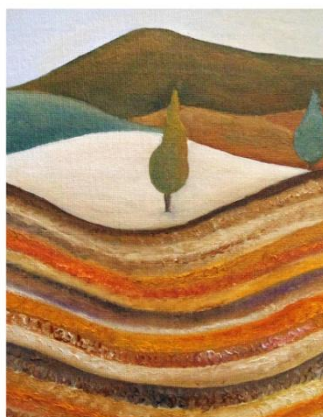

SPRINGS

THE RACHEL CARSON CENTER REVIEW

Issue #2 | 2022

December



Springs
The Rachel Carson Center
Review

Issue #2 | 2022

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Note from the Editors

The RCC is delighted to announce the release of the second issue of [Springs: The Rachel Carson Center Review](#), an open-access online publication surveying the interrelationship between social and environmental changes. The authors, writing from Australia, the US and Canada, China, South Africa, and India, convey our international scope and global mission. In essays that inform and inspire, they share their perspectives on environmental concerns across place and time. This issue includes peer-reviewed essays on sharks and Monarchs, environmental historical analyses, creative nonfiction, and a poem about an earthworm that reminds us to look more closely.

"The Pyrocene is a radical category," observes historian Tom Griffiths in "[Australia Burning](#)." Placing the "acid orange blanket," and "the funereal stillness and silence of the burnt forests" within environmental history, he offers insights about Australia in a warming world.

In "[Monarchs of the Great Plains: Plant Power and Colonial Legacies in North America](#)," historian Sara M. Gregg explores the "interwoven life cycles of milkweed and Monarch" butterflies. The article reveals the effects of Euro-American settlement and agricultural practices on both species as global and local efforts alight and take flight.

In an audio recording, Sumana Roy reads her poem, "[Earthworm](#)." A tribute to the "soil's saint," the poem serves as a reminder of the wondrous power and fragility in the everyday.

From the memory of "billowing plumes of smoke" in "[Chicago's Temple of Steel: South Works since 1882](#)," environmental historian J. R. McNeill traces iron ore from the Precambrian period through the steelworks of the industrial era, when millions migrated to the Windy City. On a recent visit, the author glimpses the creative repurposing of monuments of slag today.

When and how did certain shark species, considered true fighters by recreational anglers, become vulnerable and even endangered, a loss that threatens marine ecosystems today? In "[Fishing for Sharks](#)," scholar of marine and global environmental history Miles Powell dives into sportfishing practices, literature, biology, and ecology to find answers.

Dependence on coal, rolling blackouts, air pollution, and land scarred by mining lead to "[Power Poverty: Energy Injustice in South Africa](#)." Jane Carruthers provides a historical overview of the challenges thwarting a transition to renewable energy as South African activists gather force and international organizations convene to address climate change.

"[Ecological Civilization](#)," by Donald Worster, a founder of environmental history, describes an "imaginary" that emphasizes the ecosphere and "calls for linking the welfare of the earth to the welfare of humankind," a concept with roots in Western philosophy and Chinese traditions with relevance to our contemporary planetary consciousness.

Elin Kelsey reflects on her encounters with the natural world from dusk to dawn in "[Why I Sleep Outside](#)." What started as a "quiet gesture" becomes a "sleepy form of activism" and "a way of connecting to the planetary community of 8.7 million species."

In an "ocean-conscious" version of environmental history, "[Cities by the Sea: A Tale of Qingdao and Los Angeles](#)," Shen Hou looks across the Pacific and sees not only a route of trade and imperialism but also "an invisible bond" between these "complex, human-reconstructed ecosystems."

Springs also brings together writing from other RCC publications. Its [archive](#) curates articles that were published in the open-access online and print journal [RCC Perspectives](#) (2010-2020), in the blog [Seeing the Woods](#) (2012-2021), and in the peer-reviewed online journal [Arcadia: Explorations in Environmental History](#).

Munich,
13 December 2022

AUSTRALIA BURNING

Tom Griffiths

Springs
The Rachel Carson Center Review

2 • 2022

Tom Griffiths

In November 2019, as forest fires worked their way south along the Great Dividing Range, I walked for a week in the Australian Alps. The wild granite tors, the delicate beauty of the snow gums, and the exhilarating freedom of the Alpine herb fields always lift my spirits. In late spring and early summer, this landscape still carries the memory of snow, of a magic, ethereal otherworld I came to know on skis as a child. Slicks of ice remain tucked under crags. It is a place apart, of subtle colours and sharp air, where ranges of cerulean blue cascade in receding waves to the horizon.

But this time the mountains had all gone, swallowed by an apocalypse.



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From high in the Kosciuszko National Park, I could see nothing of the world below. In every direction I looked down upon a strange, suffocating orange blanket. This was no mystic lake of fog that would evaporate in the morning sun; it was something sinister and malevolent, infusing every scarp and canyon with its sickness. There below me, Australia was burning. Could people still be alive down there, in such dense, acrid smoke? Could they breathe? In the mornings, a temperature inversion kept the ugly blanket below me, but each afternoon my eyes started smarting as smoke infiltrated the Alpine valleys, dying the sun red. That smoke killed ten times more people than the flames. It was coming for me, and I couldn't go any higher.

This was no mystic lake of fog that would evaporate in the morning sun, it was something sinister and malevolent, infusing every scarp and canyon with its sickness.

Looking down on a burning world brought home to me, perhaps more forcibly than facing the flames below, what the future might hold. One way to make sense of this critical tipping point is the idea that we are living in the Anthropocene, having left behind the relatively stable Holocene epoch, the period since the last ice age. But as I gazed down on the smoke, I remembered an alternative name for this era that has been proposed by historian Stephen Pyne. It is the Pyrocene: a fire age, comparable to past ice ages.ⁱ

The Pyrocene centres fire in the human ecological story and contrasts it with ice. Fire is alive and ice is dead. Fire is at the heart of human civilisation, for we are a fire species. Yet we are also, paradoxically, creatures of the ice. Humanity was born in the Pleistocene, a geological epoch that began two-and-a-half million years ago and introduced a series of rhythmic ice ages—or, to be precise, one long ice age punctuated by brief interludes of interglacial warmth. The repetitive glaciations of the Pleistocene, which demanded innovation and versatility, promoted the emergence of humanity on Earth.

The Pyrocene is a radical category. The Anthropocene declares the end of the most recent interglacial period. The Pyrocene goes further by declaring the end of the much older Pleistocene. It announces the end of the Age of Ice, the beginning of the Age of Fire, and the end of what was the Age of Humans. Not the beginning of the Age of Humans, as the smugly named Anthropocene suggests, but the end. And Australia is on the front line of the Pyrocene. This is what I pondered as I watched the acrid orange blanket snake up the Alpine gullies towards me. Are we witnessing the beginning of the end? Is this what the Pyrocene looks like? Nowhere to go but up, and no up to go to?ⁱⁱ

For eight months, constant bushfires overwhelmed Australia. This traumatic period across 2019–20 became known as the Black Summer, although it began in the middle of winter and burned through to the start of autumn. It unleashed its power on a continental scale: from Queensland to the Western Australian woodlands, from the Adelaide Hills to Victoria's East Gippsland, from the coastal ranges of New South Wales to South Australia's Kangaroo Island, from the Australian Capital Territory to Tasmania. Everywhere, suddenly, bushfire was tipping into something new.ⁱⁱⁱ

Fire was not just more extensive, intense, and enduring; it went rogue. New South Wales declared six days of Catastrophic Fire Danger (the new level invented just a decade earlier), 22 days of Extreme Fire Danger, and 72 of Severe. There were 59 Total Fire Ban declarations.^{iv}

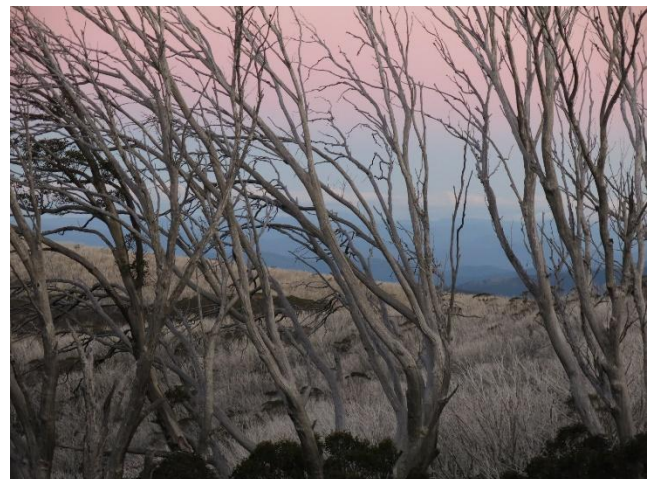
Fire shaped Aboriginal civilisation on the continent for tens of thousands of years and fire is scripted into the modern nation's identity. But Black Summer was the first time that bushfires burnt so vastly and for so long that they were neither a confined "event" and nor were they just "Australian." They became a planetary phenomenon: Smoke from these fires encircled the globe.

There is something personal about bushfire, something frighteningly irrational and beyond human comprehension. It roars out of the bush and out of our nightmares.

Great fires in Australia are given names, generally after the day they strike. They are almost always called "black" because of their legacy of grief and mourning, the loss of life they inflict, and the funereal stillness and silence of the burnt forests the day after, when there are no leaves to stir.

