

Bioregionalism as a Theoretical Human Ecology and a Possible Reorientation

Layne Hartsell, Ph.D.
3E – Energy, Economy, Environment
Asia Institute, Berlin, Tokyo
Center for Science, Technology, and Society
Department of Philosophy
Chulalongkorn University, Bangkok
hartsell-mlh@proton.me

Abstract

The historical record and trajectory of civilization defined in the modern era, result from a specific set of ideas and practices culminating in urbanization or the large influx of resources to urban centers and the “intellectual lineage of the Urban Revolution.”¹ Whereas the Industrial Revolution increased and extended urbanization beyond the city-state to the city-region to the global megapolis network of the 21st century, there is a process by how civilization has occurred leading to the Anthropocene, particularly the interaction between humans through the Technosphere to the natural environment. The reactions and critiques of the core matter are varied, wherein the current paper, civilization is interpreted from the perspective of human ecology or urban centers (cities) requiring extraction beyond a land base, and now beyond Earth leading to catastrophic planetary biophysical and geophysical disruption. As a reorientation, I consider bioregionalism as a possible unifying eco-social structure, or theoretical ecology, based on historical and archeological precedent in large-scale societies that were not urbanized. For empirical value in favor of a practical decrease in

¹ Michael Smith, “V. Gordon Childe and the Urban Revolution: A Historical Perspective on a Revolution in Urban Studies,” *Town Planning Review* 80, no. 1 (January 1, 2009): 3–30, <https://doi.org/10.3828/tpr.80.1.2a>.

extraction, recent events, particularly the Great Recession of 2008 and the Covid-19 Pandemic of 2020 are mentioned to show how regenerative forces of nature are evident not just to scientists but to the general urban populations as systemic slow down and reduction occurred. Bioregionalism, as a matter of public policy and democratic movements, can be a way to move forward and reduce the risks of further crises from environmental breakdown. Finally, suggestions are offered concerning human ecology or bioregionalism as a way forward.

Keywords: Bioregionalism, urbanization, megapolis, global justice, bio-geopolitics

Introduction

Over the last half of the 20th century till today, or since the Second World War, a new epoch has been proposed known as the Anthropocene based on industrial civilization and including fallout from nuclear technology shown in stratigraphic data in the geological record.² During this time, there has been a *Great Acceleration* of a global technical and economic system that is now threatening the planetary geophysical and biological system on which all species depend for life.³ The central system of industrial political-economy, generally referred to as neoliberalism or market capitalism, combined

² Anthropocene Working Group, "Working Group on the 'Anthropocene,'" Stratigraphy, May 21, 2019, <http://quaternary.stratigraphy.org/working-groups/anthropocene/>; Paul J. Crutzen and Eugene F. Stoermer, "The 'Anthropocene' (2000)," in *Paul J. Crutzen and the Anthropocene: A New Epoch in Earth's History*, ed. Susanne Benner et al., The Anthropocene: Politik—Economics—Society—Science (Cham: Springer International Publishing, 2021), 19–21, https://doi.org/10.1007/978-3-030-82202-6_2; Will Steffen et al., "The Trajectory of the Anthropocene: The Great Acceleration," *The Anthropocene Review* 2, no. 1 (April 1, 2015): 81–98, <https://doi.org/10.1177/2053019614564785>; Colin N. Waters et al., "A Stratigraphical Basis for the Anthropocene?," *Geological Society, London, Special Publications* 395, no. 1 (November 2, 2014): 1–21, <https://doi.org/10.1144/SP395.18>; Colin N. Waters et al., "The Anthropocene Is Functionally and Stratigraphically Distinct from the Holocene," *Science* 351, no. 6269 (2016): aad2622.

³ Anthropocene Working Group, "Working Group on the 'Anthropocene'; Jaia Syvitski et al., "Extraordinary Human Energy Consumption and Resultant Geological Impacts Beginning around 1950 CE Initiated the Proposed Anthropocene Epoch," *Communications Earth & Environment* 1, no. 1 (October 16, 2020): 1–13, <https://doi.org/10.1038/s43247-020-00029-y>.

with powerful, large-scale technology into a civilizational technics,⁴ all dependent on the physical Earth and biological life in the biosphere, have created social, cultural, and civilizational breakdown. Further, climate disruption is an existential risk to many species.

Most of humanity today interacts with the Earth through an advanced technical system or *Technosphere*⁵, which is the sum total of technological modification through knowledge, hardware, the built-system, and other durable and non-durable things such as artifacts. Taken broadly, some abstract categories can be considered as inherent to the culture:

Physical structure: as *Anthropogenic mass or total material artifact*⁶ including materials from inside the Earth, emerging nanotechnology; people & ruminants (bodies), others; and

Function: as social, political-economic organization, human society and biological reproduction; taken together on the Earth amounting to human ecology and general ecology including also as with the process of mass production through an authoritarian technics, technological process, etc.

Form: “our civilization is characterized by progress. Progress is its form, it is not one of its properties...Typically it constructs...a more and more complicated structure,” as Wittgenstein observed.⁷ Progress is an overarching construct, undefined. The myth can be seen clearly where progress is clearly towards ecological destruction. Therefore, as he

⁴ Lewis Mumford, *Technics and Civilization*, Reprint edition (Chicago; London: University of Chicago Press, 1934).

⁵ Layne Hartsell, “Global Justice, Nanotechnology, and Convergence Through Open Reasoning - A Commentary on a New Technosocial Reality” (Dissertation, Arizona, USA, American University of Sovereign Nations, 2021).

⁶ Bruno Venditti, “Visualizing the Accumulation of Human-Made Mass on Earth,” *Visual Capitalist*, November 29, 2021, <https://www.visualcapitalist.com/visualizing-the-accumulation-of-human-made-mass-on-earth/>.

⁷ Ludwig Wittgenstein et al., *Culture and Value: A Selection from the Posthumous Remains* (Blackwell, 1998).

[Wittgenstein] noted the way in which his aphorism was true reflected very badly on the foundations of Western civilization.⁸

It is the holism and critique of these major aspects that is foundational for theoretical ecology and an integration between global justice and environmentalism. Taking important examples, if we consider the extraction of sand, iron, and petroleum, we can understand the material basis for the structures around us such as buildings, glass, plastics, and roads – cities.⁹ And, we can determine through mathematics, statistics, economics, and computer modeling the amount and impact involved in the extraction, transportation, processing, and building of structures.¹⁰ Added to this built system,¹¹ if we consider the Internet, we might call it the nervous system of the Technosphere innervating the built structure or the machines, industrial digital infrastructure such as cables, and the ultra high-tech additions over the last 50 years of the Digital Age. For example, telegeography tracks “530 active and planned submarine cables [1.3 million km]” such as the MAREA cable capable of 224 TBps.¹² For the digital system, the volume of data created has been more than 400

⁸ Rupert Read, “Wittgenstein and the Illusion of ‘Progress’: On Real Politics and Real Philosophy in a World of Technocracy,” *Royal Institute of Philosophy Supplements* 78 (July 2016): 265–84, <https://doi.org/10.1017/S1358246116000321>.

⁹ Derrick Jensen, Lierre Keith, and Max Wilbert, *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*, ebook, Politics of Living (Rhinebeck, New York: Monkfish Book Publishing Company, 2021); Vaclav Smil, *Making the Modern World: Materials and Dematerialization* (West Sussex, UK: John Wiley & Sons, 2013); Paul Voosen, “Meet Vaclav Smil, the Man Who Has Quietly Shaped How the World Thinks about Energy,” *Science.org*, March 21, 2018, <https://www.sciencemag.org/news/2018/03/meet-vaclav-smil-man-who-has-quietly-shaped-how-world-thinks-about-energy>.

¹⁰ “Historical Statistics for Mineral and Material Commodities in the United States | U.S. Geological Survey,” accessed November 5, 2022, <https://www.usgs.gov/centers/national-minerals-information-center/historical-statistics-mineral-and-material-commodities>; Statista, “Global Megatrends,” Statista, September 26, 2022, <https://www.statista.com/topics/3512/global-megatrends/>; D Wuebbles, “Atmospheric Methane and Global Change,” *Earth-Science Reviews* 57, no. 3–4 (May 2002): 177–210, [https://doi.org/10.1016/S0012-8252\(01\)00062-9](https://doi.org/10.1016/S0012-8252(01)00062-9).

¹¹ David Harvey, *Paris, Capital of Modernity* (New York, NY: Routledge, 2005).

¹² “Submarine Cable Map,” accessed November 18, 2022, <https://www.submarinemap.com/>; TeleGeography, “Submarine Cable FAQs,” accessed November 18, 2022, <https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions>.

zettabytes since 2010, whereas we spend more time facing screens the ecological project fades into various levels of abstraction behind the veil of digital space, the Media, and built systems.

The culmination of the Industrial Age and industrial society is spoken of as a new emergence of industrial civilization in the Third Industrial Revolution¹³ and even a Fourth¹⁴ with a market society of quantified human interaction and convergence of technologies such as biotechnology, information systems, nanotechnology, artificial intelligence, and robotics.¹⁵ These societal-level technical innovations with planetary effects are based on the extraordinary power and proliferation of modern technology and engineering within a specific kind of technics from the Industrial Revolution to Paris to the information superhighway of today. We experience discovery, invention, and innovation directed into a mode of application of a civilizational technics and culture.¹⁶ The technics of global civilization is a phenomenon that has affected most all categories of species, and been noted by virtually all sectors and areas of human society creating the global physical, multiplex of technological infrastructure or the aforementioned major dimensions of the planetary experience and functions of the Anthropocene.

A central aspect of the scientific basis of determining the Anthropocene is measured by radiation that is present in sedimentation from the proliferation of nuclear technologies¹⁷ and the

¹³ Jeremy Rifkin, "The Third Industrial Revolution: A Radical New Sharing Economy," February 13, 2018, <https://www.youtube.com/watch?v=QX3M8Ka9vUA>.

¹⁴ Klaus Schwab, *The Fourth Industrial Revolution* (Cologny/Geneva: World Economic Forum, 2016).

¹⁵ Mihail C. Roco et al., "Convergence of Knowledge, Technology, and Society: Beyond Convergence of Nano-Bio-Info-Cognitive Technologies," Science Policy Reports (Lancaster, England: WTEC, Inc., July 2013), <https://doi.org/10.1007/978-3-319-02204-8>; Joachim Schummer, "From Nano-Convergence to NBIC-Convergence: 'The Best Way to Predict the Future Is to Create It,'" in *Governing Future Technologies: Nanotechnology and the Rise of an Assessment Regime*, ed. Mario Kaiser et al., Sociology of the Sciences Yearbook (Dordrecht: Springer Netherlands, 2009), 57–71, https://doi.org/10.1007/978-90-481-2834-1_4.

¹⁶ Mumford, *Technics and Civilization*; Lewis Mumford, "Authoritarian and Democratic Technics," *Technology and Culture* 5, no. 1 (1964): 1–8, <https://doi.org/10.2307/3101118>.

¹⁷ Stanley C. Finney and Lucy E. Edwards, "The 'Anthropocene' Epoch: Scientific Decision or Political Statement?," *GSA Today* 26, no. 3 (April 2016): 4–10, <https://doi.org/10.1130/GSATG270A.1>; Steffen et al., "The Trajectory of the Anthropocene"; Will Steffen et al., "Trajectories of the Earth System in the Anthropocene," ed. William C. Clark, *Proceedings of the National Academy of Sciences*

political and planetary determination of human-created systems leading to climate change is what the United Nations declares as, “the defining issue of our time”, and further that we are at a “defining moment.”¹⁸ The idea of a planet on which all species can live has been fading, and it is this situation that led climate scientist Will Steffen to ask in a major speech, “Where on Earth are we going?”¹⁹ The most up-to-date assessment is the current UNEP Emissions Gap Report 2022 which states the “scenario is currently not credible” of a 1.5°C maximum rise in temperature [or even 1.8°C] and “we need system-wide transformation. This report tells us how to go about such a transformation. It looks in-depth at the changes needed in electricity supply, industry, transport, buildings, and food systems.”²⁰ To answer Steffen’s pragmatic, rhetorical question, and the imperative of the UN Environment Program for the “system-wide transformation”, perhaps attention to a reorientation to bioregionalism that would produce ecocities can provide some ideas and practices that might suffice to begin a larger discussion on what to do. It is important to correctly identify the major contributing factors, particularly the essential role of urbanization in civilization and the various large processes such as the emissions from fossil fuels, agriculture/farming, livestock, deforestation, application of chemicals in nature, and artifacts.

It is also imperative that we consider population where in the last 70 years another massive event of the Anthropocene has occurred – a planetary migration resulting in most of the world’s population living in city regions²¹ and with 68% of the population expected to be urban by 2050.²² Some examples give the magnitude. The first is Latin

115, no. 33 (August 14, 2018): 8252–59, <https://doi.org/10.1073/pnas.1810141115>; Waters et al., “A Stratigraphical Basis for the Anthropocene?”; Colin N. Waters et al., “Can Nuclear Weapons Fallout Mark the Beginning of the Anthropocene Epoch?,” *Bulletin of the Atomic Scientists* 71, no. 3 (January 1, 2015): 46–57, <https://doi.org/10.1177/0096340215581357>.

¹⁸ UN, “Global Issues: Climate Change” (United Nations, 2021), <https://www.un.org/en/global-issues/climate-change>.

¹⁹ *Big History Anthropocene Conference – Keynote Address*, 2016, <https://www.youtube.com/watch?v=4ojuLN1ftXo>.

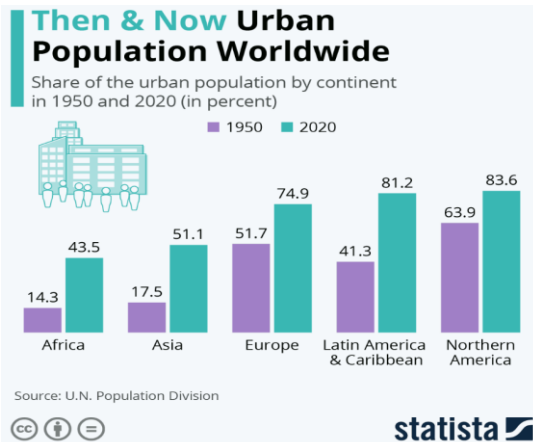
²⁰ “Emissions Gap Report 2022” (United Nations, October 21, 2022), <http://www.unep.org/resources/emissions-gap-report-2022>.

