consumption. Some of these governmental institutions even deliberated policies that included radical critiques of society's lifestyles. For example, a look at the 1974 Canadian Energy Task Force shows how expansive and far-reaching thinking proceeded when it came to tackling the monumental task of conserving energy, especially during times of a global oil price crisis. In response to the detrimental effects of the oil price shock of 1973 which was the combined result of OPEC (Organization of the Petroleum Exporting Countries) price hikes and an OAPEC (Organization of Arab Petroleum Exporting Countries) oil embargo in the wake of the October 1973 Yom Kippur War, the Canadian government established a Task Force on Energy Research and Development on January 15, 1974. Housed in the Office of Energy Research & Development in the Department of Energy, Mines and Resources (EMR), this interdepartmental task force which included scientists and environmentalists like Brian Kelly, who had left Pollution Probe in 1974 to join EMR's Office of Energy Conservation (OEC) had established six research tasks and assigned these to various lead agencies. These tasks, which were envisaged to help plan for a more sustainable energy future, included energy conservation, exploitation of domestic non-renewable energy resources, oil and gas substitution, development of nuclear capability, exploitation of renewables and improvement of energy transportation systems. It encapsulated an entirely new approach to energy policy. The first research task, which was led by the Office of Energy Conservation, was the only task subdivided into two sections. Task 1A was devoted to 'reducing consumption and/or increasing efficiency' while Task 1B was dedicated to 'improved data and management'.⁴⁴ One of the nine programs within task 1A was devoted to 'Life Styles'. The need for action was justified as follows:

44 Library and Archives Canada (LAC), RG 99-1 121, 150-3 T7 (2), Task Force on Energy Research and Development, Office of Energy R&D, Energy R&D Program, Revised October 1974. As Henry Trim has shown, Trudeau in general and EMR in

Contemporary lifestyles are characterized by high levels of energy consumption, environmental damage and social unrest. Modern advertising, education and information systems promote a society based on materialism and competition; few alternatives are offered for rational consumer decisions. Consumption is further reinforced by products of low quality and high obsolescence. Our very living patterns, based as they are on private ownership and material status, result largely in consumptive conformity. Even our emerging recreation patterns are dominated by motorized, energy-consuming activities rather than physical exercise, personal fulfillment or relaxation.⁴⁵

Here, private ownership as well as the production of unnecessary goods were explicitly named as two of the main reasons that Canadian society was consuming too much energy and producing too much waste. Such behaviour was not sustainable and needed to be changed. Canadians were 'locked into the dominant lifestyle' and education and government programs should help Canadians make 'informed consumption decisions'. Apart from educational efforts, OEC authors suggested changes to legislation to emphasize 'product durability, reparability [sic ...], re-use and recycling' and 'discourage planned obsolescence, unnecessary style changes [... and] overpackaging'.⁴⁶

As the OEC included former Pollution Probe activists, it is not surprising to see some of the arguments proposed by the grassroots movement to enter government documents. Years before the 1973 energy crisis necessitated the Canadian government to address the challenges of high energy use and wasteful behaviour, Pollution Probe insisted that demand-side approaches were needed. Already in 1970, they warned that the unquestioned belief in growth and rampant consumption imperiled Canada's society and economy and published a guide on how to live an environmentally friendly life.⁴⁷ Two years later, the group

particular championed rationalization approaches as well as computer modelling, planning and expert advisors to ensure objective policy decisions. Henry Trim, 'Brief periods of sunshine: A history of the Canadian government's attempt to build a solar heating industry, 1974–1983', *Scientia Canadensis*, 34.2 (2011), 29–49, <https://doi.org/10.7202/1014346ar>; Henry Trim, 'Experts at work: The Canadian state, North American environmentalism, and renewable energy in an era of limits, 1968–1983' (PhD diss., University of British Columbia, October 2014).

45 LAC, RG 99–1 121, 150–3 T7 (2), Task Force on Energy Research and Development, Office of Energy R&D, Energy R&D Program, Revised October 1974.