There are enough “Black” days in modern Australian history to fill up a week several times over—Black Sundays, Mondays, Tuesdays, Thursdays, Fridays, and Saturdays—and a Red Tuesday too, plus the grim irony of an Ash Wednesday on the first day of Lent, 1983. But when bushfires burn for months as they did in 2019-20, the Black day becomes a summer, the Black Summer.

Perhaps the bushfires of 2019-20 should have been called the Red Summer, to signal a new phenomenon. It was relentlessly red, the colour of danger, of ever-lurking flame. Acrid orange smoke engulfed cities and purple pyrocumuli terrified townships. The enduring image was of people cowering on beaches in a red-orange glow. The threat was always there. There was no longer a single Black day and no identifiable day-after.



(Left) Canberra covered in the smoke of a nearby bushfire. © Daniielec on iStock. All rights reserved. (Right) Sky turned purple because of bushfire. © Tom Griffiths. All rights reserved.

There is something personal about bushfire, something frighteningly irrational and beyond human comprehension. It roars out of the bush and out of our nightmares. Not only do Australians give fires names, they also assign them the characteristics of monsters: The fires have flanks, fingers, and tongues, they're hungry, they lick and devour—and they know where we are. Houses are “swallowed” and people are “caught between the jaws of the flame.” Fire has an “appetite,” “seeks more victims,” and “fiercely attacks.”^v Bushfire makes people feel hunted and its survivors toyed with. Why did the fire destroy the house next door and leave mine unscathed? Children ask parents: *How did the fire know we lived here?*^{vi}

Instead of the sprites, elves, and wood nymphs that populate the forest folklore of the Northern Hemisphere, Australian colonists found that their bush harboured a different creature. As poet Les Murray put it, the “gum forest’s smoky ambience reminds us that the presiding spirit who sleeps at its unreachable heart is not troll or goblin, but an orange-yellow monster who forbids any lasting intrusion there.”^{vii} People on the south coast of New South Wales called the Currowan fire, which rampaged for 74 days, “the beast.”^{viii}

During Black Summer, Australians witnessed the best and worst of their society: the instinctive strength of bush communities and the manipulative malevolence of fossil-fuelled politicians. In a searing piece of reportage from the NSW south coast, Bronwyn Adcock was witness to “Australians doing everything they could, even when their government didn’t.”^{ix} If the fires revealed the strength of bush communities and the innate goodness of people in extremis, so too did they expose the absence of federal leadership and the weakness of our parliamentary democracy. As if neglect and omission were not enough, federal politicians hastily encouraged lies, declaring that the fires were started by arsonists and that “greenies” prevented hazard-reduction burns. Yet we know that these fires were overwhelmingly started by dry lightning in remote terrain and that hazard-reduction

burning—which is far from a panacea—is constrained by a warming climate. The effort to stymie sensible policy reform after the fires was as pernicious as the failure to plan in advance of them.

In early 2019, as a dangerous season loomed, experienced senior fire officers from across the country formed the Emergency Leaders for Climate Action (ECLA) and called for a meeting with the then prime minister, Scott Morrison. He said he was “too busy,” dismissed their calls for strategy and resources, ignored offers of briefings, refused bipartisan political action, fobbed them off to ministers who fobbed them off to staffers, stood by while his deputy called them “time wasters,” misled the public about the level of government response, abided false personal attacks on ECLA members by the Murdoch press, and was altogether so consumed by the busy work of spinning, dissembling, and gaslighting that neither the national interest nor the welfare of fire-ravaged communities ever seemed in the vision of the person occupying the highest office in the land.^x In the years that followed Black Summer, not one cent of the AU\$4.7 billion of federal funding promised for bushfire recovery was spent. At the next federal election, which took place in May 2022, the Morrison government was swept from office in what has been called “the climate election.”

As beneficiaries of a dispossession they deny and a war they decline to recognise, Australians are highly practised in cognitive dissonance.

Australians cower on the burning frontier of a warming world. Yet political leaders decreed that possible links between bushfire and climate change were not to be spoken of in public. Where does this intransigence—or bloody-mindedness—come from? It is so deeply embedded in Australia’s modern psyche that we can hardly analyse it. It comes first from a conquest mentality that was built on denial, the denial by British invaders of Aboriginal sovereignty and cultural sophistication. As beneficiaries of a dispossession they deny and a war they decline to recognise, Australians are highly practised in cognitive dissonance.

Second, Australia’s modern history is a by-product of the Anthropocene. The transformation of hundreds of Aboriginal Countries into a cluster of British colonies coincided with the start of the fossil-fuel era. James Cook’s HM Bark *Endeavour* was a refitted coal ship from the world’s fastest industrialising nation. The new nation under southern skies, a fragment of the ancient supercontinent of Gondwana, was bequeathed substantial coal, oil, and gas resources and became dependent on them. Coal still delivers 54 percent of Australia’s electricity generation.^{xi} Undeclared fossil-fuel funding of successive governments explains much of Australia’s twenty-first century politics. But so too does a culture of popular regard for the nation’s heroic frontier-mining history, not only because mining is believed to generate wealth but also because many families and communities trace their origins to nineteenth-century emigration, tall ships, and the transformative gold rushes.



The bleached trunks of snowgums killed by fire in the Australian Alps. © Tom Griffiths. All rights reserved.

There is a third explanation for Australian climate denialism that is rarely acknowledged but perhaps more interesting, for it draws on the nation's peculiar environmental history. Europeans who came to Australia encountered a different nature, one that challenged them physically, emotionally, and intellectually. They found it a threat and a puzzle as well as full of wonder. It was seen as a land of "living fossils," "the last of lands," a continental museum, and "a palaeontological penal colony." Marsupials (the kangaroo, possum, wombat, and koala) and monotremes (the platypus and echidna) were considered undeveloped or inefficient compared to placental mammals. Australia is part of a completely different faunal world for it lies on the other side of what became known as the Wallace Line (identified by the British naturalist Alfred Russel Wallace), an abrupt boundary of faunal types between Borneo and Sulawesi that separates monkeys from kangaroos and woodpeckers from cockatoos.^{xii} Australia is truly "the antipodes," an "upside-down" land where trees shed bark rather than leaves and where the seasons are reversed.

The strange southern seasons are not even annual. Australia is renowned as a "land of droughts and flooding rains," of "fire and flood and famine," as Dorothea McKellar put it in her beloved 1908 poem "My Country." It is the driest inhabited continent, a land with a boom-and-bust ecosystem dominated by the fire-hungry eucalypt and governed by the El Niño-Southern Oscillation. Colonists considered drought years so unnatural that they were sometimes excluded from calculations of rainfall averages. British settlers learned the hard way that their new home was prone to climatic extremes that were natural rather than aberrant. Dealing with the repetitive traumas of flood, drought, and fire, and learning to expect and *fight* them, became part of what it meant to be Australian.

It's not surprising then that many farmers and bush folk have been slow to accept anthropogenic climate change—for they have spent their lives coming to terms with extreme natural variability. Their experience of wayward nature makes them sceptical about a different kind of variability, especially one they are told is global, unremitting, and unnatural. It is as if the rules of the game have changed. Thus, the history of modern Australian settlement sedated the populace against recognising its greatest peril.

Australian public debates about bushfires and climate change are further weakened by a lack of understanding of fire ecology, even among fire authorities. Managers are under pressure to generate universal solutions and to work effectively with large-scale state and federal agencies. But fire regimes are intensely local. A forest is not just any forest, but a unique community of trees. A fire is not just any fire, but one of a particular frequency, a particular intensity, a particular range, a particular ecology.

Let me give an example of a neglected ecological insight. Firestorms are bushfires of a different magnitude; they cannot be fought. Until Black Summer, the most frightening and fatal Australian firestorms had all roared out of the same region—"the fire flume," as historian Stephen Pyne calls the hot northerly winds that sweep scorching air from the central deserts into the forested ranges of Victoria and Tasmania.^{xiii} In the flume, bushfires strike every year, firestorms every few decades. Most of Australia's Black Days were minted there. They were created not only by distinct topography and weather but also by particular trees—the mountain ash and the Alpine ash—species that conspire to create a raging crown fire that kills and reproduces the whole forest *en masse*.^{xiv}

In spite of this vital ecological truth, no vegetation map appeared in the Royal Commission report into the 2009 Black Saturday fires, which erupted in the heart of the flume. "The natural environment," the commissioners blandly explained in their introduction, "was heavily impacted."^{xv} The trees that welcomed the fire were allowed no agency. The commission sat for 155 days but described the distinctive forests through which the fires raged as "fuel." Perhaps this ecological blindness is now changing: Black Summer was the first fire season in which Australians tried to calculate the mortality of wildlife (estimated in the billions).



Newspapers reporting the 2009 Black Saturday firestorm and its aftermath. © Tom Griffiths. All rights reserved.

One of the signals of Black Summer's difference was that the firestorm extended its range. For the first time New South Wales experienced life-threatening fires and property losses on a scale like those in Victoria and Tasmania. Greg Mullins, a former Commissioner of Fire and Rescue NSW, who fought on myriad fire fronts throughout 2019 and 2020, found that tried-and-true fire-fighting techniques were no longer working and "pyro-convective events" (fire-generated lightning storms), once rare, erupted frequently.^{xvi} Although climate change destabilises fire knowledge built on history, research into the unique ecologies and human histories of each forest, woodland, and grassland can map change and protect life.