²¹ Metropolitan state economic areas plus a hinterland, which become wastelands under catastrophic extraction.

²² UN DESA, “68% of the World Population Projected to Live in Urban Areas by 2050,” Department of Economic and Social Affairs, May 16, 2018, <https://www.un.org/development/desa/en/news/population/2018-revision-of->

America where, “The biggest change has been in Latin America and the Caribbean, with 81.2% of the population living in urban areas, up from 41.3% in 1950”²³ A second example is hyper-urbanization or megapolis in Nigeria where “nowhere is this breakneck-pace development [urbanization] happening faster than this 600-mile stretch between Abidjan and Lagos.”²⁴

Figure 1: Population (1950 to 2020),²⁵



Urbanization is important because “We can take stock of the “thermodynamics of the city” not in the sense of its physical states – interesting though that would be – but in terms of its daily functioning and its building-up over time.”²⁶

The process of industrialized urbanization has created an anthropogenic mass of 1154 Gt between 1900 and 2020 or 34 Gt more

world-urbanization-prospects.html; Katharina Buchholz and Statista, “How Has the World’s Urban Population Changed from 1950 to 2020?” World Economic Forum, November 4, 2020, <https://www.weforum.org/agenda/2020/11/global-continent-urban-population-urbanisation-percent/>.

²³ Buchholz and Statista, “UN.”

²⁴ Howard W. French, “Megapolis: How Coastal West Africa Will Shape the Coming Century,” *The Guardian*, October 27, 2022, sec. World news, <https://www.theguardian.com/world/2022/oct/27/megalopolis-how-coastal-west-africa-will-shape-the-coming-century>.

²⁵ Statista, “Urbanization Growth” (UN Population Division, 2020).

²⁶ Alan Wilson, “The ‘Thermodynamics’ of the City,” in *Complexity and Spatial Networks: In Search of Simplicity*, ed. Aura Reggiani and Peter Nijkamp, Advances in Spatial Science (Berlin, Heidelberg: Springer, 2009), 11–31. https://doi.org/10.1007/978-3-642-01554-0_2.

than the biomass on Earth where humans are ~0.01% of biomass.²⁷ One example is the period between 2011 and 2013, China used 140% of the cement the United States required in the entire 20th century, and half of China's infrastructure was built between 2000 to 2015.²⁸ For human energy "...expenditure in the Anthropocene, ~22 zettajoules (ZJ), exceeds that across the prior 11,700 years of the Holocene (~14.6 ZJ)" and "in total, 60% of all human-produced energy [that we can measure] has been consumed since 1950 CE,"²⁹ Further, "Human-mediated mineral species and synthetic mineral-like compounds now exceed 180,000 in number, with most species created since 1950 CE...Earth's geological processes over the last 4.5 [billion years] have only supported the formation of 5,300 naturally occurring mineral species, including those mediated by biological processes."³⁰ Finally, economic and population figures demonstrate "investment emissions" where "analysis of the investments of 125 of the world's richest billionaires shows that on average they are emitting 3 million tons a year, more than a million times the average for someone in the bottom 90% of humanity."³¹ Such data can be seen in the physical reality of civilization in the Pearl River Delta which had an aggregate of 42 million residents by 2010, "If considered as a single urban area...since the cities there all run together -- the Pearl River Delta would be the world's largest city by both area and population" yielding a megapolis or hyper-urbanized region.³² Today, there is a hemispheric plan underway to extend a New Silk Road through the Belt and Road Initiative across Asia, Eurasia, South Asia, ASEAN, and into MENA; and

²⁷ Venditti, "Visualizing the Accumulation of Human-Made Mass on Earth."

²⁸ Ana Swanson, "How China Used More Cement in 3 Years than the U.S. Did in the Entire 20th Century," *Washington Post*, March 24, 2015, sec. Wonkblog, <https://www.washingtonpost.com/news/wonk/wp/2015/03/24/how-china-used-more-cement-in-3-years-than-the-u-s-did-in-the-entire-20th-century/>; Colin N. Waters and Jan A. Zalasiewicz, "Concrete: The Most Abundant Novel Rock Type of the Anthropocene," in *Encyclopedia of the Anthropocene*, vol. 1 (Oxford: Elsevier, 2018), 75–85.

²⁹ Syvitski et al., "Extraordinary Human Energy Consumption and Resultant Geological Impacts Beginning around 1950 CE Initiated the Proposed Anthropocene Epoch."

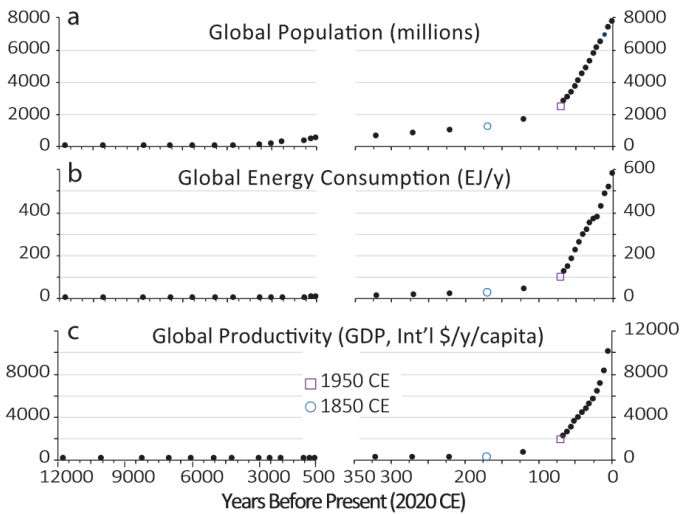
³⁰ Syvitski et al.

³¹ Nafkote Dabi et al., "Carbon Billionaires: The Investment Emissions of the World's Richest People" (Oxfam International, November 7, 2022), <https://doi.org/10.21201/2022.9684>.

³² Swanson, "How China Used More Cement in 3 Years than the U.S. Did in the Entire 20th Century."

reaching up into Europe. The U.S. and Europe have also initiated similar forms of projects though small compared to the scale of the New Silk Roads.

Figure 2: Global population, energy consumption, and production: “Correlation of global human population, energy consumption, and productivity during the Holocene and Anthropocene epochs.”³³



a) global human population (millions); b) global energy consumption (EJ/y); and c) global productivity (\$/y/capita), across the Holocene

The particular form of culture known as civilization has an imperative of expansion, extraction, progress, innovation and all directed at how nature can be exploited for civilization and measured as GDP. Such a culture combined with powerful industrial technology, an authoritarian technics,³⁴ has led to the Anthropocene. Growth, GDP, and other economic metrics are attempts at the precise measurements of civilization as an ongoing process.³⁵ In developed countries, while many know about climate change, cognitive structure and emotional abilities about understanding human ecology are in even greater decline as the climate crisis magnifies in severity showing a decline in

³³ Syvitski et al., “Extraordinary Human Energy Consumption and Resultant Geological Impacts Beginning around 1950 CE Initiated the Proposed Anthropocene Epoch.”

³⁴ Mumford, “Authoritarian and Democratic Technics.”

³⁵ Discussion with ecophilosopher and poet Derrick Jensen.

real culture.³⁶ The lack of exposure to nature, ecological education, and public deliberation, combined with how the media, both social and mainstream, operates thereby to increase ignorance through disinformation, lack of skepticism, concision, lies, and/or clear inaccuracies all has created a dystopia and epistemic crisis.^{37,38}

Civilization in History

More than 2000 years ago, Mencius (372–289 BC) wrote in Book [1A3] “...if axes are allowed in the mountains and forests only in the appropriate seasons, there will be more timber than can be used...” (Mencius, 2011, 3). He went on to lament the destruction of the beauty of Ox [Niu] mountain and the loss of biodiversity such as turtles from which sustenance had been maintained. Mencius was specific, “Given the air of the day and the night, and the moisture of the rain and the dew, they did not fail to put forth new buds and shoots, but then cattle and sheep came along to graze upon them. This accounts for the barren appearance of the mountain. Seeing this barrenness, people suppose that the mountain was never wooded. But how could this be the nature of the mountain?” (Mencius, 2011, 126) The same process is seen in the poetry of the foundation of Western Civilization in the Epic of Gilgamesh (2100 BC), “[Gilgamesh] went down to trample the forest. [after killing the forest guardian] He discovered the secret abode of the gods, Gilgamesh felling the trees, Enkidu choosing the

³⁶ Michael D. Jones and Geoboo Song, “Making Sense of Climate Change: How Story Frames Shape Cognition,” *Political Psychology* 35, no. 4 (2014): 447–76, <https://doi.org/10.1111/pops.12057>; Todd P. Newman, Erik C. Nisbet, and Matthew C. Nisbet, “Climate Change, Cultural Cognition, and Media Effects: Worldviews Drive News Selectivity, Biased Processing, and Polarized Attitudes,” *Public Understanding of Science* 27, no. 8 (November 1, 2018): 985–1002, <https://doi.org/10.1177/0963662518801170>; Johannes Persson, Nils-Eric Sahlin, and Annika Wallin, “Climate Change, Values, and the Cultural Cognition Thesis,” *Environmental Science & Policy* 52 (October 1, 2015): 1–5, <https://doi.org/10.1016/j.envsci.2015.05.001>; Nathan Anderson Quarderer et al., “Unpacking the Connections between 8th Graders’ Climate Literacy and Epistemic Cognition,” *Journal of Research in Science Teaching* 58, no. 10 (2021): 1527–56, <https://doi.org/10.1002/tea.21717>.

³⁷ John Mecklin and Science and Security Board Bulletin of the Atomic Scientists, “At Doom’s Doorstep: It Is 100 Seconds to Midnight” (Bulletin of Atomic Scientists, January 20, 2022), <https://thebulletin.org/doomsday-clock/current-time/>.

³⁸ Hannah Arendt, *The Origins of Totalitarianism*, New edition (New York: Harcourt, Brace, Jovanovich, 1973).

timber..."³⁹. In another section [Gilgamesh] "Lay low the Forest of [Cedar]."⁴⁰ Later, writing in approximately 200AD, Tertullian (155/160AD – 220AD), said "Surely it is obvious enough, if one looks at the whole world, that it is becoming daily better cultivated and more fully peopled than anciently. All places are now accessible, all are well known, all open to commerce...cultivated fields have subdued forests...there are now large cities...our numbers are burdensome to the world, which can hardly supply us from its natural elements; our wants grow more and more keen, and our complaints more bitter in all mouths, while Nature fails in affording us her usual sustenance."⁴¹ The previous paragraph could be a paraphrase of public statements today by journalists and philosophers and based on scientists at the core of oceanographic and atmospheric science.

The past is still with us when upon further consideration, Derrick Jensen, et al. write "Victims of Rome's industrial pollution [specifically, mining] may have numbered in the millions across Europe and the Middle East [of today]. The health impacts, then as now, are ghastly: convulsions, vomiting, diarrhea, anemia, stunted fetal growth, mental retardation, and cancer."^{42,43} What was known as *damnatio ad metalla* has continued for thousands of years to unsuspecting victims of the Roman Empire. The same will continue for centuries with toxic chemicals; and for tens of thousands of years due to the radioactive metal plutonium, *ceteris paribus*.⁴⁴

The Roman Empire had a significant and sustained impact on the landscapes of northern Europe from the time of conquest to the end of the imperial period. A repeated process of deforestation and land clearance for agricultural exploitation led to a rapid onset of environmental change evident in several different archaeological,

³⁹ Anonymous, *The Epic of Gilgamesh* (London, UK: Penguin UK, 2016). 107, Ish 39'.

⁴⁰ *Ibid.* 108, IM 20.

⁴¹ Tertullian, *Delphi Complete Works of Tertullian (Illustrated)*, trans. Peter Holmes (Delphi Classics, 2018). 1337-1338.

⁴² This is likely a reference to David Keys David Keys, "How Rome Polluted the World," *Geographical (Companion Interactive Publishing)*, December 2003. How Rome Polluted the World.

⁴³ Jensen, Keith, and Wilbert, *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*.

⁴⁴ Jeremy Bernstein, *Plutonium: A History of the World's Most Dangerous Element* (Cornell University Press, 2009).

historical, and geomorphological datasets.⁴⁵ Tyler Franconi describes, “At its peak in the second century CE, the Roman Empire spanned roughly 5,000,000 square kilometers of land that included some seven climatic zones and innumerable local landscapes. Across these diverse ecological zones...is important to recognize another side of this expansion [besides the human] that has gone unmentioned—Roman environmental imperialism—as the Roman State had substantial influence on its landscapes following regional incorporation.^{46,47} Tertullian did not know about advanced technologies and megapolises, but at the time he had a more or less accurate idea of what was occurring.

Modernity

In the 1640s, Miantinomo, chief of the Narragansett (Turtle Island; today, North America) said: “...we shall soon all be destroyed. You know our fathers had plenty of deer and skins, and our plains were full of deer and of turkeys, and our coves and rivers were full of fish... [the civilized] have seized upon our country, they cut down the grass with scythes, and the trees with axes. Their cows and horses eat up the grass, and their hogs spoil our beds of clams.”⁴⁸ Approximately 100 years later, the Industrial Revolution with coal and the steam engine came into existence and within the 19th century scientists

⁴⁵ Paul Erdkamp, Joseph G. Manning, and Koenraad Verboven, *Climate Change and Ancient Societies in Europe and the Near East: Diversity in Collapse and Resilience* (Springer Nature, 2021); Tyler V. Franconi, “The Environmental Imperialism of the Roman Empire in Northwestern Europe,” in *Climate Change and Ancient Societies in Europe and the Near East: Diversity in Collapse and Resilience*, ed. Paul Erdkamp, Joseph G. Manning, and Koenraad Verboven, Palgrave Studies in Ancient Economies (Cham: Springer International Publishing, 2021), 321–45, https://doi.org/10.1007/978-3-030-81103-7_11.