46 LAC, RG 99–1 121, 150–3 T7 (2), Consolidated Program or Sub-Program Statement, Task I: Reduce Consumption and/or Increase Efficiency, Program 9: Lifestyles.

47 Donald A. Chant, ed., *Pollution Probe* (Toronto: New Press, 1970).

released recommendations that called for more durable products and a ban on advertising that attempted 'to induce an artificial demand for a product'.⁴⁸

Despite these efforts, people were less enthusiastic about changing their consumption behavior. However, the environment had become an important political topic and even entered international politics. Already in 1972, the United Nations held a conference on the Human Environment in Stockholm which for the first time addressed international environmental issues. While many in the Western and industrialized world welcomed an international conference dedicated to the environment, many developing countries feared that this would hinder their quest for industrialization and economic growth. The thawing of the Cold War in the first half of the 1970s and the oil price crisis of 1973/74 redirected global discussions along a North-South axis. Debates on a New International Economic Order were particularly pushed by the developing world who were demanding fairer conditions for international trade of commodities and raw materials. To address these divergent interests, the Stockholm Declaration warned that environmental considerations should not lead to the denial of development and economic growth.⁴⁹ In this global context, environmentalism and conservationism had to be reconciled with questions of justice and growth in the Global South.

Sustainable Development

In 1987 the so-called Brundtland Report, named after the Chair of the World Commission on Environment and Development, Norwegian Prime Minister Gro Harlem Brundtland, was published by the United Nations.⁵⁰ It defined the concept of sustainable development linking questions of environmental protection to those of economic growth and intergenerational justice. The underlying assumption was that global ecological and social asymmetries were interlinked and hence needed to be addressed together. It thus added a socio-economic aspect to the until

48 Quoted in O'Connor (2015), pp. 107–108.

49 Iris Borowy, 'Sustainable development and the United Nations', in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 152–153, <https://doi.org/10.4324/9781315543017-11>.

50 United Nations (1987).

then conservation-oriented sustainability concept which was mainly based on the 1980 World Conservation Strategy.⁵¹ Subtitled 'Living Resource Conservation for Sustainable Development', this publication (which was co-authored by the United Nations Environmental Program, the World Wildlife Fund and the so-called International Union for the Conservation of Nature made up of interested national states, environmental agencies and NGOs) focused on ecological sustainability.

However, the way that the Brundtland Commission propagated the new concept was essentially helping to make sustainability more palpable. While it was radical in linking poverty with environmental degradation arguing that sustainability could not be achieved without addressing poverty, its recommendations were comfortably placed within existing growth paradigms. Development meant economic growth. The report accepted that 'a five- to tenfold increase in manufacturing output will be needed just to raise developing world consumption of manufactured goods to industrialized world levels'.⁵² By combining sustainability and development it took off the radical edges that had also been part of discussing sustainable practices in the preceding decade, the 1970s.⁵³ It has since been criticized as embodying existing power relationships and reinforcing global capitalism by updating its ecological aspirations.⁵⁴ Unfortunately, it has also retrospectively led to the reframing of earlier histories of sustainability that were much more critical of consumer societies and global capitalism. If sustainability is understood as a criticism of industrialization, then the introduction of sustainable development was instrumental in mooting this earlier meaning of the concept and ignored the more fundamental need for social change.

Already in the early 1990s, Donald Worster, eminent environmental historian, disapproved of the term sustainable development. For him, it was an empty 'popular slogan' that gave political elites the 'broad easy path [...] going in the wrong direction'. He criticized the underlying utilitarian and anthropogenic notion that humans know what the

51 Antonietta Di Giulio, *Die Idee der Nachhaltigkeit im Verständnis der Vereinten Nationen: Anspruch, Bedeutung und Schwierigkeiten* (Münster: Lit, 2004).