There is an irresistible tendency (which I have succumbed to here) to use language that describes bushfire in terms of tragedy and destruction. Not only do we talk in crisis language, we also use military metaphors—partly because, in the face of an awesome natural force, they offer some comforting human agency. Thus, we refer to the fire authorities hunkered down in a "war room," we revere the heroism of the firefighters and compare them to Anzacs (Australia's soldiers in the Great War), and we describe forests as *destroyed*, even if they are evolved to burn. And heroism in such a culture tends to be defined (dangerously) as staying and fighting. Leaving early in the face of a fire threat might be seen as cowardly or as betraying your community. On Black Saturday 2009, 173 people died, two-thirds of them in their own homes. Military metaphors make us believe that we can and must beat fire, somehow. Yet the challenging task is to learn to live with it.^{xvii}



New growth after a firestorm. © Tom Griffiths. All rights reserved

In the quest for how to live with fire, Indigenous cultural burning philosophies and practices have much to offer. On the wooded plains and the margins of the wet sclerophyll forests, Aboriginal peoples kept their hunting grounds open and freshly grassed by light regular burning. By burning small patches at a time and creating mosaics of vegetation, they controlled large fires, fostered biodiversity, and encouraged an abundance of medium-sized mammals. Farming with the firestick created open woodlands of mature, well-spaced trees, and cultivated the dominance of grass species, while the wet forests were corralled and respected. Today, Australians are still slow to recognise the complexity, diversity, and intentionality of Indigenous fire practices. We are slowly learning to respect cultural burning and its capacity to put good fire back into a land that needs fire. Sometimes we can even see a fired landscape (of the right intensity and frequency) as beautiful or “clean,” as Aboriginal peoples do. But we must go further and actually enable Indigenous fire practitioners to take the lead again. Victor Steffensen, a Tagalaka descendant from North Queensland, has written a hopeful book, *Fire Country* (2020), which is as much about negotiating the bureaucratic

hierarchies of firepower as it is about fire itself. As his mentor, Tommy George, declared in frustration, “Those bloody national park rangers, they should be learning from us.”^{xviii}

But cultural burning is not the same as prescribed burning.^{xix} Sensitive controlled burning might render some lands safer for habitation, although it has proven difficult to achieve required levels in a warming world. And in a landscape of transformed ecologies, greatly increased population, and rapidly changing climate, it is unreasonable and dangerous to expect Indigenous peoples to make the land safe for the proliferating newcomers. Anthropologist Tim Neale has argued that the settler “dream of control” places an “impossible burden” on Aboriginal peoples, trapping them again within an idealised expectation of unchanging ancient behaviour.^{xx}

Renewing and reviving Indigenous fire practices is important, first and foremost, for human rights, native title, and the health, well-being, and self-esteem of First Nation communities. We are fortunate that an additional opportunity presents itself: for a rapprochement between the exercise of Indigenous responsibility to Country and modern Australia’s need for labour-intensive and ecologically sensitive fire management on the ground. There is much creative promise in that partnership and developing it requires time, patience, and respect.

Renewing and reviving Indigenous fire practices is important, first and foremost, for human rights, native title, and the health, well-being, and self-esteem of First Nation communities.

Australian scholars of fire need to work on at least three temporal scales. First, there is the deep-time environmental and cultural history of the continent and its management over millennia. Second, there is the century-scale history of invasion, documenting the changes wrought by the collision of a naïve fire people with the fire continent. And third, there is the long future of climate-changed nature and society. Australians have held 58 retrospective bushfire inquiries since Black Friday 1939; establishing them in the ashes is understandably a government reflex and part of the blame game.^{xxi} Arsonists, greenies, and errant managers are easier to blame than poor policy, environmental ignorance, or cultural blindness. Political and technological solutions are too often preferred over deeper environmental or cultural adaptations.

There will be more Black Days and even scarier Red Summers. Rather than spending millions of dollars on lawyers after the flames, the nation would do better to spend a few thousand dollars on environmental historians. Historians listen holistically to the voice of experience, however surprising or uncomfortable it may be. They release narratives that run counter to official or dominant interpretations. They are more inclined to acknowledge the complex and sometimes fatal integration of nature and culture, the embedded patterns of settlement that can create or amplify disaster. And they can elucidate the long perspective of Earth history demanded by the Pyrocene

Notes

ⁱ Stephen J. Pyne, *The Pyrocene: How We Created an Age of Fire, and What Happens Next* (Oakland: University of California Press, 2021).

ⁱⁱ I rely here on my essay "Drawing Breath" in Sophie Cunningham, ed., *Fire, Flood, Plague: Australian Writers Respond to 2020* (Melbourne: Vintage Australia, 2020). I have also made use of my Royal Historical Society of Victoria (RHSV) Augustus Wolskel Lecture 2020, published in the *Victorian Historical Journal* 91, no. 2 (December 2020): 217–44; as well as my essays "Savage Summer," *Inside Story*, 8 January 2020, <https://insidestory.org.au/savage-summer/>; and "Season of Reckoning," *Australian Book Review*, March 2020, <https://www.australianbookreview.com.au/abr-online/archive/2020/march-2020-no-419/734-march-2020-no-419/6243-season-of-reckoning-by-tom-griffiths>.

ⁱⁱⁱ For the best multidisciplinary analysis of Black Summer, see Peter Christoff, ed., *The Fires Next Time: Understanding Australia's Black Summer* (Melbourne: Melbourne University Publishing, forthcoming), which includes my chapter "The Fires: A Long Historical Perspective."

^{iv} Greg Mullins, *Firestorm: Battling Super-Charged Natural Disasters* (Melbourne: Viking, 2021), 253.

^v *Healesville and Yarra Glen Guardian*, 27 February 1926, 3; *Healesville and Yarra Glen Guardian*, 6 February 1926, 1; *Lilydale Express*, 21 February 1919, 3.

^{vi} Stephen Matthews, *How Did The Fire Know We Lived Here? Canberra's Bushfires January 2003* (Canberra: Ginninderra Press, 2003).

^{vii} Les Murray, *The Australian Year: The Chronicle of Our Seasons and Celebrations* (Sydney: Angus & Robertson, 1985).

^{viii} Bronwyn Adcock, *Currowan: The Story of a Fire and a Community During Australia's Worst Summer* (Melbourne: Black Inc., 2021).

^{ix} Bronwyn Adcock, "Living Hell," *The Monthly*, February 2020, <https://bronwynadcock.com/2020/02/11/living-hell/>.

^x This is a summary of Greg Mullins' account in *Firestorm*, 125–60.

^{xi} "Electricity Generation," Australian Government, Department of Climate Change, Energy, the Environment and Water, accessed 23 November 2022, <https://www.energy.gov.au/data/electricity-generation>.

^{xii} Penny van Oosterzee, *Where Worlds Collide: The Wallace Line* (Sydney: Reed Books, 1997).

^{xiii} Stephen J. Pyne, *Burning Bush: A Fire History of Australia* (Sydney: Allen & Unwin, 1992).

^{xiv} Tom Griffiths, "We Have Still Not Lived Long Enough," *Inside Story*, 16 February 2009, <https://insidestory.org.au/we-have-still-not-lived-long-enough/>; Id., *Forests of Ash: An Environmental History* (Melbourne: Cambridge University Press, 2001), 76–89.

^{xv} Hon. Bernard Teague AO, Ronald McLeod AM, and Susan Pascoe AM, *The Fires and the Fire-Related Deaths*, vol. 1. of 2009 Victorian Bushfires Royal Commission Final Report (Melbourne: Parliament of Victoria, 2010), xxiii.

^{xvi} Mullins, *Firestorm*, 170.

^{xvii} Christine Hansen and Tom Griffiths, *Living with Fire: People, Nature and History in Steels Creek* (Melbourne: CSIRO Publishing, 2012); Christine Hansen, "Deep Time and Disaster: Black Saturday and the Forgotten Past," *Environmental Humanities* 10, no. 1 (May 2018): 226-40, <https://doi.org/10.1215/22011919-4385543>.

^{xviii} Victor Steffensen, *Fire Country: How Indigenous Fire Management Could Help Save Australia* (Sydney: Hardie Grant, 2020), 22.

^{xix} Daniel May, "To Burn or Not to Burn Is Not the Question," *Inside Story*, 17 January 2020, <https://insidestory.org.au/to-burn-or-not-to-burn-is-not-the-question/>.

^{xx} Timothy Neale, "Digging for Fire: Finding Control on the Australian Continent," *Journal of Contemporary Archaeology* 5, no. 1 (May 2018): 79-90, p. 87, <https://doi.org/10.1558/jca.33208>.

^{xxi} Kevin Tolhurst, "We Have Already Had Countless Bushfire Inquiries: What Good will It Do to Have Another?" *The Conversation*, 15 January 2020, <https://theconversation.com/we-have-already-had-countless-bushfire-inquiries-what-good-will-it-do-to-have-another-129896>.