⁴⁶ Tyler V. Franconi, “The Environmental Imperialism of the Roman Empire in Northwestern Europe,” in *Climate Change and Ancient Societies in Europe and the Near East: Diversity in Collapse and Resilience*, ed. Paul Erdkamp, Joseph G. Manning, and Koenraad Verboven, Palgrave Studies in Ancient Economies (Cham: Springer International Publishing, 2021), 321–45, https://doi.org/10.1007/978-3-030-81103-7_11; Kyle Harper, *The Fate of Rome* (Princeton, NJ: Princeton University Press, 2017);

⁴⁷ Kevin Walsh, *The Archaeology of Mediterranean Landscapes: Human-Environment Interaction from the Neolithic to the Roman Period* (Cambridge University Press, UK: Cambridge University Press, 2014).

⁴⁸ Robert Blaisdell, *Great Speeches by Native Americans* (Mineola, New York: Dover Publications, 2000). p.26-27.

began to hypothesize, such as Swedish chemist, Svante Arrhenius' (1859-1927), that industrial civilization might be having serious effects on the atmosphere. In the early 20th century, the situation was reported publicly in *Popular Mechanics*.⁴⁹ By the 1950s, it was known almost certainly that the burning of fossil fuels were contributing to atmospheric effects.⁵⁰ In the short time from 1750s Britain to the 1950s globally,⁵¹ industrial civilization had produced enough emissions for geophysical detection raising the concern of scientists; however, this knowledge was not used to alert humanity but to achieve an early entry into the market for new resources that were expected to eventually be exposed by ice melt. Therefore, concerning the market economy, unfortunately, it is not a matter of changing a technical apparatus or increasing innovation when the mindset about the Earth is one of absolute extraction, such as Harry Merlo, former CEO of the Louisiana-Pacific timber corporation echoing Gilgamesh, "There shouldn't be anything left on the ground. We need everything that's out there. We don't log on to a ten-inch top or an eight-inch top or even a six-inch top. *We log to infinity*. Because it's out there and we need it all, now."⁵² The ideas and orientation against nature from the "intellectual lineage of the Urban Revolution"⁵³ are all through history, however, since the mid-20th century, the Technosphere has become exponentially powerful compared to the destruction of nature even a century ago.

Defining Civilization

⁴⁹ Hearst Molena, "The Remarkable Weather of 1911," *Popular Mechanics*, March 1912. p. 339-343.

⁵⁰ Jordan Blum, "The March from Humble Oil to Exxon Dates Back More than a Century," *Chron*, May 25, 2016, <https://www.chron.com/local/history/economy-business/article/The-march-from-Humble-Oil-to-Exxon-dates-back-7943392.php>; H. R. Brannon et al., "Radiocarbon Evidence on the Dilution of Atmospheric and Oceanic Carbon by Carbon from Fossil Fuels," *Eos, Transactions American Geophysical Union* 38, no. 5 (1957): 643-50, <https://doi.org/10.1029/TR038i005p00643>; "Humble Oil Predicts the Future in 1962 Ad," *HuffPost*, June 10, 2010, https://www.huffpost.com/entry/humble-oil-predicts-the-f_b_607434.

⁵¹ Brannon et al., "Radiocarbon Evidence on the Dilution of Atmospheric and Oceanic Carbon by Carbon from Fossil Fuels."

⁵² Derrick Jensen, *Endgame, Vol 1: The Problem of Civilization* (New York, NY, USA: Seven Stories Press, 2006). 331.

⁵³ Smith, "V. Gordon Childe and the Urban Revolution."

The foundation of civilization or logic, characteristics, and tendencies all coalesce with a core substance of large-scale, human settlements as urban centers, and then other characteristics of agriculture or farming; writing and codification of laws (beyond accounting and recordkeeping); monumental architecture; and advances in science and technology (authoritarian technics). Urbanization is the *process towards a city*, Childe's "a single built up area" with "agglomerations of population"⁵⁴ where resource extraction increases to meet the demands of human settlements, and where "socio-spatial constructs and their relationship to empirical evidence of change in the physical and functional aspects of urban form"⁵⁵ occur that not only go beyond the carrying capacity⁵⁶ but beyond the landbase itself concerning soil, minerals, rocks, rivers and so on.⁵⁷ Such a process is one of *catastrophic extraction* and the highly refined version is imperialism. Therefore, civilization is a spatio-cultural system based on catastrophic extraction in which the removal of organic and physical dimensions of a landbase identify as expansion through the destruction of nature and dehumanization and early death, e.g., in mining, quarrying, and agriculture. At some point between early semi-settled human societies such as Uruk, or nested villages or megasites (non-urban hive),⁵⁸ and the city-state (late Uruk, Babylon, Egypt), through a combination of internal *tyrannical rupture* and invasion from external forces, urbanization first came about. Urbanization might be more precisely located when a tyrannical

⁵⁴ V. Gordon Childe, "The Urban Revolution," *The Town Planning Review* 21, no. 1 (1950): 3–17. pg. 4.

⁵⁵ Michael Neuman and Angela Hull, "The Futures of the City Region," *Regional Studies* 43, no. 6 (July 1, 2009): 777–87, <https://doi.org/10.1080/00343400903037511>. Lewis Mumford, *The City in History: Its Origins, Its Transformations, and Its Prospects* (Harcourt, Brace & World, 1961).

⁵⁶ M. A. Hixon, "Carrying Capacity," in *Encyclopedia of Ecology*, ed. Sven Erik Jørgensen and Brian D. Fath (Oxford: Academic Press, 2008), 528–30, <https://doi.org/10.1016/B978-008045405-4.00468-7>.

⁵⁷ Andrea L. Brock, "Urbanizing the Eternal City: How Did the Ancient Romans Transform and Adapt to Rome's Riverine Landscape?," *World Development Perspectives* 26 (June 1, 2022): 100426, <https://doi.org/10.1016/j.wdp.2022.100426>; David Harvey, "Cities or Urbanization?," *City* 1, no. 1–2 (January 1, 1996): 38–61, <https://doi.org/10.1080/13604819608900022>; Jensen, *Endgame, Volume 1*; Encyclopedia Britannica, ed., "Urbanization," in *Britannica* (London, UK: Encyclopedia Britannica, 2022), <https://www.britannica.com/topic/urbanization>.

⁵⁸ Examples are camps, hamlets, villages, culture-centers, megasites: Gobekli Tepe, Nebelivka etc.

rupture occurred at a Sumerian megasite and then claimed its hinterlands by incorporating areas of the Zagros mountains for lapis lazuli and minerals creating the city-state (regional incorporation).^{59,60} As mentioned, this process was later identified as civilization in the modern age looking back on “development”, and moving forwards into modernity where city-states turned into city-regions that have now become a global system of metropolis and megapolis: Babylon to Memphis to Athens to Rome to Venice to Paris to New York to the Pearl River Delta and Lagos/Abidjan. Civilization is the cultural pattern of the dominance of humans over nature⁶¹ or “empire of man,” or *imperium in naturam*,⁶² and commonly referred to as a war against nature.⁶³ Such *tyrannical ruptures*⁶⁴ identified by mass violence through a tyrant-ruler who takes on self-appointed divinity are a form of pressure in any society, regardless of size. Democratic process attenuates the aberration of disruption, such as in the more

⁵⁹ David Wengrow, *What Makes Civilization? The Ancient Near East and the Future of the West* (Oxford, UK: Oxford University Press, 2010). p.35-37.

⁶⁰ Robert McCormick Adams, *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates* (University of Chicago Press, 1981). Childe, “The Urban Revolution.”

⁶¹ Jensen, *Endgame, Volume 1*; Derrick Jensen and George Draffan, *Strangely Like War: The Global Assault on Forests* (Natraj Publishers, 2005); Mauro Scalercio, “Dominating Nature and Colonialism. Francis Bacon’s View of Europe and the New World,” *History of European Ideas* 44, no. 8 (November 17, 2018): 1076–91, <https://doi.org/10.1080/01916599.2018.1512282>.

⁶² Francis Bacon, *Novum Organum* (CreateSpace Independent Publishing Platform, 2017); Francis Bacon, *Francis Bacon: The New Organon* (Cambridge University Press, 2000). Francis Bacon, *The New Atlantis* (Lindhardt og Ringhof, 2022). See commentary on Bacon’s work: Carolyn Merchant, *The Death of Nature* (New York, NY: HarperCollins, 2019). Svetozar Y. Minkov, “Chapter 2. The Place of the Treatment of the Conquest of Nature in Francis Bacon’s on the Wisdom of the Ancients,” in *Chapter 2. The Place of the Treatment of the Conquest of Nature in Francis Bacon’s on the Wisdom of the Ancients* (University of Pennsylvania Press, 2018), 2, <https://doi.org/10.9783/9780812294866-004>. pg.2. *Imperium in naturam* is used specifically and as a basis for *Novum Organum Scientiarum* (1620). Bacon’s title is a reference to Aristotle’s work *Organon*.

⁶³ Jensen and Draffan, *Strangely Like War*. Judith Shapiro, *Mao’s War against Nature: Politics and the Environment in Revolutionary China*, Studies in Environment and History (Cambridge: Cambridge University Press, 2001), <https://doi.org/10.1017/CBO9780511512063>. Also see: Svetozar Y. Minkov and Bernhardt L. Trout, *Mastery of Nature: Promises and Prospects* (University of Pennsylvania Press, 2018).

⁶⁴ The tyrannical rupture may have begun as early as Arslantepe around the same time as expansion in Uruk.(Graeber & Wengrow, 2022, 319).

democratic, non-civilized societies, which are applicable to all sizes and scales of human society was well.⁶⁵ In this light, to be civilized is to be of a certain kind of culture of the city. For analytical clarity, the two terms, culture, and civilization, are not conflated in ecophilosophy when taken from the perspective of bioregional, democratic confederalism, where a flourishing culture and people are possible without civilization. Modern examples of pragmatic naturalism and democracy in the United States have both intellectual and pragmatic influences starting with the Haudenosaunee Confederacy, the Wendat, and resting further back, such as with the Hopewell, located in the eastern woodlands of Turtle Island.⁶⁶ There is a direct line from the aforementioned democratic confederacies up to Henry David Thoreau⁶⁷, John Muir⁶⁸, and then to Aldo Leopold, Rachel Carson, Kirkpatrick Sale, Winona LaDuke, and Derrick Jensen.⁶⁹ Rachel Carson, along with the unions, brought scientific awareness to the public, and this endeavor culminated into a global, environmental movement.⁷⁰ It is a movement, recognized globally, by those who already observe the ancient harmony with nature from the Amazon to the Tundra,

⁶⁵ Graeber and Wengrow; Reuben Thwaites, ed., *The Jesuit Relations and Allied Documents: Travels and Explorations of the Jesuit Missionaries in New France*, vol. 1, 71 vols. (Cleveland, OH: The Burrows Brothers Co, 1896), <https://archive.org/search?query=Jesuit+Relations>.

⁶⁶ David S. Brose and N'omi B. Greber, eds., *Hopewell Archaeology: The Chillicothe Conference* (Kent, OH: Kent State University Press, 1979); Mark A. Hill, Kevin C. Nolan, and Mark S. Seeman, "Social Network Analysis and the Social Interactions That Define Hopewell," in *Archaeological Networks and Social Interaction* (Routledge, 2020); Paul W. Sciulli and Michael C. Mahaney, "Evidence of Local Biological Continuity for an Ohio Hopewell Complex Population," *Midcontinental Journal of Archaeology* 11, no. 2 (1986): 181-99; Alice Wright and Cameron Gokee, "Modeling the Interaction Sphere: Social Network Approaches to Hopewellian Material Culture in the Middle Woodland Southeast" (Southeastern Archaeological Conference, Tampa, FL, 2013).

⁶⁷ Keshav Raj Chalise, "Ecophilosophy of Natural Harmony and Pragmatic Naturalism in Thoreau's Poems," *Kaumodaki: Journal of Multidisciplinary Studies*, February 16, 2022, 58-68, <https://doi.org/10.3126/kdk.v2i1.42877>; Henry David Thoreau, *Walden: A Fully Annotated Edition* (Yale University Press, 2004).

⁶⁸ Stephen R. Fox, *The American Conservation Movement: John Muir and His Legacy* (Madison: University of Wisconsin Press, 1981).

⁶⁹ Jensen, *Endgame, Volume 1*; Aldo Leopold, *A Sand County Almanac, and Sketches Here and There* (Oxford University Press, 1989); Kirkpatrick Sale, *Dwellers in the Land: The Bioregional Vision* (University of Georgia Press, 2000).

⁷⁰ Rachel Carson, *Silent Spring* (Penguin Books, 2000); Eliza Griswold, "How 'Silent Spring' Ignited the Environmental Movement," *NYT Magazine*, September 21, 2012.

Madagascar to China to the Mekong, in the much larger movement of La Via Campesina.⁷¹ Therefore, what is generally accepted in modernity is that a large-scale human settlement required a mass workforce and hierarchical organization where a city-state must form so that we can enjoy the fruits of civilized life is, by today, a dangerous mythology.⁷²

In the modern era, it is a history forced as a capitalist mode of competition in a cynical “all against all” and as if it could not have been otherwise, despite plenty of direct evidence and reports to the contrary.⁷³ For example, in the New World, civilization has been imposed based on the desire for mining regions such as the silver mines of Cerro Rico in Potosi (Bolivia).⁷⁴ Neolithic chauvinism, or more clearly urbanist aggression, continues up to today as ethnocentrism where the inherent practice of dominance (ancient sovereignty and administrative apparatus) over territory is imposed for global intervention and extraction to occur. *Prima facie* while the myth might be exposed, there arises an inherent conundrum of how to attempt to undo the chain of extraction in a way that leads to development as bioregional culture and not social and ecological breakdown. Therefore, pragmatically, the reasonable way out of the logic and practice would be to find a way to undo the chain of extraction.⁷⁵ Yet rather than a culture almost purely driven by the technological imperative, an ecologically-oriented culture should be brought about.