52 United Nations (1987), p. 31.

53 Robinson (2004), p. 370.

54 Helga Eblinghaus and Armin Stickler, *Nachhaltigkeit und Macht: Zur Kritik von Sustainable Development* (Frankfurt: Iko-Verlag für Interkulturelle Kommunikation, 1996).

limits to nature are and exploit nature up to that limit. Sustainable development was about ‘resources and economics’ and not about ‘ethics or aesthetics’. Worster made an important qualitative distinction between environmentalism of the 1960s and 1970s and sustainable development that emerged in the 1980s.⁵⁵ The way that sustainability (what he calls contemporary environmentalism) was addressed in those formative decades was much more radical and included the realization that there were limits to population growth, technological advancement and human ‘appetite and greed’.

Underlying that insight was a growing awareness that the progressive, secular, and materialist philosophy on which modern life rests, indeed on which Western civilization has rested for the past three hundred years, is deeply flawed and ultimately destructive to ourselves and the whole fabric of life on the planet. The only true, certain way to the environmental goal, therefore, was to challenge that philosophy at its foundation and find a new one based on material simplicity and spiritual richness—to find other ends to life than production and consumption.⁵⁶

While the Brundtland Report reversed and distorted conceptualizations of sustainability of the previous decade, its emphasis on development and growth makes it a document of its time. The 1980s were characterized by a conservative backlash and neo-conservative governments in the Western world. Unsurprisingly, the Brundtland Report did not question neoliberal market economics nor suggest a different political economy. It believed a compromise was possible between conservation and economic growth. It is also closely linked to larger questions of global economic and energy governance in the 1970s. The New International Economic Order which the Global South was proposing since 1974 was also a direct response to the 1973/74 energy crises because rising petroleum prices and the worldwide recession particularly affected developing countries that were not oil producers. The rise in energy prices hit those countries particularly hard as they were trying to catch up to growth rates in the Global North.

Gottschlich and Friedrich make a convincing case that in the German discourse von Carlowitz’s *Nachhaltigkeit* was linked to the 1987

55 Donald Worster, *The Wealth of Nature: Environmental History and the Ecological Imagination* (New York: Oxford University Press, 1994), pp. 142–155, <https://doi.org/10.1093/oso/9780195092646.001.0001>.

56 *Ibid.*, p. 143.

Brundtland Report when Germans were looking for an appropriate translation of the English term sustainable development. Rather than inventing a new term, Germans rediscovered *Nachhaltigkeit*, the well-known concept in forestry and agricultural management practices since the early eighteenth century. This means that the two meanings of sustainability in German are not congruent. Equally, the Brundtland Commission never considered these earlier forestry-related texts on sustainability.⁵⁷ In the meantime that linkage has become so pervasive that it has also entered English-language historical treatments of sustainability which often relate it back to von Carlowitz and other forestry sources from the eighteenth century. As discussed above, the German term *Nachhaltigkeit* was translated by American forestry officials including Pinchot into sustained yield theory of management. This is why, contrary to Gottschlich and Friedrich, one of the harshest critics of sustainable development, Worster, sees a straight line from early European ideas on forestry to the 1980s coinage of the term:

‘Sustained development’ is therefore not a new concept but has been around for at least two centuries; it is a product of the European Enlightenment, is at once progressive and conservative in its impulses, and reflects uncritically the modern faith in human intelligence’s ability to manage nature. All that is new in the Brundtland Report and the other recent documents is that they have extended the idea to the entire globe.⁵⁸

Conclusion

Sustainability as a philosophy has undergone various changes. As Warde has cautioned, it is not something to be discovered but to be invented. However, as the above discussion has shown it may have been invented many times over, at different times, in different localities and for different purposes. Sustainability is an idea that has also been imagined for political reasons. Sustainable development is a very good example of how (international) politics and the necessity to arrive at compromise has shaped the ways that we came to understand sustainability toward the end of the twentieth century. Sustainable development aimed to reconcile environmentalist impulses with international challenges of

⁵⁷ Gottschlich and Friedrich (2014), p. 24.

⁵⁸ Worster (1994), p. 146.

a world divided between the Global North and South. It is important to remember that sustainable development was introduced as a compromise between environmental concerns in the Global North and developmental concerns in the Global South.