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FISHING FOR SHARKS

Miles Powell

Springs
The Rachel Carson Center Review

2 • 2022

Miles Powell

Today, the most potent symbol for shark conservation is arguably that of a finned shark—staring out helplessly from black eyes with its appendages sliced off for use in a soup prized in Chinese cuisine before its body is tossed back into the ocean, dead or alive. Despite receiving far less attention, sportfishing also poses a growing threat to these creatures. By tracing the historical origins of this pursuit, we can better understand its internal dynamics and ecological ramifications. In the early twentieth century, with entrepreneurs already having established industrial fisheries to convert shark bodies into commodities such as leather, oil, and meat, anglers found a new value for sharks as sources of recreation. They suggested that certain shark species constituted outstanding big game fish, stressing their spectacular fighting ability and the added benefit of ridding the waters of a menace. Despite the conservationist ethos and reverence for nature held by many proponents of sportfishing, angling for sharks often proved ecologically disastrous. At the same time, the claims of some recreational shark fishers that rescuing bathers justified depleting shark populations do not align with historical records of fatal human encounters with sharks.



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Humans have likely derived some pleasure from fishing since taking up the pursuit tens of thousands of years ago, but sportfishing as we understand it today has a specific genealogy. The vision of recreational angling explored here first emerged in early modern England and then spread throughout the Anglosphere, often by displacing (but never entirely erasing) Indigenous practices. In 1653, Englishman Izaak Walton published his popular volume *The Compleat Angler, or, The Contemplative Man's Recreation*. Focusing primarily on angling in rivers and streams, he extolled the pastime's relaxing, salubrious effects. Over the course of the nineteenth century, in popular

publications such as *Forest and Stream* and *Field & Stream*, American sportfishers further refined the notion of recreational fishing and exchanged ideas on what it meant to fish for sport. Urbanites seeking a respite from frenetic city life, the readers of these magazines embraced fishing for its regenerative qualities. Their carefully defined sportsman's code entailed never killing for profit, especially during breeding season, limiting the number of fish caught, and always giving their target a sporting prospect of escape.²²

Desiring to reserve as much quarry as possible for their own recreation, sportfishers developed hostility towards commercial harvesters pursuing livelihoods or subsistence fishers catching a meal.

By enhancing the difficulty of the catch, this code placed sportfishers at the vanguard of early conservation efforts, but race, gender, and class prejudices permeated the activity. Recreational fishing with a rod and reel became, for many, an assertion of an affluent, masculine Anglo-American identity—part of a broader movement in the English-speaking world, which proposed that “Anglo-Saxons” possessed a proclivity for outdoor sporting pursuits and nature conservation. Desiring to reserve as much quarry as possible for their own recreation, sportfishers developed hostility towards commercial harvesters pursuing livelihoods or subsistence fishers catching a meal. As sportfishers increasingly embraced catch-and-release angling, they grew still more frustrated with those who nearly always killed their catch, attitudes that frequently placed recreational anglers at odds with Indigenous groups. Although recreational anglers had recognized that they could deplete fish numbers, they generally blamed others, especially commercial harvesters, for plummeting stocks.²³

From the late nineteenth century, sportfishing for sharks mirrored popular narratives of big game hunting for land-based predators. Early accounts often emphasized the dangers that sharks posed to humans (and more desirable marine life) and the service fishers performed by killing them. As a turn-of-the-century Australian commenter stated, “Although it is possible that it would not find favour with the devotees of Isaak Walton’s gentle art, shark fishing has much to recommend it to lovers of sport.” The author added that “those who indulge in it have the additional satisfaction of knowing that they are doing a public service in assisting to exterminate these pests.” Many other writers made similar claims.²⁴



The Bonito Shark. A rod catch by Mr. Sharp. Jim Gardner, boatman.



(Left) Shark and billfish hanging on dock. Early proponents of recreational shark fishing contended that sharks should be recognized as game fish equivalent to the billfish co-displayed here. Photo by Tudor Washington Collins, 1945. [Wikimedia Commons](#). CC BY 4.0. (Right): Shortfin mako (a.k.a. bonito) shark caught on rod and reel, 1905. Owing to the mako's explosive speed and power, shark fishing proponents have long touted it as an outstanding game fish. Photo published in Charles Frederick Holder, *Fisheries of the Pacific Coast: A Handbook for Sportsmen and Tourists* (New York: Dodge Publishing Company, 1912). [Wikimedia Commons](#). Public domain.

Sportfishing for sharks received a further boost when Zane Grey and Ernest Hemingway, two US authors perceived as embodying manliness, recounted their shark-hunting adventures. After first angling for sharks in New Zealand in the 1920s, Grey resumed the sport in Australia in the 1930s but appeared torn in his attitude toward targeting sharks. Although he contended that makos, tiger sharks, and white sharks were legitimate quarry, testing the angler's strength, skill, and nerve, he endorsed abandoning the rules of sportfishing to protect people from sharks. Well-versed in the sportsman's code, Grey noted that shooting or harpooning a shark would disqualify the catch from game-fish records. Whenever possible, he advocated bringing the shark alongside the boat with a rod and reel before gaffing it: "the most thrilling method, and the one that gives the man-eater, terrible as he is, a chance for his life." Yet his loathing for sharks also made him receptive to less sporting methods: "Certainly it would be better to fish for sharks and shoot them on sight than not fish at all. For, every shark killed may save one or more lives."²⁵ Like Grey, Hemingway also considered sharks legitimate angling quarry. In his 1949 article "Cuban Fishing," he identified the mako shark as a fish that tested an angler's skill and stamina.²⁶ However, he also wrote of humans' struggles with sharks in his Pulitzer Prize-winning novel *The Old Man and the Sea* (1951). It narrates the tale of an aged Cuban fisherman who captures a giant marlin and tethers it to his boat, only to have sharks reduce it to a skeleton as he rows back to shore. An avid big game fisherman, Hemingway had experienced his own frustrations with sharks attacking his catches in the Gulf Stream. He reportedly responded by bringing a Thompson machine gun with him and firing at any sharks that disrupted his play.

Both Hemingway and Grey viewed the mako shark as especially well-suited to sportfishing. Among the most athletic sharks, makos engage in the type of spectacular aerial acrobatics prized by

anglers. As Hemingway stated, “The mako shark, which can jump as high as any fish, run faster than most, and pull as hard as any, seems to me to be a true fighter.” Grey also described the mako, with its “great curved fangs, his round body, potent, with tremendous power, his utter lack of fear of man or boat” as a particularly worthy opponent. Beginning in the early twentieth century and spanning through the present, numerous other anglers have identified the mako as perhaps the ultimate shark for sportfishing. But this adrenaline rush has come at an ecological cost.²⁷

Numerous anglers have identified the mako as perhaps the ultimate shark for sportfishing. But this adrenaline rush has come at an ecological cost.

Although both writers, and many historical accounts, generally describe a singular mako shark, makos consisted of two closely related species, the shortfin mako shark (*Isurus oxyrinchus*)—the more common, which anglers would have primarily encountered—and the longfin mako (*Isurus paucus*). Shortfin makos are exceptionally athletic, measuring about four meters, with muscular, torpedo-shaped bodies that can propel them over 95 kilometers per hour in short spurts, possibly the fastest speed reached by any sharks. True apex predators, shortfin makos feed on large bony fish like swordfish and tunas, sea turtles, and even other sharks. With their semi-camouflaged blue backs (contrasting with their white bellies), shortfin makos approach their prey from below and then seize on it with their distinctively large and jagged teeth. These explosive ascents contribute to the fishes’ extraordinary leaping abilities. Highly migratory, they occupy temperate and tropical coastal and oceanic waters around the globe.²⁸

Despite their extraordinary speed, shortfin makos, like most shark species, do not rapidly mature and reproduce. As opposed to “R-selected” species, which reproduce copiously and thus rebound quickly from harvests, nearly all sharks are, in the parlance of ecologists, “K-selected” organisms. This means they birth few young and grow slowly, thriving in undisturbed conditions but ill-suited to recover from population declines. Male makos reach reproductive maturity at around eight years of age and females at around twenty years. After a 15- to 18-month gestation period, shortfin makos give birth to litters typically numbering between 10 and 18. Female makos then require up to sixteen months of recovery before their next pregnancy, meaning the reproductive cycle lasts three years in total. With an estimated maximum age of 28–32 years, female shortfin makos only birth two to three litters over their lifetime. For these biological reasons, makos are not suited to surviving sustained human harvests. Because of sportfishing, targeted food fisheries, and incidental bycatch, shortfin-mako populations have plummeted globally, mirroring other shark populations. They are presently identified as endangered on the IUCN Red List.²⁹

These declines in shark numbers have presented serious risks for marine ecosystems. Like all predator species, sharks help maintain healthy prey populations by removing weak and sickly individuals. As apex predators, large sharks play a pivotal role in preserving ecosystem stability. Researchers have shown that the removal of such species frequently results in “trophic cascading,” which involves shifts in population ratios and feeding patterns as the organisms within each level of a food web adapt to new threats and opportunities. Observing such processes has convinced ecologists that some sharks represent “keystone” species, and their elimination might disrupt entire ecosystems. Ecocritic Sid Dobrin has made a strong case that sport fisheries can be ethical, sustainable, and edifying. But even this staunch advocate of recreational fishing states that we need to take into consideration fishes’ biology and their place in the broader ecosystem. In the case of most shark species, such analysis argues against killing them for sport.³⁰