Evidence indicates that humans that were engaged in horticulture mixed with hunting, fishing, foraging, and gathering, created a variety of social organizational forms; some forms changed

⁷¹ María Elena Martínez-Torres and Peter M. Rosset, “La Vía Campesina: The Birth and Evolution of a Transnational Social Movement,” *The Journal of Peasant Studies* 37, no. 1 (January 1, 2010): 149–75, <https://doi.org/10.1080/03066150903498804>.

⁷² Such as the myth-making based on Hobbes and Rousseau.

⁷³ “Jesuit Relations, Internet Archive, Volumes,” 1896, <https://archive.org/download/thejesuitrelatio446669gut>; George R. Healy, “The French Jesuits and the Idea of the Noble Savage,” *The William and Mary Quarterly* 15, no. 2 (1958): 144–67, <https://doi.org/10.2307/1919438>. Also see the journals of the conquistadors and of First Contact.

⁷⁴ Ricardo A. Godoy, *Mining and Agriculture in Highland Bolivia: Ecology, History, and Commerce Among the Jukumanis* (University of Arizona Press, 1990). *Damnatio en metalla* or the Man-Eating Mines of Potosi.

⁷⁵ Richard Shusterman, “Pragmatist Aesthetics and Confucianism,” *The Journal of Aesthetic Education* 43, no. 1 (2009): 18–29.

with the season,⁷⁶ including for what we know as megasites. The megasites seem to be villages “nested” into a large area, such as at Uruk, which was as large or larger than human settlements of what is usually called the Golden Age of the ancient world at Athens. While there might be other models, not universalized as civilization,⁷⁷ which are not at a level of extraction required to meet the Mesopotamian Model, it is this Model that is generalized and defined in modernity. The distinctions of types of culture are important when it comes to an ecological perspective. As the ancient forms of civilization dropped away due to pandemic, conquest, and social decay, there have been various assemblages into modern systems that followed such as the Westphalian Nation-state Model, then the League of Nations, World Trade Organization, and the United Nations or the modern international, suprastate system. The city-region (and now megapolis) was considered to be the “hinge of the U.S. economy”⁷⁸ and it can be said that the megapolis is the hinge of the “World City Network”⁷⁹. With this cultural model, there is a constellation of integrated parts including massive infrastructure based on natural resources, and then civilizational values that direct us towards progress, technology, and consumerist accumulation with generalized scarcity. This trajectory is “what they mean for the spatial scales of governance...more closely tied to territorially based understandings of intervention and the changing set of political concerns”⁸⁰ and the same can be said for bioregionalism but with a different orientation and trajectory.

1950 to Present

⁷⁶ Graeber and Wengrow, *The Dawn of Everything*.

⁷⁷ Such as amiable behavior, human decency (being civil); and/or concentrations of humans in various locations; hospitality.

⁷⁸ Donald J. Bogue, *State Economic Areas: A Description of the Procedure Used in Making a Functional Grouping of the Counties of the United States* (U.S. Government Printing Office, 1951); David Pratley, “Beyond the 100 Mile City. Some Thoughts about the Impact of the Coalition’s Cultural Policies at the Edge of London’s Cultural Hinterland,” *Cultural Trends* 24, no. 1 (February 3, 2015): 66–70, <https://doi.org/10.1080/09548963.2014.1000588>; Thomas J. Vicino, Bernadette Hanlon, and John Rennie Short, “Megalopolis 50 Years On: The Transformation of a City Region,” *International Journal of Urban and Regional Research* 31, no. 2 (2007): 344–67, <https://doi.org/10.1111/j.1468-2427.2007.00728.x>.

⁷⁹ Peter J. Taylor and Ben Derudder, *World City Network: A Global Urban Analysis* (Psychology Press, 2004).

⁸⁰ Neuman and Hull, “The Futures of the City Region.”

During the latter half of the 20th century, philosophically, new questions have arisen about how the human being “fits” into nature and an increasingly technical urbanized world. There arose an imperative to either change how we interact with each other and change how we are relating to nature, or proceed towards crises where a convergence at some time could become existential. A confluence of major risks could disrupt feedback loops that indicate nature’s homeostasis. Other risks include nuclear weapons, climate change, and geofinancial instability as threats to human societies as an epistemic crisis expands.⁸¹ Climate change may seem to be an abrupt addition to how we interact with the biophysical system; however, it is not so abrupt when the literature is surveyed. By 1988, the geophysical conditions were discussed as testimony before the Senate of the United States by climate scientist James Hansen, where the fact of technology and human ecology began to enter the public dialogue because of the risks and challenges of technological society.⁸² The demands of civilization, by now, are beyond what the Planet can produce through regeneration or natural production; in fact, the current ideology is one of limitless natural resources and a technological imperative,⁸³ taking on a metaphysical course that cannot be physically met by actual, physical extraction from quarrying, mining, and biologics, at concentrations that urban centers demand. It is necessary to turn from a metaphysics of the machine to a metaphysics of organisms [ecology]; and for a serious, ongoing, public dialogue to occur to further integrate the humanitarianism of global justice⁸⁴ and the environmentalism of scientific conservation and

⁸¹ Mecklin and Science and Security Board Bulletin of the Atomic Scientists, “At Doom’s Doorstep: It Is 100 Seconds to Midnight.”

⁸² Roger A Pielke, “Policy History of the US Global Change Research Program: Part I. Administrative Development,” *Global Environmental Change* 10, no. 1 (April 2000): 9–25, [https://doi.org/10.1016/S0959-3780\(00\)00006-6](https://doi.org/10.1016/S0959-3780(00)00006-6); *James Hansen’s 1988 Testimony after 30 Years. How Did He Do?* (New Haven, CT: Yale University, 2018), <https://www.youtube.com/watch?v=UVz67cwmXTM>.

⁸³ John Weckert, “Is There a New Technological Imperative?” in *Ethics in Nanotechnology: Emerging Technologies Aspects* (De Gruyter, 2021), 21–40, <https://doi.org/10.1515/9783110701883-002>.

⁸⁴ Martha C. Nussbaum, *Women and Human Development: The Capabilities Approach* (Cambridge University Press, 2000), <https://www.cambridge.org/core/books/women-and-human-development/58D8D2FBFC1C9E902D648200C4B7009E>; Thomas Pogge, “Allowing the Poor to Share the Earth,” *Journal of Moral Philosophy* 8, no. 3 (January 1, 2011): 335–52, <https://doi.org/10.1163/174552411X588982>; Thomas Pogge, “Are We

natural regeneration.⁸⁵ The bioregional orientation is towards revivaging and integral simplicity:⁸⁶ urban re-villaging and neo-bucolic regeneration,⁸⁷ within the biotic community and away from Half-Earth and/or the Megapolis.⁸⁸

In previous sections, I gave a trajectory from the ancient to the current world, materially, ecologically, politically, economically, socially where today we are far beyond the ancient model, extending the model to multiple cities into countries and then the nation-state gathering of aforementioned city-regions of Westphalia⁸⁹ to the United Nations [nation-states]⁹⁰ and made up through the process of urbanization into the megapolis encapsulating multiple towns and cities into the World City Network.⁹¹ Nevertheless, the ideology, societal process, and human ecology going back to Mesopotamia is the same canonized inertia; though with advanced technology, such as mining machines that are now the size of buildings, toxic chemicals

Violating the Human Rights of the World's Poor?," in *Ethical Issues in Poverty Alleviation*, ed. Helmut P. Gaisbauer, Gottfried Schweiger, and Clemens Sedmak, vol. 14, Studies in Global Justice (Cham: Springer International Publishing, 2016), 17–42, https://doi.org/10.1007/978-3-319-41430-0_2; Amartya Sen, "Population Policy: Authoritarianism versus Cooperation," *Journal of Population Economics* 10, no. 1 (1997): 3–22; Amartya Sen, "Elements of a Theory of Human Rights," Justice and the Capabilities Approach, May 15, 2017, <https://doi.org/10.4324/9781315251240-6>.

⁸⁵ Carson, *Silent Spring*; Fox, *The American Conservation Movement: John Muir and His Legacy*; Layne Hartsell, "Conservationism and Humanism," National Building Institute Journal, Bangkok (Bangkok, August 2022); Jensen, *Endgame, Volume 1*; Sale, *Dwellers in the Land*; Vandana Shiva, *Soil Not Oil by Vandana Shiva*, North Atlantic Books (Berkeley, CA, 2015); Henry Shue, *Climate Justice: Vulnerability and Protection* (Oxford, UK: Oxford University Press, 2014), <https://global.oup.com/academic/product/climate-justice-9780198713708?cc=us&lang=en&>.

⁸⁶ A version of Thoreau's simplicity that includes advanced science and technology as biotechnics and culture within biotic communities.

⁸⁷ [No. 015] *Technics and Civilization on Bioregionalism: Dr. Layne Hartsell's Lecture*, 2023, <https://www.koreaittimes.com/news/articleView.html?idxno=121451>.

⁸⁸ Iman Ghosh, "Ranked: The Megaregions Driving the Global Economy," Visual Capitalist, September 19, 2019, <https://www.visualcapitalist.com/ranked-the-megaregions-driving-the-global-economy/>; John Harrison and Michael Hoyer, *Megaregions - Globalization's New Urban Form?* (UK: Edward Elgar Publishing Limited, 2015); E.O. Wilson, *Half-Earth, First* (New York, NY: W.W. Norton, 2016).

⁸⁹ Derek Croxton and Anuschka Tischer, *The Peace of Westphalia: A Historical Dictionary* (Greenwood Press, 2002).

⁹⁰ United Nations, "UN Charter," United Nations (United Nations, June 1945), <https://www.un.org/en/about-us/un-charter>.

⁹¹ Taylor and Derudder, *World City Network*.

spread out terrestrially, along with catastrophic extraction all increasing the destruction of the landbase and incorporation of city-regions into today's megapolis system. While culture and civilization are conflated, there is also a conflation between social progression and technological sophistication; however, empirically the two are inversely proportional. Since resources still come from the landbase of the Earth, and not yet from other sources such as asteroids or the Moon or from minute elements condensed in nanoprinters, then even for the "green" and/or "renewable" system that is purported to connect pure sunlight to electricity for the home, then the current system will not be sustainable. There is an ideology and pragmatics in planning, testing, implementation, and then proliferation and accessibility of technology in public relations, marketing, and consumerism, which is necessary to make the current system possible. Therefore, the new green revolution or renewables is a continuation of the previous industrial and fossil regime with an innovative increase in energy use on top of wood, oil, and nuclear (energy) to create more urbanization. More clearly, this process of decision-making, development of technology, and political economy, culminates in a technics, which is neither a neutral process in each part, nor neutral, holistically; it is largely an authoritarian technics.⁹²

Culture is much wider than civilization, thus having reviewed the current model of civilization as arising out of a process of urbanization to dominance over a territory and extraction of resources for inflows to urban centers, I want to move to explore bioregionalism as a matter of actual human ecology, based on empirical observations from recent events that might provide for public involvement.

Reorientation: Reconciliation and Rethinking

For a reorientation to bioregionalism, the current imperatives, or intellectual and metaphysical project, would have to change in

⁹² Mumford, "Authoritarian and Democratic Technics." Chenyang Li, "The Confucian Ideal of Harmony," *Philosophy East and West* 56, no. 4 (2006): 583-603; Paola Villavicencio Calzadilla and Louis J. Kotzé, "Living in Harmony with Nature? A Critical Appraisal of the Rights of Mother Earth in Bolivia," *Transnational Environmental Law* 7, no. 3 (November 2018): 397-424, <https://doi.org/10.1017/S2047102518000201>. Gregory Morgan Swer, "The Road to Necropolis: Technics and Death in the Philosophy of Lewis Mumford," *History of the Human Sciences* 16, no. 4 (November 1, 2003): 39-59, <https://doi.org/10.1177/0952695103164003>.

order to create a human ecology that is in harmony with the land.⁹³ Bioregionalism with its political project of democratic process and the upholding of the integrity of the land and species, such as through revivaging and rewilding combined with a reduction in extractive damage and better development of advanced technology could be effective. A bioregional orientation would steer away from planetary experimentation with increasing fossil fuel systems and machines along with geoeengineering where we can expect almost certain horrific, irreversible outcomes, since there is no significant risk deterrent but a leveraging of risk on top of risk due to a metaphysical commitment to the current technics and then the use of untested, powerful technologies.

How might an ecological reconciliation occur? In simple terms, there is already an effective slogan to engage the public: Reduce-Reuse-Recycle. Through engagement and innovation on what is already a slogan, it may be possible to implement a degree of effective change; and with momentum, mitigation of problems might occur. A mitigation of problems could slow destruction such that it is possible to salvage as much wild nature as possible for a basis of true regeneration.⁹⁴ Theoretical ecology is appropriate to the conditions, philosophically, because while we have knowledge, wealth, and organization to meet the challenges, my argument is theoretical in that I do not think the challenges will be met before even more serious breakdown occurs. Therefore, my argument is integral considering social and political philosophy (global justice) with environmental ethics and with implementation of a new technics – a reorientation, away from urbanization to bioregionalism. Many would have to come together to develop as accurate a picture as possible on empirical reality and move to a pragmatic, effective project for change with continual update due to evidence-based deliberation. The Green New Deal⁹⁵ is currently available and could provide an initial step toward

⁹³ Fox, *The American Conservation Movement: John Muir and His Legacy*; Leopold, *A Sand County Almanac, and Sketches Here and There*; Michael B. Smith, "The Value of A Tree: Public Debates of John Muir and Gifford Pinchot," *The Historian* 60, no. 4 (June 1, 1998): 757–78, <https://doi.org/10.1111/j.1540-6563.1998.tb01414.x>. Leopold, *A Sand County Almanac, and Sketches Here and There*. Li, "The Confucian Ideal of Harmony"; Shusterman, "Pragmatist Aesthetics and Confucianism."

⁹⁴ Private conversation with ecophilosopher Derrick Jensen.