As the various historical episodes demonstrate, sustainability means different things to different actors. Most of the times the word sustainability is not even used to denote what we may infer to be sustainability. As a source concept, which appears in historical sources of the times, it is not as present as we may expect. One should use caution when assuming a linear genealogy of the term. Oftentimes this says more about our views and priorities today and how we want to understand sustainability than how historically accurate those descriptions are. It also allows us to reimagine sustainability today.

Finally, the history of sustainability is closely embedded into the Anthropocene and specific energy systems. While sustained yield forestry, conservation and preservation mainly focused on energy carriers of the so-called organic regime, environmentalism of the 1970s was clearly influenced by and imagined through conceptualizations of fossil-based energy systems. While both discussions may use a similar language they differ noticeably in scale.

Bibliography

- Borowy, Iris, 'Sustainable development and the United Nations', in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 151–163, <https://doi.org/10.4324/9781315543017-11>
- Caradonna, Jeremy L., *Sustainability: A History* (Oxford: Oxford University Press, 2014).
- Carlowitz, Hans Carl von, *Sylvicultura Oeconomica, oder Haußwirtschaftliche Nachricht und Naturgemäße Anweisung zur Wilden Baum-Zucht* (Leipzig: Braun, 1713).
- Carson, Rachel, *Silent Spring* (Boston: Houghton Mifflin, 1962).
- Crutzen, Paul J., and Eugene F. Stoermer, 'The Anthropocene', *IGBP Global Change Newsletter*, 41 (2000), 17–18.
- Crutzen, Paul J., 'Geology of mankind', *Nature*, 415.6867 (2002), 23, <https://doi.org/10.1038/415023a>

- Chakrabarty, Dipesh, 'The climate of history: Four theses', *Critical Inquiry* 35 (2009), 197–222, <https://doi.org/10.1086/596640>
- Chant, Donald A., ed., *Pollution Probe* (Toronto: New Press, 1970).
- Childs, William R., 'The transformation of the Railroad Commission of Texas, 1917–1940: Business-Government relations and the importance of personality', *The Business History Review*, 65.2 (1991), 285–344, <https://doi.org/10.2307/3117405>
- Di Giulio, Antonietta, *Die Idee der Nachhaltigkeit im Verständnis der Vereinten Nationen: Anspruch, Bedeutung und Schwierigkeiten* (Münster: Lit Verlag, 2004).
- Eblinghaus, Helga, and Armin Stickler, *Nachhaltigkeit und Macht: Zur Kritik von Sustainable Development* (Frankfurt: Iko-Verlag für Interkulturelle Kommunikation, 1996).
- Ehrlich, Paul, *The Population Bomb* (New York: Ballantine Books, 1968).
- Grober, Ulrich, 'Eternal forest, sustainable use: The making of the term "Nachhaltig" in seventeenth- and eighteenth-century German forestry', in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 96–105, <https://doi.org/10.4324/9781315543017-7>
- Grober, Ulrich, *Sustainability: A Cultural History*, trans. by Ray Cunningham (Totnes: Green Books, 2012).
- Gottschlich, Daniela, and Beate Friedrich, 'Das Erbe der Sylvicultura oeconomica: eine kritische Reflexion des Nachhaltigkeitsbegriffs', *GAIA—Ecological Perspectives for Science and Society*, 23.1 (2014), 23–29, <https://doi.org/10.14512/gaia.23.1.8>
- Hardin, Garrett, 'The tragedy of the commons', *Science*, 162 (1968), 1243–1248, <https://doi.org/10.1126/science.162.3859.1243>
- Johnson, Erik W., and Pierce Greenberg, 'The US environmental movement of the 1960s and 1970s: Building frameworks of sustainability', in *Routledge Handbook of the History of Sustainability*, ed. by Jeremy L. Caradonna (London: Routledge, 2017), pp. 137–150, <https://doi.org/10.4324/9781315543017-10>
- Library and Archives Canada (LAC), RG 99–1 121, 150–3 T7 (2), Consolidated Program or Sub-Program Statement, Task I: Reduce Consumption and/or Increase Efficiency, Program 9: Lifestyles.
- Library and Archives Canada (LAC), RG 99–1 121, 150–3 T7 (2), Task Force on Energy Research and Development, Office of Energy R&D, Energy R&D Program, Revised October 1974.
- Leopold, Aldo, *A Sand County Almanac* (New York: Oxford University Press, 1949).