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Although the mako and several other species of sharks possess the size, strength, and athleticism prized in big game fish, sharks have presented multiple challenges to anglers over the past century. With most people perceiving large sharks as threatening to humans, sportfishers struggle with the morality of giving these fish a sporting opportunity to escape when it might endanger a bather or surfer. Nonetheless, recreational shark fishing gradually took hold, owing in part to endorsements from Grey and Hemingway. In the mid-twentieth century, Alf Dean and Frank Mundus, from Australia and the US, respectively, further expanded the sport by landing massive white sharks that awed and terrified the public. Nonetheless, as a bloody pastime dependent on buckets of chum, sometimes with cetacean origins that disgusted early environmentalists, shark fishing continued to fit uneasily within the genteel world envisioned by Walton. This became doubly true at the shark-fishing tournaments—often frenzied, chaotic, and violently competitive—that exploded in popularity in much of the English-speaking world from the 1950s onwards. By the 1980s, as researchers learned more about sharks' limited reproduction, and the public became more environmentally aware, anglers increasingly turned to catch-and-release methods, but researchers have debated the survival rates of freed sharks.³¹

As data became available, the numbers did not support recreational anglers' initial position that any declines in shark populations resulted from commercial overfishing. By the 1980s, sportfishing accounted for over 40 percent of the total reported US shark catch. If we exclude dogfish and focus on large sharks, the statistics are even more astonishing. Between 1981 and 2001, US recreational anglers landed more large coastal sharks than did their commercial counterparts in fifteen out of twenty years. Given that much of the global shark-fin catch has historically gone unreported, we should take such numbers with a grain of salt, by they are still startling.³²

Fatal shark bites measure in the single digits annually, while humans kill an estimated 100 million sharks per year. For every person killed by a shark, 10 million or more sharks lose their lives to nets and hooks.

Today, an account of sharks as “engines of destruction” rings false. Negative shark encounters have increased mainly because of recreational swimming, diving, and surfing, raising the probability of a shark mistaking a person for natural prey. Even so, fatal shark bites typically measure in the single digits annually, while humans kill an estimated 100 million sharks per year. For every person killed by a shark, 10 million or more sharks lose their lives to nets and hooks. Such figures do not include the millions of interactions facilitated by shark cages, scuba gear, or public aquariums, which do not involve an injury to either party, or the innumerable incidents in which sharks perceive us in their environment, and we have no idea they are there.³³

The development of recreational shark fisheries speaks to the central dangers that these creatures have faced since industrial fisheries emerged in the early twentieth century. Nearly all species of sharks are poorly suited to withstand any sustained exploitation, and despite repeated claims that killing sharks makes human bathers safer, sharks pose a statistically negligible risk to people. However, their removal from marine ecosystems threatens unforeseen and cascading consequences for our oceans. Despite sportfishers’ claims of moral superiority over their commercial counterparts, numerous individuals have benefitted financially from recreational fisheries for sharks. For charter-fishing captains, boat and gear manufacturers, resort-town business operators, and even outdoor adventure writers, sportfishing represented an opportunity to commodify a group of fish that resisted easy incorporation into the market. These individuals sold the experience of killing or tormenting sharks as surely as other entrepreneurs sold sharkskin, liver oil, meat, or fins. Once again, the desire to profit from sharks ran up against biological limits, resulting in plummeting populations of some of the most ecologically significant marine species on the planet.

Notes

²² Although men predominated in recreational angling, historian Nancy Unger has demonstrated that women also participated in such sporting activities, with men sometimes welcoming their female counterparts for adding further respectability to the pursuit; see Nancy C. Unger, *Beyond Nature’s Housekeepers: American Women in Environmental History* (New York: Oxford University Press, 2012), 79–80. Izaak Walton, “The Compleat Angler,” in *The Ocean Reader: History, Culture, Politics*, edited by Eric Paul Roorda, 387–91 (Durham: Duke University Press, 2020), 387–88; Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999), 166, 167; John F. Reiger, *American Sportsmen and the Origins of Conservation* (Corvallis: Oregon State University Press, 2001), 3, 6, 36; Kevin Kokomoor, “In the Land of the Tarpon: The Silver King, Sport, and the Development of Southwest Florida, 1885–1915,” *The Journal of the Gilded Age and Progressive Era* 11, no. 2 (2012): 191–224, p. 212, <https://www.jstor.org/stable/23249073>; Myra E. Wright, *The Poetics of Angling in Early Modern England* (New York: Routledge, 2019), 134–55; Sidney I. Dobrin, *Blue Ecocriticism and the Oceanic Imperative* (London: Routledge, 2021), 47.

²³ Joseph E. Taylor III, “El Niño and Vanishing Salmon: Culture, Nature, History, and the Politics of Blame,” *Western Historical Quarterly* 29, no. 4 (Winter 1998): 437–57, <https://doi.org/10.2307/970403>; Louis S. Warren, *The Hunter’s Game: Poachers and Conservationists in Twentieth-Century America* (New Haven: Yale University Press, 1999), 12, 168; Paul Schullery, “Frontier Fly-Fishing in the New West,” *Montana: The Magazine of Western History* 52, no. 2 (Summer 2002): 2–9, p. 3; Robert Arlinghaus, Steven J. Cooke, Jon Lyman, David Policansky, Alexander Schwab, Cory Suski, Stephen G. Sutton, and Eva B. Thorstad, “Understanding the Complexity of Catch-and-Release in Recreational Fishing: An Integrative Synthesis of Global Knowledge from Historical, Ethical, Social, and Biological Perspectives,” *Reviews in Fisheries Science* 15, no. 1–2 (2007): 75–167, p. 83, <https://doi.org/10.1080/10641260601149432>; Jen Corrinne Brown, *Trout Culture: How Fly Fishing Forever Changed The Rocky Mountain West* (Seattle: University of Washington Press, 2015), 14, 16, 20; Miles A. Powell, *Vanishing America: Species Extinction, Racial Peril, and the Origins of Conservation* (Cambridge: Harvard University Press, 2016), 93–94; Loren McClenachan, “Recreation and the ‘Right to Fish’ Movement: Anglers and Ecological Degradation in the Florida Keys,” *Environmental History* 18, no. 1 (January 2013): 76–87, pp. 77–78, <https://doi.org/10.1093/envhis/ems110>.

²⁴ “Shark Fishing,” *Manilla Express*, 16 March 1901, 6; “The Thrills of Shark Fishing,” *Nambour Chronicle*, 21 May 1926, 4; T. C. Roughley, “Catching Sharks for Profit,” *The Australian Museum Magazine*, January–March

- 1928, 149–155, p. 149; “Shark Fishing: Thrills at Bondi,” *Noosa Advocate and Cooroora Advertiser*, 16 January 1931, 3; “Shark Fishing: A Titan Sport,” *Queensland Times*, 6 January 1933, 5; “J. M. McLachlen to ‘Sir’,” Australian National Archives (hereinafter ANA), 18 June 1934, “Shark Fisheries” ser. # A461, control symbol F345/1/2.
- ²⁵ See Zane Grey, *An American Angler in Australia* (1937; repr., Warsaw: Ktocyta, 2018), 47, 57–58; Sidney I. Dobrin, *Fishing, Gone? Saving the Ocean through Sportfishing* (College Station: Texas A&M, 2019), 102–103.
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CHICAGO'S TEMPLE OF STEEL: SOUTH WORKS SINCE 1882

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In my childhood on summer days, when my mother took us to the shore of Lake Michigan at the 57th Street Beach, we could easily see the billowing plumes of smoke bending in the breeze above smokestacks five kilometers to the south-southeast. An incurious lad, except where baseball and fighter planes were concerned, I probably never thought to ask my mother about the fires beneath the smokestacks. I've grown more inquisitive since then, and on a sunny October afternoon I stopped by Steelworkers Park in South Chicago to see what was left of what, half a century ago, I had ignored. It all began about two billion years ago.

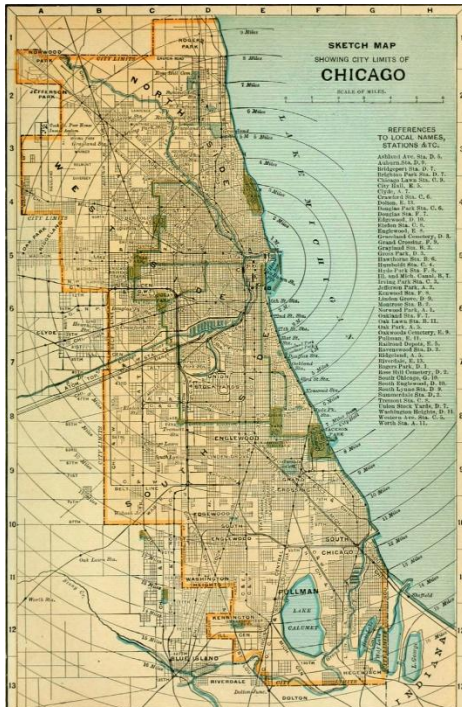


South Slip at South Works, 1917. This artificial inlet received ore and coal to be distributed by rail cars within the steel plants. Note the coal mountain within the ore walls just beneath the gantry cranes. Courtesy of the Southeast Chicago Historical Society [Archive ID: 1983-100-d22]. All rights reserved.