⁹⁵ Jason Hickel, "A Response to Pollin and Chomsky: We Need a Green New Deal without Growth," Jason Hickel, 2020, <https://www.jasonhickel.org/blog/2020/10/19/we-need-a-green-new-deal-without->

such a movement for a bioregional orientation for ecological integrity, security, and for reconciliation. One of the great challenges will be this reconciliation within the Anthropocene due to the enormous technological power that has caused geophysical changes, and because a small population of the total human population have actually caused the dire situation. In fact, some want to triumphally proceed into a civilizational technics, “Some believe that humanity should accept the ecological chaos we have created as just damaged collateral to a brilliant destiny. ‘We are as gods,’ the futurist Stewart Brand has written, ‘and have to get good at it.’”⁹⁶ Such beliefs, which have gained popularity, are empirically, and existentially, unworkable. Rather than sophisticated obfuscation and hype about technology, bioregionalism could be more effective than a continued focus on the technological imperative or leveraged risk on top of risk. Reconciliation, reorientation, ecological design, and qualified technologies can be implemented at the same time along with the regenerative forces of nature. In fact, this information has been available since the middle of the 20th century where for a pragmatic ecology, bioregionalism⁹⁷ and specifically various forms of the *Design with Nature*⁹⁸ approach show empirical evidence for application. Urban planners Bo Yang and Shujuan Li (2016) write, “We conclude that McHarg’s ecological wisdom is actionable, defensible, and meaningful...”⁹⁹ and can be relied upon for further investigation, planning, and implementation in city planning.

growth; Ann Pettifor, *The Case for the Green New Deal* (Verso Books, 2020); Nathan Schneider, “The Green New Deal Could Dramatically Expand Economic Democracy,” February 15, 2019, <https://www.thenation.com/article/the-green-new-deal-could-dramatically-expand-economic-democracy/>.

⁹⁶ Wilson, *Half-Earth*. pg. 46.

⁹⁷ Richard Evanoff, “Bioregionalism,” in *Companion to Environmental Studies* (Routledge, 2018); Terry Leahy, *The Politics of Permaculture* (Pluto Press, 2021); Michael Vincent McGinnis, *Bioregionalism* (Routledge, 1999); Allen Van Newkirk, “Bioregions: Towards Bioregional Strategy for Human Cultures,” *Environmental Conservation* 2, no. 2 (ed 1975): 108–108, <https://doi.org/10.1017/S0376892900001004>.

⁹⁸ Ian L. McHarg, *Design with Nature* (Turtleback, 1995).

⁹⁹ Bo Yang and Shujuan Li, “Design with Nature: Ian McHarg’s Ecological Wisdom as Actionable and Practical Knowledge,” *Landscape and Urban Planning, Ecological Wisdom for Urban Sustainability: Doing real and permanent good in ecological practice*, 155 (November 1, 2016): 21–32, <https://doi.org/10.1016/j.landurbplan.2016.04.010>.

Recent global events highlight the effects of decreased extraction of resources

There are two examples that give empirical evidence on planetary effects of decreased extraction due to systemic changes that I argue might be a basis for going from theory to practice. Though, admittedly, these examples are seen as imposed “by nature,” they still show clearly what can happen, particularly with how quickly natural regeneration occurs. The two events are the Great Recession in 2008 and the Covid-19 Pandemic in 2019, both of which had planetary effects, when it comes to extraction, and therefore can be studied to provide insight on natural regeneration. In the two planetary-scale events of systemic breakdown that led to reduction in extraction, and subsequently *deurbanization*, especially with the Pandemic, a regeneration began to occur biologically along with changes in the atmosphere concomitantly. These changes occurred quickly, were widespread, and as expected, they reversed once urbanization began to increase again with economic stimulus in both cases. What is remarkable is that during the Pandemic the changes (regenerative effects of nature) were obvious to most of the world’s population creating knowledge from experience that could translate into the political forum.

The Great Recession indicates a crisis of the global financial system in 2008 based on the system of hedge funds that were overleveraged leading to a freezing of banks and then the collapse of major banks such as Lehman Brothers.¹⁰⁰ Government intervention prevented the complete collapse of society, and it was an ongoing intervention of trillions of \$USD that continued up until the Covid-19 Pandemic. What is important empirically is that the recessions (even depression in some areas) that followed each global event led to a decrease in extraction. After the stimulus and “new normal” in 2008-2009, extraction increased and went beyond the previous. In terms of bioregionalism, a “new abnormal” ensued. Using mining as an example of a core feature of urbanization, and aluminum extraction specifically, except for the Great Recession, aluminum use “essentially doubled

¹⁰⁰ Lucca De Paoli and Jeremy Hill, “Lehman Brothers’ Collapse: The Bankruptcy That Took Over a Decade to Unwind,” May 18, 2022, <https://www.bloomberg.com/features/2022-lehman-brothers-collapse-plan-repay-after-bankruptcy/>.

between 2005 and 2019.”^{101, 102} To continue to increase aluminum, even with a system of full recycling, bauxite mining has to continue due to demand for new aluminum for advanced technologies such as airplanes. Other examples of extraction include coal, fossils, and copper, all through extraction and subsequent degradation of nature on a planetary scale.

Even more encouraging for the global socio-political systems is the visual experience of natural regeneration during the Covid-19 Pandemic. The Covid-19 Pandemic (epidemics generally) was thought to be the result of rapid human incursion into an ecosystem or biotic community in China;¹⁰³ another dangerous outcome of urbanization in general. In 2020, as the Pandemic was finally recognized and governments eventually acted to close down airports, shopping malls, and then societies across the globe; as could be expected, there was also an almost immediate natural regeneration that was visible to regular citizens. For example, “Covid-19 lockdowns brought blue skies to the most polluted regions of the globe...” where pollution or particulates have a more devastating impact on life expectancy than communicable diseases like tuberculosis and HIV/AIDS, and behavioral killers like cigarette smoking.¹⁰⁴ While air traffic slowed down creating less emissions¹⁰⁵ globally, it was reported that wildlife was reclaiming Los Angeles¹⁰⁶ and cities were being overgrown with

¹⁰¹ Jensen, Keith, and Wilbert, *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*.

¹⁰² Also see the recession of the early 1980s.

¹⁰³ M. Fernanda Gebara, Peter H. May, and Gunars Platais, “Pandemics, Conservation, and Human-Nature Relations,” *Climate Change Ecology* 2 (December 2021): 100029, <https://doi.org/10.1016/j.ecochg.2021.100029>; Ruchi D. Raval and Mansi Mehta, “Nipah: An Interesting Stance,” *Health Promotion Perspectives* 10, no. 1 (January 28, 2020): 5–7, <https://doi.org/10.15171/hpp.2020.03>.

¹⁰⁴ AQLI, “New Data Shows Strong Air Pollution Policies Lengthen Life Expectancy,” *AQLI* (blog), September 1, 2021, <https://aqli.epic.uchicago.edu/news/new-data-shows-strong-air-pollution-policies-lengthen-life-expectancy/>.

¹⁰⁵ Niko Kommenda, “How Is the Coronavirus Affecting Global Air Traffic?” *The Guardian*, April 3, 2020, <http://www.theguardian.com/world/ng-interactive/2020/apr/03/how-is-the-coronavirus-affecting-global-air-traffic>.

¹⁰⁶ Louis Sahagun, “Coyotes, Falcons, Deer and Other Wildlife Are Reclaiming L.A. Territory as Humans Stay at Home,” *Los Angeles Times*, April 21, 2020, sec. Climate & Environment, <https://www.latimes.com/environment/story/2020-04-21/wildlife-thrives-amid-coronavirus-lockdown>; Amanda J. Zellmer et al., “What Can We Learn from Wildlife Sightings during the COVID-19 Global Shutdown?” *Ecosphere* 11, no. 8 (2020): e03215, <https://doi.org/10.1002/ecs2.3215>.

plant life. At the same time, green rhetoric in wishful or magical thinking was also prevalent “the pandemic may send the petroleum industry to the grave”¹⁰⁷ and was met with a civilized response, “[drill] every molecule of hydrocarbon will come out.”¹⁰⁸

While natural regeneration was in direct view for much of the world’s populace the IEA argued for a “once in a lifetime opportunity” for governments to move away from fossil fuels with \$3 trillion in investment. Also, “the relationship between humans and wildlife in urban settings changed during the shutdown, and understanding the reasons for that change could inform urban ecology and conservation.”¹⁰⁹ Aside from the problematic nature of the public paying for “free market” innovations in green technology,¹¹⁰ the key matter is all areas of civilized society now have a direct example of what may be possible if an integral program of bioregionalism were to be implemented widely. It would be better to implement democratic ecological societies now than to wait for further imposition given the relatively mild, destructive effects from the Great Recession and the Covid-19 Pandemic, when compared medically to pandemics of the past and likely in the future. A new biogeopolitics must address various converging risks.

Discussion and Suggestions

In considering bioregionalism as a theoretic ecology it could follow that a *new technosocial and ecological reality* might develop where the technologies that enable the conditions for such a reality are absolutely important to be considered and framed from the integral perspective of human ecology and global justice to provide the clarity needed for a complex moral, humanitarian, and ecological re-orientation based on the pragmatic approach to working with how the

¹⁰⁷ Antonia Juhasz, “The End of Oil Is Near,” Sierra Club, August 24, 2020, <https://www.sierraclub.org/sierra/2020-5-september-october/feature/end-oil-near>.

¹⁰⁸ Javier Blas, “The Saudi Prince of Oil Prices Vows to Drill ‘Every Last Molecule,’” *Bloomberg.Com*, July 22, 2021, <https://www.bloomberg.com/news/features/2021-07-22/saudi-prince-abdulaziz-bin-salman-seeks-to-tame-oil-prices-opec-russia>.

¹⁰⁹ Zellmer et al., “What Can We Learn from Wildlife Sightings during the COVID-19 Global Shutdown?”

¹¹⁰ Jensen, Keith, and Wilbert, *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*.

Earth regenerates and how we are affected as human beings and all species.¹¹¹

It can be presumed that in the real world, advanced technology will be built into a fossils-based “renewable” energy system; and, yet I think there is a rational public demand for a clean, renewable energy system. The two statements do not integrate together, and this is due not to technology but according to current technics. There are possible ways for a pragmatic project with a positive effect that could move towards an advanced technical ecosociety through bioregionalism, which is not only a matter of survival, but also includes innovations in culture – Better culture to ensure thriving, and flourishing. Some major points:

1. Move towards a clean, renewable energy system¹¹²

- a. The importance of UN SDG 7 cannot be overstated because there has been no effective plan for the reduction of fossil fuels. Fossil fuels are dramatically increasing as the theoretical intent is “drill every last molecule” from the “molecules of freedom.”¹¹³ Energy through technology is at the foundation of human communities today; therefore, the development of, and access to, an affordable, reliable, renewable, and clean energy is an existential matter as a challenge to the current energy regime.¹¹⁴
 - i. Green New Deal. Clean, Renewable Energy is central to achieving the 2030 Agenda for Sustainable Development and the Paris Agreement on climate change. While those accords are not going to be reached, in fact, missed by a long distance; SDG 7, which calls

¹¹¹ See La Via Campesina and also Confucian Harmony with Nature.

¹¹² Andreas Roos, *Solar Technology and Global Environmental Justice: The Vision and the Reality* (Routledge, 2023).

¹¹³ Blas, “The Saudi Prince of Oil Prices Vows to Drill ‘Every Last Molecule’”; Luke O’Neill, “US Energy Department Rebrands Fossil Fuels as ‘Molecules of Freedom,’” *the Guardian*, May 29, 2019, <http://www.theguardian.com/business/2019/may/29/energy-department-molecules-freedom-fossil-fuel-rebranding>.

¹¹⁴ Benjamin K. Sovacool and Michael H. Dworkin, *Global Energy Justice* (Cambridge University Press, 2014).

for “ensuring access to affordable, reliable, sustainable and modern energy for all” should be a focus of survival based on existential threat.¹¹⁵

- ii. Nanotechnology - While nanotechnology might be key to a clean, renewable energy system, e.g., piezotronics,¹¹⁶ it is largely science fiction at this time.
- iii. Rather than a second fossil fuel regime, which is called “green” or “renewable”, we need an actual clean system that is renewable along with a significant decrease in all fossil fuels.¹¹⁷
- iv. Incomes can be created, and families can be supported from implementation, along with income generating removal, rematerialization, or restructuring of past infrastructure.

2. Rematerialization

- a. Civilization is not the only trajectory of human culture and ingenuity. There is already 1,154Gt of material artifact produced and there is plenty of know-how. Human ingenuity will have to be directed in a better way towards using what is already available. A bioregional system that is in the direction of designing with nature, would free up discovery, invention, and innovation for

¹¹⁵ UN SDGs, “Goal 7 | Department of Economic and Social Affairs, Sustainable Development,” United Nations, 2015, <https://sdgs.un.org/goals/goal7>.

¹¹⁶ Zhong Lin Wang, “Progress in Piezotronics and Piezo-Phototronics,” *Advanced Materials* 24, no. 34 (2012): 4632–46, <https://doi.org/10.1002/adma.201104365>; Zhong Lin Wang, “Nanogenerators, Self-Powered Systems, Blue Energy, Piezotronics and Piezo-Phototronics – A Recall on the Original Thoughts for Coining These Fields,” *Nano Energy* 54 (December 1, 2018): 477–83, <https://doi.org/10.1016/j.nanoen.2018.09.068>.

¹¹⁷ Jensen, Keith, and Wilbert, *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*.

- rematerialization (urban mining)¹¹⁸ making use of what is available.
- b. Retool, reuse, reconfigure: Such a program can also create income.
 - c. Nanotechnology if it can be used for nanoprinters to decouple the chain of extraction. See distributed digital manufacturing below.

3. *Education with an Ecological Imperative*

- a. Comprehensive, open education for all will create the grounds for discovery, invention, and innovation.
- b. Increase open science and training for more scientists. For people who want to learn and do science, make specialized education easily accessible.
- c. Increase restoration, rewilding, and regenerative ecology from primary schools on up to specialized vocational schools.¹¹⁹
- d. Open-reasoning and a knowledge-commons for public deliberation in physical and digital publics,¹²⁰ which would meet the challenge of the current epistemic crisis.