- Lovins, Amory B., *Soft Energy Paths: Toward a Durable Peace* (Cambridge: Ballinger Publishing Co., 1977).
- McNeill, J. R., and Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge: The Belknap Press of Harvard University Press, 2014), <https://doi.org/10.4159/9780674970731>
- Meadows, Dennis, et al., *The Limits to Growth* (New York: Universe Books, 1972), <https://doi.org/10.1349/ddlp.1>
- O'Connor, Ryan, *The First Green Wave: Pollution Probe and the Origins of Environmental Activism in Ontario* (Vancouver: UBC Press, 2015).
- Petrocultures Research Group, *After Oil* (Edmonton: University of Alberta, Department of English and Film Studies, 2016).
- Randall, Stephen J., 'Harold Ickes and United States foreign petroleum policy planning, 1939–1945', *The Business History Review*, 57.3 (1983), 367–387, <https://doi.org/10.2307/3114049>
- Robinson, John, 'Squaring the circle? Some thoughts on the idea of sustainable development', *Ecological Economics*, 48 (2004), 369–384, <https://doi.org/10.1016/j.ecolecon.2003.10.017>
- Sandgruber, Roman, 'Korreferat zu Matthias Asche', in *Wirtschaft und Umwelt vom Spätmittelalter bis zur Gegenwart Auf dem Weg zu Nachhaltigkeit?*, ed. by Günther Schulz and Reinhold Reith (Stuttgart: Franz Steiner, 2015), pp. 77–87.
- Schumacher, E. F., *Small Is Beautiful: A Study of Economics As If People Mattered* (London: Blond & Briggs, 1973).
- Science Council of Canada, *Natural Resource Policy Issues in Canada* (Ottawa: Information Canada, 1973).
- Smil, Vaclav, *Energy Transitions: History, Requirements, Prospects* (Santa Barbara, CA: Praeger, 2010).
- Szeman, Imre, *On Petrocultures: Globalization, Culture, and Energy* (Morgantown: West Virginia University Press, 2019).
- Trim, Henry, 'Brief periods of sunshine: A history of the Canadian Government's attempt to build a solar heating industry, 1974–1983', *Scientia Canadensis*, 34.2 (2011), 29–49, <https://doi.org/10.7202/1014346ar>
- Trim, Henry, 'Experts at work: The Canadian state, North American environmentalism, and renewable energy in an era of limits, 1968–1983' (PhD diss., University of British Columbia, October 2014).
- United Nations, *Our Common Future: Report of the World Commission on Environment and Development* (New York: United Nations, 1987), <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>

- Vietor, Richard H. K., *Energy Policy in America since 1945: A Study of Business-Government Relations* (Cambridge: Cambridge University Press, 1984), <https://doi.org/10.1017/cbo9780511528057>
- Warde, Paul, *The Invention of Sustainability: Nature and Destiny, C. 1500–1870* (Cambridge: Cambridge University Press, 2018), <https://doi.org/10.1017/9781316584767>
- Warner, C. A., 'Texas and the oil industry', *The Southwestern Historical Quarterly*, 50.1 (1946), 1–24.
- Williams, Howard R., 'Conservation of oil and gas', *Harvard Law Review*, 65.7 (1952), 1155–1183, <https://doi.org/10.2307/1337050>
- Wilson, Sheena, Adam Carlson and Imre Szeman, eds., *Petrocultures: Oil, Politics, Culture* (Montreal: McGill-Queen's University Press, 2017).
- Worster, Donald, *The Wealth of Nature: Environmental History and the Ecological Imagination* (New York: Oxford University Press, 1994), <https://doi.org/10.1093/oso/9780195092646.001.0001>
- Wrigley, E.A., *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press, 2010), <https://doi.org/10.1017/cbo9780511779619>
- Zimmermann, Erich W., *Conservation in the Production of Petroleum* (New Haven: Yale University Press, 1957).