In the middle Precambrian, in what is now northeastern Minnesota's Mesabi Range, the oxygenation of Earth's atmosphere brought about the precipitation of iron into banded formations of iron ore. The richness of this ore is the ancient secret behind the iron and steel industry of North America. Miners began intensive exploitation of the high-grade ore in the 1890s, and shortly thereafter the Rockefellers and Carnegies took over, shipping mountains of ore in the form of pellets (marble-sized spheres) to the Great Lakes steel cities, including Chicago. There, the ore met up with coal, the residue of 300-million-year-old swamps, in what is now eastern Ohio and western Pennsylvania, and with limestone from quarries in southern Indiana, a cemetery of calcareous sea creatures from 490 to 360 million years ago.

Before anyone mined the Mesabi Range, Chicagoans had already brought iron ore, coal, limestone, and fire together to make steel. The first big mill opened alongside the North Branch of the Chicago River in 1857, in a part of the city now chic and costly. In 1882, its operations moved southeast to

the lakeshore, near the outlet of the Calumet River, which promised a better anchorage for boats and barges carrying ore and coal.



Sketch map of Chicago, 1905. *The New International Encyclopedia*. [Wikimedia Commons](#). [Public domain](#).

Lake Michigan's shoreline retreated northward some five to three thousand years ago, leaving wetlands and little lakes behind, which the Calumet River has—languidly—drained ever since. The area's waterways once teemed with fish and bird life, providing a smorgasbord for the Potawatomi, Native Americans who had long lived in and around the region. They lost their lands in an 1833 treaty, and most were soon forced westward in accordance with US policies of "Indian removal." A few European immigrant families, mainly Dutch, tried draining and farming the wetlands of the Calumet region. The location's potential, however, invited grander plans. Between 1869 and 1882, the US Army Corps of Engineers dredged and straightened the river's channel into what would eventually become the world's largest inland harbor. Over the next century, every manner of acid and oil would leach or splash into the harbor and river, killing almost all of its remaining life forms.¹

The new steel mill at the north edge of the remodeled Calumet River's mouth acquired the name of South Works. From 1889, Illinois Steel, briefly the world's largest steelmaker, operated it. In 1901, through a series of mergers, it became part of US Steel, then the world's largest company of any kind. In short order, South Works was one of three large, integrated steel works in Chicago,² which together turned out about a million

tons of steel each year. It came to specialize in "structural" steel: for rail cars made at the nearby Pullman factory; rails; bridge spans; and girders for the skyscrapers that were then beginning to create the jagged Chicago skyline.

When it opened, South Works covered 30 hectares. By 1898, it extended over 105 hectares. South Works' footprint, you could say, grew of its own accord. Steelmaking always involved slag-making. Slag is a molten mix of impurities, lime, calcium, silicates, oxides, a bit of iron, and a few other ingredients. When it cools, it forms anthropogenic rock, which is sometimes used in roadbuilding but often ends up in landfills. At South Works, it was dumped into Lake Michigan to make land, about five or ten new acres of Chicago each year. By 1922, South Works accounted for about 200 hectares of new land: less Lake Michigan, but more space for blast furnaces, rail lines, and other steelmaking infrastructure. Slag now lies six to ten meters deep atop the sand and glacial till that rest upon the limestone and shale bedrock underneath South Works.

Over the 110-year career of South Works (1882-1992), hundreds of thousands of workers made the steel and slag. In its first decades, a few dozen men died there each year, crushed, burned, gassed, exploded, or pierced and bled to death. Several hundred more were injured seriously, especially those working in the railyards or near the blast furnaces—the mill had its own hospital and surgeon on site.³ But every year, tens of thousands of young men from the Habsburg and Russian empires flocked to Chicago to find jobs, and South Works was almost always hiring.



Steelworkers in a foundry room at South Works. Molten iron or steel could be as hot as 1,500 degrees Celsius. The photo is undated but the safety gear and bucket suggest it is from the 1950s-1960s. Courtesy of the Southeast Chicago Historical Society [Archive ID: 1981-077-076i]. All rights reserved.

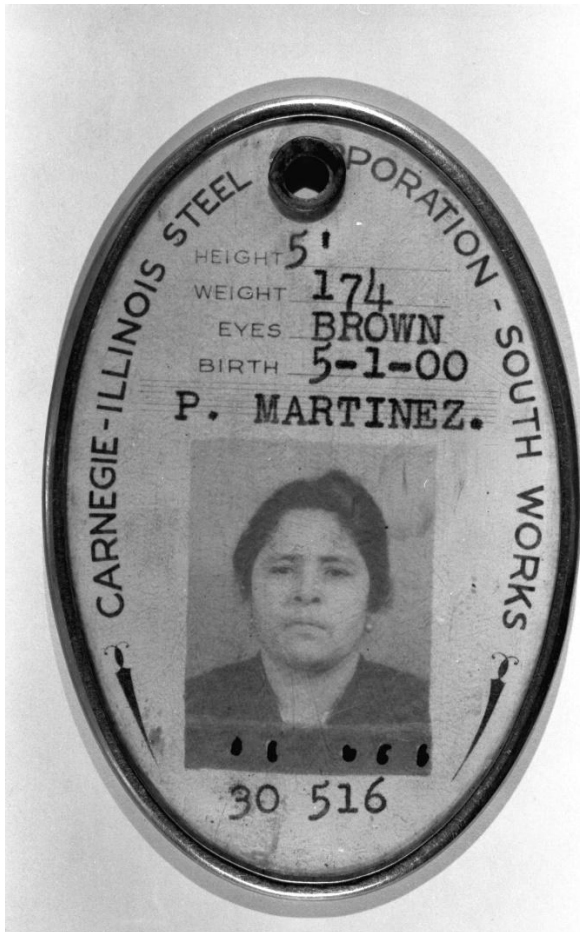
The first steelworkers at South Works came mainly from the British Isles. By 1890, most new recruits were immigrants born in Eastern Europe. By 1915, when the mill employed 10,000 people, Mexicans were flowing into South Chicago looking for work. The violence of the Mexican Revolution (1910-20) sent a million Mexicans north of the border, many of them poor young men avoiding conscription into rival armies. Simultaneously, the need for steel during World War I (1914-18) raised demand for laborers at South Works. In the 1920s, the Windy City was on a path to become the third-largest Mexican city north of the Rio Grande (it was already the second-largest Polish city in the world).⁴



Workers demonstrating newly introduced safety goggles, undated photo ca. 1915. Before 1930, signs at South Works were often in multiple eastern European languages, in this case in Czech, Hungarian, Croatian, and Polish. Courtesy of the Southeast Chicago Historical Society [Archive ID: 1981-051-5m]. All rights reserved.

World War I, and then immigration restrictions imposed in 1921 and 1924, severed Chicago's links to overflowing eastern and southern European villages whose youth had formerly flocked to the steel mills. Mexicans were not alone in filling the resulting labor gap. Starting in 1915, half a million African Americans from the Deep South made their way north to Chicago, part of what US historians call "The Great Migration." Thousands of former sharecroppers joined the Mexicans, Poles, Croatians, Slovenians, Hungarians, Italians, and Irish in the steel mills of South Chicago. By 1925, one seventh of South Works' employees were African American, and another seventh were Mexicans. Tens of thousands of their descendants still live in the neighborhood.