¹¹⁸ Urban mining.

¹¹⁹ Solveig T. Børresen et al., "The Role of Education in Biodiversity Conservation: Can Knowledge and Understanding Alter Locals' Views and Attitudes towards Ecosystem Services?," *Environmental Education Research* 29, no. 1 (January 2, 2023): 148–63, <https://doi.org/10.1080/13504622.2022.2117796>.

¹²⁰ Marco Bani, "Crowdsourcing Democracy: The Case of Icelandic Social Constitutionalism," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, October 22, 2012), <https://doi.org/10.2139/ssrn.2128531>; James Fishkin, *When the People Speak: Deliberative Democracy and Public Consultation* (Oxford; New York: Oxford University Press, 2009); H el ene Landemore, "We, All of the People: Five Lessons from Iceland's Failed Experiment in Creating a Crowdsourced Constitution.," *Slate Magazine*, July 31, 2014, <https://slate.com/technology/2014/07/five-lessons-from-icelands-failed-crowdsourced-constitution-experiment.html>.

4. *Political-ecology*

- a. A turn from urbanism to bioregionalism; from a “mechanical fabric”¹²¹ to a democratic, ecological holism such as the World Village compared to Megapolis. *Urbanism as old; Bioregionalism as cutting edge*. Physical, political, psychological, and spiritual reorientation.
- b. Democratic process to enact a structure of rules/laws towards the ecosociety, and thereby creating as much input as possible to achieve a clear understanding of conditions. A clear diagnosis based on science leads to the best development of treatment.
- c. Strong regulations concerning mining, quarrying, drilling, and other extractive processes such as harvesting, logging, etc. of biological materials.
- d. Avoid green tyranny and technocratic authoritarianism.

5. *Social/Individual – Ecological Culture*

- a. Reduce, Reuse, Recycle: much of this can create local incomes.
- b. Urban greening, gardening, and wildlife restoration such as the Friends of Griffith Park.¹²²
- c. Rural regeneration or neo-bucolic regeneration of the land.
- d. Agroforestry, agroecology, horticulture
- e. Rewilding.¹²³ The decade of 2021 to 2030 has been declared by the UN to be a decade of ecological

¹²¹ Lewis Mumford, “The First Megamachine,” *Diogenes* 14, no. 55 (September 1, 1966): 1–15, <https://doi.org/10.1177/039219216601405501>.

¹²² “Friends of Griffith Park |,” accessed November 18, 2022, <https://friendsofgriffithpark.org/>.

¹²³ Jamie Lorimer et al., “Rewilding: Science, Practice, and Politics,” *Annual Review of Environment and Resources* 40, no. 1 (2015): 39–62, <https://doi.org/10.1146/annurev-environ-102014-021406>; Andrea Perino et al., “Rewilding Complex Ecosystems,” *Science* 364, no. 6438 (April 26, 2019): eaav5570, <https://doi.org/10.1126/science.aav5570>.

restoration.¹²⁴ Such declarations should be expanded to include all species and nature and avoid a conclusion that leads to further commodification of nature in a model of mechanics and economics.¹²⁵

- f. Integral simplicity – A way of life in a biotic community; simplicity in living and with the enjoyment of flourishing family, friends, culture, cuisine, intellectual, artistic, scientific, political, and enterprising endeavors. Integral simplicity is an extension of the simplicity from the pragmatic naturalists from the early, large-scale human societies up to modern times.¹²⁶ *Homo hospitabilis* compared to *Homo economicus*.

6. Economic

- a. Wealth of Networks: build an open-source economy as a wider form of productive system.¹²⁷ Let innovators create the next system of wealth that will provide incomes from collaborative efforts between experts and regular citizens.
- b. Distributed, digital manufacturing (DDM), desktop manufacturing or meta-local production. DDM is resource efficient in materials due to localization and subsequent decrease in the need for transportation logistics. It is a next level economy that can decrease industrialism and urbanization by eliminating the chain of extraction and logistics.

Conclusion

¹²⁴ UN General Assembly, "UN Decade on Restoration," UN Decade on Restoration, accessed May 26, 2023, <http://www.decadeonrestoration.org/node>.

¹²⁵ Alasdair Cochrane, *Sentientist Politics: A Theory of Global Inter-Species Justice* (Oxford University Press, 2018).

¹²⁶ Thoreau, *Walden*.

¹²⁷ Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, ebook pdf (New Haven and London: Yale University Press, 2006).

What is our relationship to nature, and to the future? What kind of culture do we want? Many look to the futurist to give some clues, however, much of futurism has a presupposition or bias of the technological imperative.^{128, 129} While futurism is interesting in that the freedom of speculation should be encouraged, it is also important where the speculation is directed and whether it is overindulged.¹³⁰ I find little in futurism discussing bioregionalism and I think there is better speculation about the future combining bioregionalism, planetary ecology, and technology.

Social disparity and ecological destruction in the modern age, and particularly since the 1950s, are the result of a specific ideology and metaphysics of urbanism and technical sophistication based on catastrophic extraction on a planetary scale as civilization has become a geological, or we can say planetary force.

From the perspective on civilization, history, and ecology I present here, it is the integral approach of bioregionalism that best considers the development of the land ethic,¹³¹ the intrinsic value of nature, and cultural and scientific understanding of natural processes about how to design with an attitude of harmony in nature.¹³² Ecofuturism could be the new futurism as the techno-utopianism and market-centered theology fails in an vandalistic, planetary disaster that is now existential. Ecofuturism is, of course, for immediate application, such that there is a salvaging of as much of wild nature as possible.¹³³ There is historical, ecological precedent of influence when it comes to human relations with each other and with nature in a cultural background such as the more democratic confederacies of indigenous village networks in what is today the United States and Latin America that are a foundational influence on environmentalism

¹²⁸ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Electbook Classics (London: Oxford University Press, 1998); Weckert, "Is There a New Technological Imperative?"

¹²⁹ Turgot's influence on Adam Smith

¹³⁰ Peter Campbell and Alistair Gray, "Tesla's Elon Musk Changes Job Title to 'Technoking,'" *Financial Times*, March 15, 2021, <https://www.ft.com/content/e4c43a5e-7e62-40d6-a4d2-534f62970463>; *Elon Musk: SpaceX, Mars, Tesla Autopilot, Self-Driving, Robotics, and AI | Lex Fridman Podcast #252*, 2021, <https://www.youtube.com/watch?v=DxREm3s1scA>; Neuman and Hull, "The Futures of the City Region."

¹³¹ Leopold, *A Sand County Almanac, and Sketches Here and There*.

¹³² William J. Cohen, *Ecohumanism and the Ecological Culture* (Temple University Press, 2019); Mumford, "Authoritarian and Democratic Technics."

¹³³ Personal discussion with ecophilosopher Derrick Jensen.

and earlier on the Enlightenment. Biotic communities were largely intact, where human communities are not formative or even managerial of the biosystem but have influence just as other animals do. The eastern woodlands and northern California of the United States and central Mexico are core examples. There is also convincing evidence from other geographies such as the Eurasian megasites and Asia generally going far back in time that contrast against the obdurate myths of civilization.¹³⁴ If a voluntary reorientation does occur, then the ethical and moral project to share the Earth and to have a thriving culture that is technologically advanced would have to be worked out from bioregion to biotic community.

Acknowledgements

Funding for this paper has been partially supported by a grant from the Project on Creating an Environment for Open Science, Chulalongkorn University, Bangkok. A special thank-you to Derrick Jensen, teacher, and friend. Also, I want to recognize Wanassanant Kunphon for her assistance on this paper.

References

- Adams, Robert McCormick. *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates*. University of Chicago Press, 1981.
- Anonymous. *The Epic of Gilgamesh*. London, UK: Penguin UK, 2016.
- Anthropocene Working Group. "Working Group on the 'Anthropocene.'" *Stratigraphy*, May 21, 2019. <http://quaternary.stratigraphy.org/working-groups/anthropocene/>.
- AQLI. "New Data Shows Strong Air Pollution Policies Lengthen Life Expectancy." *AQLI* (blog), September 1, 2021. <https://aqli.epic.uchicago.edu/news/new-data-shows-strong-air-pollution-policies-lengthen-life-expectancy/>.

¹³⁴ See Sri Aurobindo, Mahatma Gandhi "village republics"; China and India as central to history; Kondiaronk; also Xicotencatl the Elder in *Historia de los Indios de la Nueva Espana* Toribio de Benavente O. Motolinía, *Historia de Los Indios de La Nueva Espana: Escrita a Medios Del Siglo XVI* (Alpha Editions, 2020).

- Arendt, Hannah. *The Origins of Totalitarianism*. New edition. New York: Harcourt, Brace, Jovanovich, 1973.
- Bacon, Francis. *Francis Bacon: The New Organon*. Cambridge University Press, 2000.
- . *Novum Organum*. CreateSpace Independent Publishing Platform, 2017.
- . *The New Atlantis*. Lindhardt og Ringhof, 2022.
- Bani, Marco. "Crowdsourcing Democracy: The Case of Icelandic Social Constitutionalism." SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, October 22, 2012. <https://doi.org/10.2139/ssrn.2128531>.
- Benkler, Yochai. *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. Ebook pdf. New Haven and London: Yale University Press, 2006.
- Bernstein, Jeremy. *Plutonium: A History of the World's Most Dangerous Element*. Cornell University Press, 2009.
- Big History Anthropocene Conference – Keynote Address*, 2016. <https://www.youtube.com/watch?v=4ojuLN1ftXo>.
- Blaisdell, Robert. *Great Speeches by Native Americans*. Mineola, New York: Dover Publications, 2000.
- Blas, Javier. "The Saudi Prince of Oil Prices Vows to Drill 'Every Last Molecule.'" *Bloomberg.Com*, July 22, 2021. <https://www.bloomberg.com/news/features/2021-07-22/saudi-prince-abdulaziz-bin-salman-seeks-to-tame-oil-prices-opeec-russia>.
- Blum, Jordan. "The March from Humble Oil to Exxon Dates Back More than a Century." *Chron*, May 25, 2016. <https://www.chron.com/local/history/economy-business/article/The-march-from-Humble-Oil-to-Exxon-dates-back-7943392.php>.
- Bogue, Donald J. *State Economic Areas: A Description of the Procedure Used in Making a Functional Grouping of the Counties of the United States*. U.S. Government Printing Office, 1951.
- Børresen, Solveig T., Rehema Ulimboka, Julius Nyahongo, Peter S. Ranke, Gine Roll Skjaervø, and Eivin Røskoft. "The Role of Education in Biodiversity Conservation: Can Knowledge and Understanding Alter Locals' Views and Attitudes towards Ecosystem Services?" *Environmental Education Research* 29, no. 1 (January 2, 2023): 148–63. <https://doi.org/10.1080/13504622.2022.2117796>.

- Brannon, H. R., A. C. Daughtry, D. Perry, W. W. Whitaker, and M. Williams. "Radiocarbon Evidence on the Dilution of Atmospheric and Oceanic Carbon by Carbon from Fossil Fuels." *Eos, Transactions American Geophysical Union* 38, no. 5 (1957): 643–50. <https://doi.org/10.1029/TR038i005p00643>.
- Brock, Andrea L. "Urbanizing the Eternal City: How Did the Ancient Romans Transform and Adapt to Rome's Riverine Landscape?" *World Development Perspectives* 26 (June 1, 2022): 100426. <https://doi.org/10.1016/j.wdp.2022.100426>.
- Brose, David S., and N'omi B. Greber, eds. *Hopewell Archaeology: The Chillicothe Conference*. Kent, OH: Kent State University Press, 1979.
- Buchholz, Katharina, and Statista. "How Has the World's Urban Population Changed from 1950 to 2020?" World Economic Forum, November 4, 2020. <https://www.weforum.org/agenda/2020/11/global-continent-urban-population-urbanisation-percent/>.
- Calzadilla, Paola Villavicencio, and Louis J. Kotzé. "Living in Harmony with Nature? A Critical Appraisal of the Rights of Mother Earth in Bolivia." *Transnational Environmental Law* 7, no. 3 (November 2018): 397–424. <https://doi.org/10.1017/S2047102518000201>.
- Campbell, Peter, and Alistair Gray. "Tesla's Elon Musk Changes Job Title to 'Technoking.'" *Financial Times*, March 15, 2021. <https://www.ft.com/content/e4c43a5e-7e62-40d6-a4d2-534f62970463>.
- Carson, Rachel. *Silent Spring*. Penguin Books, 2000.
- Chalise, Keshav Raj. "Ecophilosophy of Natural Harmony and Pragmatic Naturalism in Thoreau's Poems." *Kaumodaki: Journal of Multidisciplinary Studies*, February 16, 2022, 58–68. <https://doi.org/10.3126/kdk.v2i1.42877>.
- Childe, V. Gordon. "The Urban Revolution." *The Town Planning Review* 21, no. 1 (1950): 3–17.
- Cochrane, Alasdair. *Sentientist Politics: A Theory of Global Inter-Species Justice*. Oxford University Press, 2018.
- Cohen, William J. *Ecohumanism and the Ecological Culture*. Temple University Press, 2019.
- Croxton, Derek, and Anuschka Tischer. *The Peace of Westphalia: A Historical Dictionary*. Greenwood Press, 2002.

- Crutzen, Paul J., and Eugene F. Stoermer. "The 'Anthropocene' (2000)." In *Paul J. Crutzen and the Anthropocene: A New Epoch in Earth's History*, edited by Susanne Benner, Gregor Lax, Paul J. Crutzen, Ulrich Pöschl, Jos Lelieveld, and Hans Günter Brauch, 19–21. The Anthropocene: Politik—Economics—Society—Science. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-82202-6_2.
- Dabi, Nafkote, Alex Maitland, Max Lawson, Hilde Stroot, Alexandre Poidatz, and Ashfaq Khalfan. "Carbon Billionaires: The Investment Emissions of the World's Richest People." Oxfam International, November 7, 2022. <https://doi.org/10.21201/2022.9684>.
- De Paoli, Lucca, and Jeremy Hill. "Lehman Brothers' Collapse: The Bankruptcy That Took Over a Decade to Unwind," May 18, 2022. <https://www.bloomberg.com/features/2022-lehman-brothers-collapse-plan-repay-after-bankruptcy/>.
- Elon Musk: *SpaceX, Mars, Tesla Autopilot, Self-Driving, Robotics, and AI | Lex Fridman Podcast #252*, 2021. <https://www.youtube.com/watch?v=DxREm3s1sCA>.
- "Emissions Gap Report 2022." United Nations, October 21, 2022. <http://www.unep.org/resources/emissions-gap-report-2022>.
- Encyclopedia Britannica, ed. "Urbanization." In *Britannica*. London, UK: Encyclopedia Britannica, 2022. <https://www.britannica.com/topic/urbanization>.
- Erdkamp, Paul, Joseph G. Manning, and Koenraad Verboven. *Climate Change and Ancient Societies in Europe and the Near East: Diversity in Collapse and Resilience*. Springer Nature, 2021.
- Evanoff, Richard. "Bioregionalism." In *Companion to Environmental Studies*. Routledge, 2018.
- Finney, Stanley C., and Lucy E. Edwards. "The 'Anthropocene' Epoch: Scientific Decision or Political Statement?" *GSA Today* 26, no. 3 (April 2016): 4–10. <https://doi.org/10.1130/GSATG270A.1>.
- Fishkin, James. *When the People Speak: Deliberative Democracy and Public Consultation*. Oxford; New York: Oxford University Press, 2009.
- Fox, Stephen R. *The American Conservation Movement: John Muir and His Legacy*. Madison: University of Wisconsin Press, 1981.
- Franconi, Tyler V. "The Environmental Imperialism of the Roman Empire in Northwestern Europe." In *Climate Change and Ancient Societies in Europe and the Near East: Diversity in*

- Collapse and Resilience*, edited by Paul Erdkamp, Joseph G. Manning, and Koenraad Verboven, 321–45. Palgrave Studies in Ancient Economies. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-81103-7_11.
- French, Howard W. “Megalopolis: How Coastal West Africa Will Shape the Coming Century.” *The Guardian*, October 27, 2022, sec. World news. <https://www.theguardian.com/world/2022/oct/27/megalopolis-how-coastal-west-africa-will-shape-the-coming-century>.
- “Friends of Griffith Park |.” Accessed November 18, 2022. <https://friendsofgriffithpark.org/>.
- Gebara, M. Fernanda, Peter H. May, and Gunars Platais. “Pandemics, Conservation, and Human-Nature Relations.” *Climate Change Ecology* 2 (December 2021): 100029. <https://doi.org/10.1016/j.ecochg.2021.100029>.
- Ghosh, Iman. “Ranked: The Megaregions Driving the Global Economy.” *Visual Capitalist*, September 19, 2019. <https://www.visualcapitalist.com/ranked-the-megaregions-driving-the-global-economy/>.
- Godoy, Ricardo A. *Mining and Agriculture in Highland Bolivia: Ecology, History, and Commerce Among the Jukumanis*. University of Arizona Press, 1990.
- Graeber, David, and David Wengrow. *The Dawn of Everything*. UK: Penguin, Random House, 2022.
- Griswold, Eliza. “How ‘Silent Spring’ Ignited the Environmental Movement.” *NYT Magazine*, September 21, 2012.
- Harper, Kyle. *The Fate of Rome*. Princeton, NJ: Princeton University Press, 2017.
- Harrison, John, and Michael Hoyler. *Megaregions - Globalization’s New Urban Form?* UK: Edward Elgar Publishing Limited, 2015.
- Hartsell, Layne. “Conservationism and Humanism.” *National Building Institute Journal*, Bangkok. Bangkok, August 2022.
- . “Global Justice, Nanotechnology, and Convergence Through Open Reasoning - A Commentary on a New Technosocial Reality.” Dissertation, American University of Sovereign Nations, 2021.
- Harvey, David. “Cities or Urbanization?” *City* 1, no. 1–2 (January 1, 1996): 38–61. <https://doi.org/10.1080/13604819608900022>.
- . *Paris, Capital of Modernity*. New York, NY: Routledge, 2005.

- Healy, George R. "The French Jesuits and the Idea of the Noble Savage." *The William and Mary Quarterly* 15, no. 2 (1958): 144–67. <https://doi.org/10.2307/1919438>.
- Hickel, Jason. "A Response to Pollin and Chomsky: We Need a Green New Deal without Growth." Jason Hickel, 2020. <https://www.jasonhickel.org/blog/2020/10/19/we-need-a-green-new-deal-without-growth>.
- Hill, Mark A., Kevin C. Nolan, and Mark S. Seeman. "Social Network Analysis and the Social Interactions That Define Hopewell." In *Archaeological Networks and Social Interaction*. Routledge, 2020.
- "Historical Statistics for Mineral and Material Commodities in the United States | U.S. Geological Survey." Accessed November 5, 2022. <https://www.usgs.gov/centers/national-minerals-information-center/historical-statistics-mineral-and-material-commodities>.
- Hixon, M. A. "Carrying Capacity." In *Encyclopedia of Ecology*, edited by Sven Erik Jørgensen and Brian D. Fath, 528–30. Oxford: Academic Press, 2008. <https://doi.org/10.1016/B978-008045405-4.00468-7>.
- HuffPost. "Humble Oil Predicts the Future in 1962 Ad," June 10, 2010. https://www.huffpost.com/entry/humble-oil-predicts-the-f_b_607434.
- James Hansen's 1988 Testimony after 30 Years. How Did He Do?* New Haven, CT: Yale University, 2018. <https://www.youtube.com/watch?v=UVz67cwmxTM>.
- Jensen, Derrick. *Endgame, Vol 1: The Problem of Civilization*. New York, NY, USA: Seven Stories Press, 2006.
- Jensen, Derrick, and George Draffan. *Strangely Like War: The Global Assault on Forests*. Natraj Publishers, 2005.
- Jensen, Derrick, Lierre Keith, and Max Wilbert. *Bright Green Lies: How the Environmental Movement Lost Its Way and What We Can Do About It*. Ebook. Politics of Living. Rhinebeck, New York: Monkfish Book Publishing Company, 2021.
- "Jesuit Relations, Internet Archive, Volumes," 1896. <https://archive.org/download/thejesuitrelatio44669gut>.
- Jones, Michael D., and Geoboo Song. "Making Sense of Climate Change: How Story Frames Shape Cognition." *Political Psychology* 35, no. 4 (2014): 447–76. <https://doi.org/10.1111/pops.12057>.

- Juhasz, Antonia. "The End of Oil Is Near." Sierra Club, August 24, 2020. <https://www.sierraclub.org/sierra/2020-5-september-october/feature/end-oil-near>.
- Keys, David. "How Rome Polluted the World." *Geographical (Companion Interactive Publishing)*, December 2003.
- Kommenda, Niko. "How Is the Coronavirus Affecting Global Air Traffic?" *The Guardian*, April 3, 2020. <http://www.theguardian.com/world/ng-interactive/2020/apr/03/how-is-the-coronavirus-affecting-global-air-traffic>.
- Landemore, H el ene. "We, All of the People: Five Lessons from Iceland's Failed Experiment in Creating a Crowdsourced Constitution." *Slate Magazine*, July 31, 2014. <https://slate.com/technology/2014/07/five-lessons-from-icelands-failed-crowdsourced-constitution-experiment.html>.
- Leahy, Terry. *The Politics of Permaculture*. Pluto Press, 2021.
- Leopold, Aldo. *A Sand County Almanac, and Sketches Here and There*. Oxford University Press, 1989.
- Li, Chenyang. "The Confucian Ideal of Harmony." *Philosophy East and West* 56, no. 4 (2006): 583–603.
- Lorimer, Jamie, Chris Sandom, Paul Jepson, Chris Doughty, Maan Barua, and Keith J. Kirby. "Rewilding: Science, Practice, and Politics." *Annual Review of Environment and Resources* 40, no. 1 (2015): 39–62. <https://doi.org/10.1146/annurev-environ-102014-021406>.
- Mart inez-Torres, Mar a Elena, and Peter M. Rosset. "La V a Campesina: The Birth and Evolution of a Transnational Social Movement." *The Journal of Peasant Studies* 37, no. 1 (January 1, 2010): 149–75. <https://doi.org/10.1080/03066150903498804>.
- McGinnis, Michael Vincent. *Bioregionalism*. Routledge, 1999.
- McHarg, Ian L. *Design with Nature*. Turtleback, 1995.
- Mecklin, John, and Science and Security Board Bulletin of the Atomic Scientists. "At Doom's Doorstep: It Is 100 Seconds to Midnight." *Bulletin of Atomic Scientists*, January 20, 2022. <https://thebulletin.org/doomsday-clock/current-time/>.
- Mencius. *Mencius*. Translated by Irene Bloom. UK: Columbia University Press, 2011.
- Merchant, Carolyn. *The Death of Nature*. New York, NY: HarperCollins, 2019.

- Minkov, Svetozar Y. "Chapter 2. The Place of the Treatment of the Conquest of Nature in Francis Bacon's on the Wisdom of the Ancients." In *Chapter 2. The Place of the Treatment of the Conquest of Nature in Francis Bacon's on the Wisdom of the Ancients*, 30–42. University of Pennsylvania Press, 2018. <https://doi.org/10.9783/9780812294866-004>.
- Minkov, Svetozar Y., and Bernhardt L. Trout. *Mastery of Nature: Promises and Prospects*. University of Pennsylvania Press, 2018.
- Molena, Hearst. "The Remarkable Weather of 1911." *Popular Mechanics*, March 1912.
- Motolinía, Toribio de Benavente O. *Historia de Los Indios de La Nueva Espana: Escrita a Medios Del Siglo XVI*. Alpha Editions, 2020.
- Mumford, Lewis. "Authoritarian and Democratic Technics." *Technology and Culture* 5, no. 1 (1964): 1–8. <https://doi.org/10.2307/3101118>.
- . *Technics and Civilization*. Reprint edition. Chicago; London: University of Chicago Press, 1934.
- . *The City in History: Its Origins, Its Transformations, and Its Prospects*. Harcourt, Brace & World, 1961.
- . "The First Megamachine." *Diogenes* 14, no. 55 (September 1, 1966): 1–15. <https://doi.org/10.1177/039219216601405501>.
- Nations, United. "UN Charter." United Nations. United Nations, June 1945. <https://www.un.org/en/about-us/un-charter>.
- Neuman, Michael, and Angela Hull. "The Futures of the City Region." *Regional Studies* 43, no. 6 (July 1, 2009): 777–87. <https://doi.org/10.1080/00343400903037511>.
- Newkirk, Allen Van. "Bioregions: Towards Bioregional Strategy for Human Cultures." *Environmental Conservation* 2, no. 2 (ed 1975): 108–108. <https://doi.org/10.1017/S0376892900001004>.
- Newman, Todd P., Erik C. Nisbet, and Matthew C. Nisbet. "Climate Change, Cultural Cognition, and Media Effects: Worldviews Drive News Selectivity, Biased Processing, and Polarized Attitudes." *Public Understanding of Science* 27, no. 8 (November 1, 2018): 985–1002. <https://doi.org/10.1177/0963662518801170>.
- [No. 015] *Technics and Civilization on Bioregionalism: Dr. Layne Hartsell's Lecture*, 2023.

- <https://www.koreaittimes.com/news/articleView.html?idxno=121451>.
- Nussbaum, Martha C. *Women and Human Development: The Capabilities Approach*. Cambridge University Press, 2000.
<https://www.cambridge.org/core/books/women-and-human-development/58D8D2FBFC1C9E902D648200C4B7009E>.
- O'Neill, Luke. "US Energy Department Rebrands Fossil Fuels as 'Molecules of Freedom.'" *the Guardian*, May 29, 2019.
<http://www.theguardian.com/business/2019/may/29/energy-department-molecules-freedom-fossil-fuel-rebranding>.
- Perino, Andrea, Henrique M. Pereira, Laetitia M. Navarro, Néstor Fernández, James M. Bullock, Silvia Ceașu, Ainara Cortés-Avizanda, et al. "Rewilding Complex Ecosystems." *Science* 364, no. 6438 (April 26, 2019): eaav5570.
<https://doi.org/10.1126/science.aav5570>.
- Persson, Johannes, Nils-Eric Sahlin, and Annika Wallin. "Climate Change, Values, and the Cultural Cognition Thesis." *Environmental Science & Policy* 52 (October 1, 2015): 1–5.
<https://doi.org/10.1016/j.envsci.2015.05.001>.
- Pettifor, Ann. *The Case for the Green New Deal*. Verso Books, 2020.
- Pielke, Roger A. "Policy History of the US Global Change Research Program: Part I. Administrative Development." *Global Environmental Change* 10, no. 1 (April 2000): 9–25.
[https://doi.org/10.1016/S0959-3780\(00\)00006-6](https://doi.org/10.1016/S0959-3780(00)00006-6).
- Pogge, Thomas. "Allowing the Poor to Share the Earth." *Journal of Moral Philosophy* 8, no. 3 (January 1, 2011): 335–52.
<https://doi.org/10.1163/174552411X588982>.
- . "Are We Violating the Human Rights of the World's Poor?" In *Ethical Issues in Poverty Alleviation*, edited by Helmut P. Gaisbauer, Gottfried Schweiger, and Clemens Sedmak, 14:17–42. Studies in Global Justice. Cham: Springer International Publishing, 2016. https://doi.org/10.1007/978-3-319-41430-0_2.
- Pratley, David. "Beyond the 100 Mile City. Some Thoughts about the Impact of the Coalition's Cultural Policies at the Edge of London's Cultural Hinterland." *Cultural Trends* 24, no. 1 (February 3, 2015): 66–70.
<https://doi.org/10.1080/09548963.2014.1000588>.
- Quarderer, Nathan Anderson, Gavin W. Fulmer, Brian Hand, and Ted A. Neal. "Unpacking the Connections between 8th Graders'