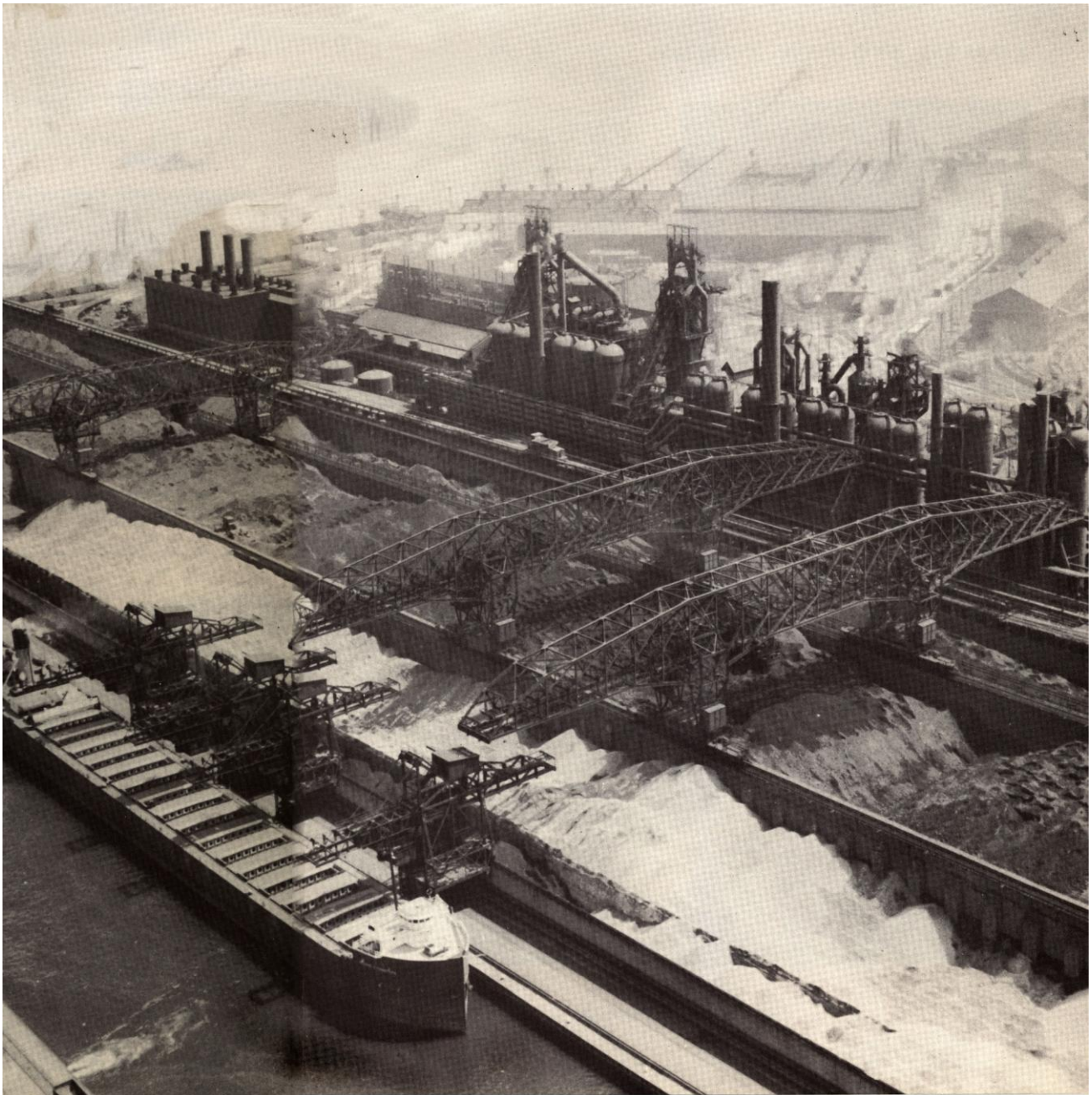
Despite bitter and bloody strikes in 1919 and again in the late 1930s, South Works continued to attract workers seeking steady jobs. With mass unemployment during the 1930s, a mill job, despite the loud, hot, and dangerous work, was a godsend. Thanks to the first fruits of unionization, by 1940 mill jobs paid well enough to allow a man with no formal education to buy a small house and raise a family. When World War II boosted demand for steel to new heights, South Works employed nearly 20,000 people—some of them women, including, for example, Pasquale Barrios Martínez, who had left Zacatecas and migrated to Chicago as a young woman in 1923 and, when the war came, took a job at South Works when she was in her early forties.



(Left) South Works ID badge of Pasquale Martinez. Courtesy of the Southeast Chicago Historical Society [Archive ID: 1982-055-6]. All rights reserved. (Right) Kitty Kalwasinski Markovich welding, 1945. The stars on her helmet are for the five of her nine brothers then serving in the US Army. The solid star represents a brother killed in action in France. Courtesy of the Southeast Chicago Historical Society [Archive ID 1981-049-19]. All rights reserved.

Or Kazmira (Kitty) Kalwasinski Markovich, who arrived in Chicago from Poland in 1913 at age 10 and took a job at South Works in 1944, where many of her nine brothers had worked before the US entry into World War II. Unlike most women at South Works, she stayed on after the war. She married a fellow steelworker and retired only in 1967.

South Works continued to flourish after World War II. During the 1950s, Chicago made a tenth of the world's steel. South Works made the girders for the Sears (now Willis) Tower in Chicago, the tallest building in the world when it was completed in 1974.



Barges ready to unload cargo for storage with lime and ore between the ore walls. The buildings are a power station on the left and, in the center, behind the gantry cranes, what were the world's two biggest blast furnaces. *South Works Anniversary Book: Steelmaster for 75 Years*, [undated] ca. 1955. Courtesy of the Southeast Chicago Historical Society. All rights reserved.

But the end was nigh. The opening of the St. Lawrence Seaway in 1959 allowed oceangoing vessels access to North America's Great Lakes. Ships brought cheap steel from distant lands without unions. The US federal government's free-trade policies during the Cold War decades left US steel producers vulnerable once other countries' metallurgical sectors had fully recovered from WWII and modernized technologically. By the 1970s, South Works was shrinking, slowly at first, then quickly. The first mass layoffs in 1980 reduced the workforce to 10,000. During the corrosive 1980s, when deindustrialization in Chicago hit its full stride, South Works continued to diminish. In 1992, the mill closed down.

The works were demolished, the land abandoned. In 2004, the Chicago Park District acquired most of the site because no one would buy it—partly out of fear of the toxins embedded in the earth.

Soon the Park District arranged to slather the slag surface of a section of the South Works site with 65 centimeters of mud dredged from Lake Peoria in central Illinois, which had been filling up with sediment for more than a century. Vegetation, both planted and spontaneous, took root. In 2014, the Park District proclaimed that the newly mud-covered area, about 7 hectares, would henceforth be called Steelworkers Park.⁵

On the sunny October afternoon when I ventured to the ruins of South Works, I had no idea what to expect. My visit was spontaneous, just a way to fill an hour between engagements on the South Side. All that remains, beyond the occasional ore pellet among the weeds and dust, are what are called the ore walls: two parallel walls, standing about ten meters tall and stretching nearly 700 meters inland from the lakeshore. For a century, these walls stored iron ore pellets and coking coal, shipped to South Works in the warmer months when Lake Michigan was not frozen over, and fed into the blast furnaces year-round. A portion of one surviving wall looked faintly like the 2,500-year-old Temple of Poseidon at Sounion, south of Athens, albeit with slender columns and skimpy entablature:

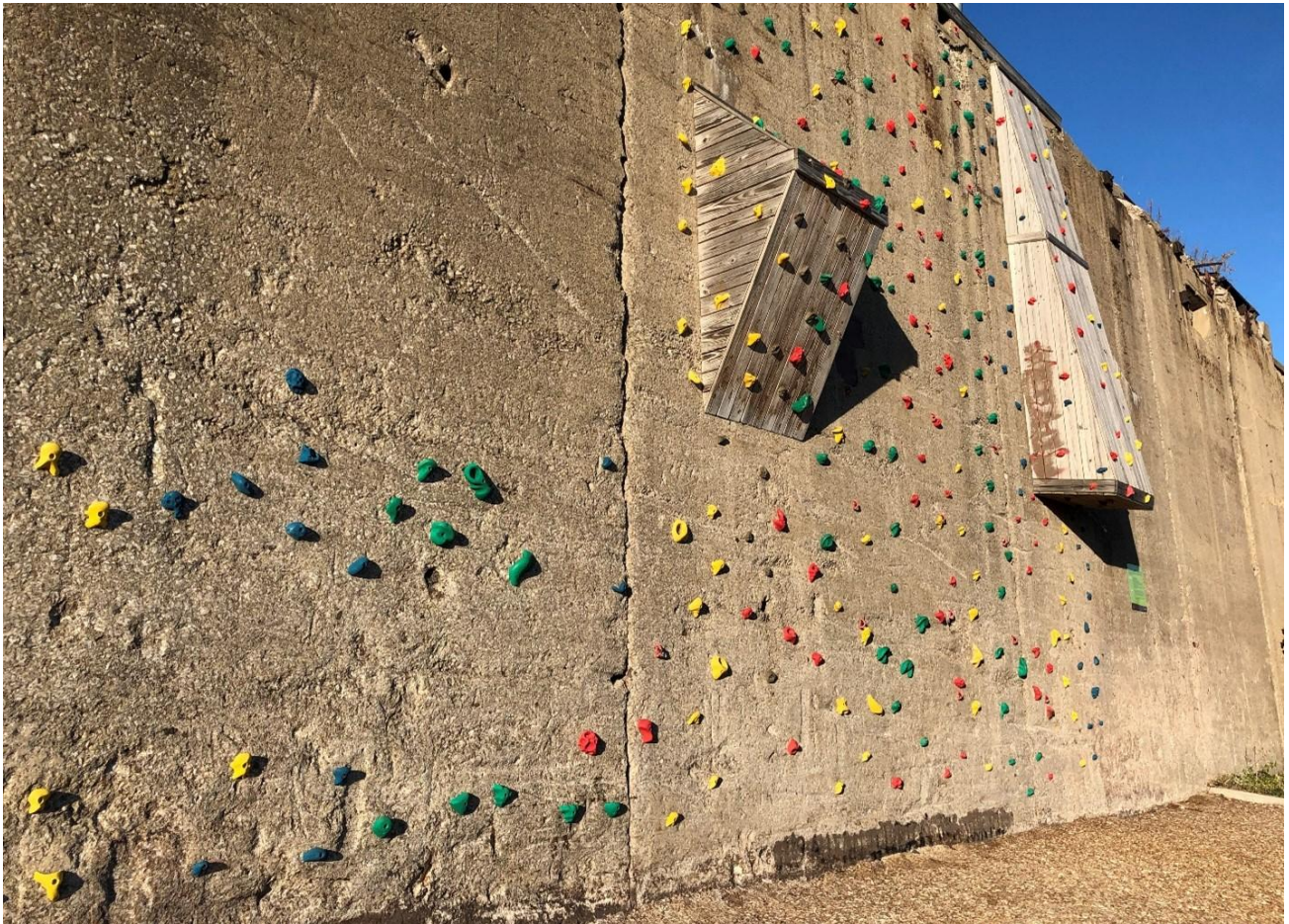


Ore wall segment at South Works, October 2022. © John R. McNeill. All rights reserved.