- Climate Literacy and Epistemic Cognition." *Journal of Research in Science Teaching* 58, no. 10 (2021): 1527–56.
<https://doi.org/10.1002/tea.21717>.
- Raval, Ruchi D., and Mansi Mehta. "Nipah: An Interesting Stance." *Health Promotion Perspectives* 10, no. 1 (January 28, 2020): 5–7. <https://doi.org/10.15171/hpp.2020.03>.
- Read, Rupert. "Wittgenstein and the Illusion of 'Progress': On Real Politics and Real Philosophy in a World of Technocracy." *Royal Institute of Philosophy Supplements* 78 (July 2016): 265–84.
<https://doi.org/10.1017/S1358246116000321>.
- Rifkin, Jeremy. "The Third Industrial Revolution: A Radical New Sharing Economy," February 13, 2018.
<https://www.youtube.com/watch?v=QX3M8Ka9vUA>.
- Roco, Mihail C., W.S. Bainbridge, B. Tonn, and G. Whitesides. "Convergence of Knowledge, Technology, and Society: Beyond Convergence of Nano-Bio-Info-Cognitive Technologies." Science Policy Reports. Lancaster, England: WTEC, Inc., July 2013. <https://doi.org/10.1007/978-3-319-02204-8>.
- Roos, Andreas. *Solar Technology and Global Environmental Justice: Vision and the Reality*. Routledge, 2023.
- Sahagun, Louis. "Coyotes, Falcons, Deer and Other Wildlife Are Reclaiming L.A. Territory as Humans Stay at Home." *Los Angeles Times*, April 21, 2020, sec. Climate & Environment.
<https://www.latimes.com/environment/story/2020-04-21/wildlife-thrives-amid-coronavirus-lockdown>.
- Sale, Kirkpatrick. *Dwellers in the Land: The Bioregional Vision*. University of Georgia Press, 2000.
- Scalercio, Mauro. "Dominating Nature and Colonialism. Francis Bacon's View of Europe and the New World." *History of European Ideas* 44, no. 8 (November 17, 2018): 1076–91.
<https://doi.org/10.1080/01916599.2018.1512282>.
- Schneider, Nathan. "The Green New Deal Could Dramatically Expand Economic Democracy," February 15, 2019.
<https://www.thenation.com/article/the-green-new-deal-could-dramatically-expand-economic-democracy/>.
- Schummer, Joachim. "From Nano-Convergence to NBIC-Convergence: 'The Best Way to Predict the Future Is to Create It.'" In *Governing Future Technologies: Nanotechnology and the Rise of an Assessment Regime*, edited by Mario Kaiser, Monika Kurath, Sabine Maasen, and Christoph Rehmann-Sutter, 57–71.

- Sociology of the Sciences Yearbook. Dordrecht: Springer Netherlands, 2009. https://doi.org/10.1007/978-90-481-2834-1_4.
- Schwab, Klaus. *The Fourth Industrial Revolution*. Cologny/Geneva: World Economic Forum, 2016.
- Sciulli, Paul W., and Michael C. Mahaney. "Evidence of Local Biological Continuity for an Ohio Hopewell Complex Population." *Midcontinental Journal of Archaeology* 11, no. 2 (1986): 181–99.
- Sen, Amartya. "Elements of a Theory of Human Rights." Justice and the Capabilities Approach, May 15, 2017. <https://doi.org/10.4324/9781315251240-6>.
- . "Population Policy: Authoritarianism versus Cooperation." *Journal of Population Economics* 10, no. 1 (1997): 3–22.
- Shapiro, Judith. *Mao's War against Nature: Politics and the Environment in Revolutionary China*. Studies in Environment and History. Cambridge: Cambridge University Press, 2001. <https://doi.org/10.1017/CBO9780511512063>.
- Shiva, Vandana. *Soil Not Oil by Vandana Shiva*. North Atlantic Books. Berkeley, CA, 2015.
- Shue, Henry. *Climate Justice: Vulnerability and Protection*. Oxford, UK: Oxford University Press, 2014. <https://global.oup.com/academic/product/climate-justice-9780198713708?cc=us&lang=en&>.
- Shusterman, Richard. "Pragmatist Aesthetics and Confucianism." *The Journal of Aesthetic Education* 43, no. 1 (2009): 18–29.
- Smil, Vaclav. *Making the Modern World: Materials and Dematerialization*. West Sussex, UK: John Wiley & Sons, 2013.
- Smith, Adam. *An Inquiry into the Nature and Causes of the Wealth of Nations*. Electbook Classics. London: Oxford University Press, 1998.
- Smith, Michael. "V. Gordon Childe and the Urban Revolution: A Historical Perspective on a Revolution in Urban Studies." *Town Planning Review* 80, no. 1 (January 1, 2009): 3–30. <https://doi.org/10.3828/tpr.80.1.2a>.
- Smith, Michael B. "The Value of a Tree: Public Debates of John Muir and Gifford Pinchot." *The Historian* 60, no. 4 (June 1, 1998): 757–78. <https://doi.org/10.1111/j.1540-6563.1998.tb01414.x>.

- Sovacool, Benjamin K., and Michael H. Dworkin. *Global Energy Justice*. Cambridge University Press, 2014.
- Statista. "Global Megatrends." Statista, September 26, 2022. <https://www.statista.com/topics/3512/global-megatrends/>.
- . "Urbanization Growth." UN Population Division, 2020.
- Steffen, Will, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig. "The Trajectory of the Anthropocene: The Great Acceleration." *The Anthropocene Review* 2, no. 1 (April 1, 2015): 81–98. <https://doi.org/10.1177/2053019614564785>.
- Steffen, Will, Johan Rockström, Katherine Richardson, Timothy M. Lenton, Carl Folke, Diana Liverman, Colin P. Summerhayes, et al. "Trajectories of the Earth System in the Anthropocene." Edited by William C. Clark. *Proceedings of the National Academy of Sciences* 115, no. 33 (August 14, 2018): 8252–59. <https://doi.org/10.1073/pnas.1810141115>.
- "Submarine Cable Map." Accessed November 18, 2022. <https://www.submarinecablemap.com/>.
- Swanson, Ana. "How China Used More Cement in 3 Years than the U.S. Did in the Entire 20th Century." *Washington Post*, March 24, 2015, sec. Wonkblog. <https://www.washingtonpost.com/news/wonk/wp/2015/03/24/how-china-used-more-cement-in-3-years-than-the-u-s-did-in-the-entire-20th-century/>.
- Swer, Gregory Morgan. "The Road to Necropolis: Technics and Death in the Philosophy of Lewis Mumford." *History of the Human Sciences* 16, no. 4 (November 1, 2003): 39–59. <https://doi.org/10.1177/0952695103164003>.
- Syvitski, Jaia, Colin N. Waters, John Day, John D. Milliman, Colin Summerhayes, Will Steffen, Jan Zalasiewicz, et al. "Extraordinary Human Energy Consumption and Resultant Geological Impacts Beginning around 1950 CE Initiated the Proposed Anthropocene Epoch." *Communications Earth & Environment* 1, no. 1 (October 16, 2020): 1–13. <https://doi.org/10.1038/s43247-020-00029-y>.
- Taylor, Peter J., and Ben Derudder. *World City Network: A Global Urban Analysis*. Psychology Press, 2004.
- TeleGeography. "Submarine Cable FAQs." Accessed November 18, 2022. <https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions>.

- Tertullian. *Delphi Complete Works of Tertullian (Illustrated)*. Translated by Peter Holmes. Delphi Classics, 2018.
- Thoreau, Henry David. *Walden: A Fully Annotated Edition*. Yale University Press, 2004.
- Thwaites, Reuben, ed. *The Jesuit Relations and Allied Documents: Travels and Explorations of the Jesuit Missionaries in New France*. Vol. 1. 71 vols. Cleveland, OH: The Burrows Brothers Co, 1896. <https://archive.org/search?query=Jesuit+Relations>.
- UN. "Global Issues: Climate Change." United Nations, 2021. <https://www.un.org/en/global-issues/climate-change>.
- UN DESA. "68% of the World Population Projected to Live in Urban Areas by 2050." Department of Economic and Social Affairs, May 16, 2018. <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>.
- UN General Assembly. "UN Decade on Restoration." UN Decade on Restoration. Accessed May 26, 2023. <http://www.decadeonrestoration.org/node>.
- UN SDGs. "Goal 7 | Department of Economic and Social Affairs, Sustainable Development." United Nations, 2015. <https://sdgs.un.org/goals/goal7>.
- Venditti, Bruno. "Visualizing the Accumulation of Human-Made Mass on Earth." Visual Capitalist, November 29, 2021. <https://www.visualcapitalist.com/visualizing-the-accumulation-of-human-made-mass-on-earth/>.
- Vicino, Thomas J., Bernadette Hanlon, and John Rennie Short. "Megalopolis 50 Years On: The Transformation of a City Region." *International Journal of Urban and Regional Research* 31, no. 2 (2007): 344–67. <https://doi.org/10.1111/j.1468-2427.2007.00728.x>.
- Voosen, Paul. "Meet Vaclav Smil, the Man Who Has Quietly Shaped How the World Thinks about Energy." Science.org, March 21, 2018. <https://www.sciencemag.org/news/2018/03/meet-vaclav-smil-man-who-has-quietly-shaped-how-world-thinks-about-energy>.
- Walsh. *The Archaeology of Mediterranean Landscapes: Human-Environment Interaction*. Cambridge: Cambridge University Press, 2014. https://books.google.com/books/about/The_Archaeology_of_Mediterranean_Landsca.html?id=IQJaAQAAQBAJ.

- Walsh, Kevin. *The Archaeology of Mediterranean Landscapes: Human-Environment Interaction from the Neolithic to the Roman Period*. Cambridge University Press, UK: Cambridge University Press, 2014.
- Wang, Zhong Lin. "Nanogenerators, Self-Powered Systems, Blue Energy, Piezotronics and Piezo-Phototronics – A Recall on the Original Thoughts for Coining These Fields." *Nano Energy* 54 (December 1, 2018): 477–83.
<https://doi.org/10.1016/j.nanoen.2018.09.068>.
- . "Progress in Piezotronics and Piezo-Phototronics." *Advanced Materials* 24, no. 34 (2012): 4632–46.
<https://doi.org/10.1002/adma.2011104365>.
- Waters, Colin N., James P. M. Syvitski, Agnieszka Gałuszka, Gary J. Hancock, Jan Zalasiewicz, Alejandro Cearreta, Jacques Grinevald, et al. "Can Nuclear Weapons Fallout Mark the Beginning of the Anthropocene Epoch?" *Bulletin of the Atomic Scientists* 71, no. 3 (January 1, 2015): 46–57.
<https://doi.org/10.1177/0096340215581357>.
- Waters, Colin N., and Jan A. Zalasiewicz. "Concrete: The Most Abundant Novel Rock Type of the Anthropocene." In *Encyclopedia of the Anthropocene*, 1:75–85. Oxford: Elsevier, 2018.
- Waters, Colin N., Jan A. Zalasiewicz, Mark Williams, Michael A. Ellis, and Andrea M. Snelling. "A Stratigraphical Basis for the Anthropocene?" *Geological Society, London, Special Publications* 395, no. 1 (November 2, 2014): 1–21.
<https://doi.org/10.1144/SP395.18>.
- Waters, Colin N., Jan Zalasiewicz, Colin Summerhayes, Anthony D. Barnosky, Clément Poirier, Agnieszka Gałuszka, Alejandro Cearreta, Matt Edgeworth, Erle C. Ellis, and Michael Ellis. "The Anthropocene Is Functionally and Stratigraphically Distinct from the Holocene." *Science* 351, no. 6269 (2016): aad2622.
- Weckert, John. "Is There a New Technological Imperative?" In *Ethics in Nanotechnology: Emerging Technologies Aspects*, 21–40. De Gruyter, 2021. <https://doi.org/10.1515/9783110701883-002>.
- Wengrow, David. *What Makes Civilization? The Ancient Near East and the Future of the West*. Oxford, UK: Oxford University Press, 2010.
- Wilson, Alan. "The 'Thermodynamics' of the City." In *Complexity and Spatial Networks: In Search of Simplicity*, edited by Aura Reggiani and Peter Nijkamp, 11–31. Advances in Spatial

- Science. Berlin, Heidelberg: Springer, 2009.
https://doi.org/10.1007/978-3-642-01554-0_2.
- Wilson, E.O. *Half-Earth*. First. New York, NY: W.W. Norton, 2016.
- Wittgenstein, Ludwig, Georg Henrik Wright, Heikki Nyman, and Alois Pichler. *Culture and Value: A Selection from the Posthumous Remains*. Blackwell, 1998.
- Wright, Alice, and Cameron Gokee. "Modeling the Interaction Sphere: Social Network Approaches to Hopewellian Material Culture in the Middle Woodland Southeast." Tampa, FL, 2013.
- Wuebbles, D. "Atmospheric Methane and Global Change." *Earth-Science Reviews* 57, no. 3–4 (May 2002): 177–210.
[https://doi.org/10.1016/S0012-8252\(01\)00062-9](https://doi.org/10.1016/S0012-8252(01)00062-9).
- Yang, Bo, and Shujuan Li. "Design with Nature: Ian McHarg's Ecological Wisdom as Actionable and Practical Knowledge." *Landscape and Urban Planning*, Ecological Wisdom for Urban Sustainability: Doing real and permanent good in ecological practice, 155 (November 1, 2016): 21–32.
<https://doi.org/10.1016/j.landurbplan.2016.04.010>.
- Zellmer, Amanda J., Eric M. Wood, Thilina Surasinghe, Breanna J. Putman, Gregory B. Pauly, Seth B. Magle, Jesse S. Lewis, Cria A. M. Kay, and Mason Fidino. "What Can We Learn from Wildlife Sightings during the COVID-19 Global Shutdown?" *Ecosphere* 11, no. 8 (2020): e03215. <https://doi.org/10.1002/ecs2.3215>.