When the works closed in the 1990s, demolition crews tore down or blew up all of the buildings and tried to destroy the ore walls. But the walls were made of a concrete consisting mainly of slag,

forged at 1,500 degrees Celsius in South Works' blast furnaces. The walls resisted dynamite. The crews gave up after punching a few breaches in them. Perhaps, like Attic marble, the walls made of South Works slag will last for 2,500 years. Volunteer prairie grasses and bushes have grown up around the ore walls, their roots seeking water and nutrients in crevices in the underlying slag.

Walking through a crevasse in the southern ore wall I came upon a twenty-first-century surprise:



Ore wall converted to climbing wall, October 2022. © John R. McNeill. All rights reserved.

One of the ore walls now serves as a climbing wall. Despite the lovely weather on the afternoon I visited, no climbers appeared. Only a little girl of perhaps two or three, who spoke English with an African American woman who appeared to be her mother; and Spanish with a man whom I took to be her father. I can't be sure, but given that we were in Chicago, I'd guess he was Mexican American. I left them in peace, resisting an urge to ask them if their ancestors had come to South Chicago to work in the steel mills.

On the day I saw her, the toddler was experimenting with walking, jumping, and tumbling, making good use of the soft, rubberized surface provided for climbers who fall. In a few short years, perhaps, she will tackle the climbing wall in Steelworkers Park, the former ore wall at South Works, built out of slag atop yet more slag, made from Minnesota's Precambrian iron ore bands, Ohio's Permian coal, Indiana's Early Carboniferous limestone, and dumped into the inshore waters of Lake Michigan by generations of Chicago's East European, Irish, Italian, Mexican, and African American steelworkers.

I hope she does. From the top of the wall, on a clear day, if she looks to the south-southeast she'll easily see the billowing plumes rising from smokestacks at US Steel's Gary Works, 25 kilometers away in Gary, Indiana. It opened in 1908 and today is the largest steel mill in North America.

Notes

¹ The most comprehensive environmental history of Chicagoland is Kathleen A. Brosnan, Ann Durkin Keating, and William C. Barnett eds., *City of Lake and Prairie: Chicago's Environmental History* (Pittsburgh: University of Pittsburgh Press, 2020). On the steel district, see Craig E. Colten, *Industrial Wastes in the Calumet Area, 1869-1970: An Historical Geography* (Champaign, IL: State Water Survey Division, Illinois Department of Energy and Natural Resources, 1985). Also useful is Joel Greenberg, *A Natural History of the Chicago Region* (Chicago: University of Chicago Press, 2002).

² An integrated steel mill makes steel directly from raw materials, converting coal into coke, iron ore into liquid iron, and iron into steel.

³ William Hard, "Making Steel and Killing Men," *Everybody's Magazine*, November 1907, 343-348.

⁴ A history attuned to ethnicity is Dominic Pacyga, *Chicago: A Biography* (Chicago: University of Chicago Press, 2009).

⁵ See *South Works Deep Geological Study: The Human Role in the Formation of Southwork*, an art project by the Chicago artist Stella J. Brown, which frames the story as part of the Anthropocene, <http://www.stellajbrown.com/south-works-deep-geological-study-1>.

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ECOLOGICAL CIVILIZATION

Donald Worster

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2 • 2022

Donald Worster

Capitalism and communism have been fighting each other for more than a century and a half, until now the fight seems to have exhausted itself. A third and highly appealing alternative is emerging, the ecological civilization, which purports to be guided not by individual or class appetites and interests but by altruism, reason, and knowledge. It comes out of the natural sciences, and clearly, we cannot go forward without help from that direction. Any plausible discussion of the state of civilization for our time must start with the preeminence of the natural sciences, especially ecology, and the problems of the earth.



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The ecological civilization challenges the economic growth and distribution of wealth, matters over which capitalism and communism have long wrangled. It emphasizes instead the ecosphere, seeks knowledge of all ecosystems and species on earth, and teaches responsibility for them. The ecological civilization calls for linking the welfare of the earth to the welfare of humankind, whatever that may imply about wealth or justice.

It is what we might call an “imaginary,” which has been defined as a vision of “scientific and technological progress” that seeks “the common good.”¹ Imaginaries may not be the prime movers of history; mostly, they are cultural responses to material events around us, in this case changes caused by human numbers and appetites that are disrupting climate and other earth systems. Neither Adam Smith nor Karl Marx experienced those changes, so how could either offer relevant guidance? Science has helped us discover the earth as a whole and to understand it as a special planet in the solar system, where life has miraculously appeared. Today’s question is whether that

planet can still be preserved as habitat. Can humans learn, by subordinating their appetites to their brains, how to live on this earth intelligently and ethically?

Imaginaries may not be the prime movers of history; mostly, they are cultural responses to material events around us, in this case changes caused by human numbers and appetites that are disrupting climate and other earth systems.

Nowhere has a new ecological civilization become more discussed than in China over the past two decades. Although the eco-civilization imaginary is originally Western in origin, China claims to have its own resources in philosophy, poetry, science, and technical skills, which can produce a new imaginary that is distinctly Chinese. Among its earliest proponents was a deputy director of the Ministry of Environmental Protection, Pan Yue, who was frustrated by his country's growing list of environmental problems. Old solutions were no longer good enough, he thought; nothing less than a new social vision was needed—and thus he put forward the ecological civilization.²



Anonymous, *Emperor Ming-huang's Flight to Szechwan*, ca. 12th century. Tang dynasty hanging scroll, 55.9×81cm. [Wikimedia Commons](#). [Public domain](#).

Pan and others of his generation, though lamenting a disharmony that they blamed on the West, did not spend much time examining the non-Chinese roots of their new imaginary. Ironically, the idea was first put forward by Western philosophers and critics, most of them living in Germany and the United States. One point of beginnings was Oswald Spengler's *The Decline of the West*, published in 1918 and 1922. Then there were the philosophers of the Frankfurt School of Neo-

Marxism, founded in 1923, including such figures as Max Horkheimer and Theodor Adorno. Also, one should include one of the twentieth century's most influential thinkers, Martin Heidegger, and his students, particularly Hans Jonas, Herbert Marcuse, and Hannah Arendt—the so-called “Heidegger’s children,” all of whom ended up living as expatriates in the United States. Then there were American-born writers such as Robert Heilbroner, Lewis Mumford, Murray Bookchin, and even the conservationists Rachel Carson and Aldo Leopold, all of them active from the 1930s on.³

Diverse they certainly were, but they were bound together by growing anxiety over where the world, and particularly modernity experienced in Europe and the US, was heading. They feared that civilization was caught up in a whirlwind of technology, which would dehumanize people and poison the earth. Two world wars, the atomic bomb, the invention of airplanes and automobiles, exploding populations, climate change, and signs of planetary, not just national, degradation made them increasingly fearful of the future. They attracted thousands of followers on both sides of the Atlantic, and by the 1960s those followers formed a “counterculture” to supersede both communism and capitalism, which were seen as part of a common “technological civilization.” The enemy was identified as “the Machine,” the technosocial apparatus built by the human brain to satisfy human urges and appetites. Germany under the Nazis exemplified the Machine. The technological civilization, however, was understood to be globalizing in scope, making all peoples and the earth alike sick. While never organized into a coherent political movement, this counterculture fought against modernity and turned instead to environmentalism and Green Party politics.⁴

Among those opposed to the Machine was Iring Fetscher, a reform-minded Marxist in Germany’s Frankfurt School. Fetscher’s book *Überlebensbedingungen der Menschheit* was published in 1976, and it was he who first coined the phrase “ecological civilization.” We must abandon our faith in machines, he urged, in economic growth, and in reductive, instrumentalized thinking about people and nature. Unlike Karl Marx, who was concerned primarily with rescuing the human proletariat, Fetscher wanted to save both humanity and nature.

But then out of modernizing China came a revival of Fetscher’s notion of an “ecological civilization.” In 2017, President Xi Jinping delivered a report and blueprint to the National Congress of the Communist Party that made the ecological civilization a major goal for the PRC. He claimed that “we have made notable progress in building the ecological civilization,” although the first duty of government, he added, was “to sustain the Chinese nation’s development.” But then he added, “we must realize that lucid waters and lush mountains are invaluable assets . . . and [we must] cherish the environment as we cherish our own lives. We will adopt a holistic approach to conserving our mountains, rivers, forests, farmlands, lakes, and grasslands, implement the strictest possible systems for environmental protection, and develop eco-friendly growth models and ways of life.”⁵ To that end, Xi called for a civilization that aimed not at the endless accumulation of wealth but at a “moderate prosperity.” His speech was added to the Chinese constitution, making China the only nation so far to commit to a radically new form of civilization.

We have become neighbors on a common planet. This interdependency requires everyone, including China, to work toward mutual respect and coexistence on a shrinking planet.

Every nation or people has the right to define what such civilization should mean. Westerners have always felt free to do so and seldom have paid attention to nonwestern nations, simply assuming that the world should follow their lead. In the twenty-first century, however, no nation can stand as a model for all others. We have become parts of an interdependent whole, neighbors on a common planet. If we want to seek a new and better civilization, then we do so everywhere or not at all. Otherwise, we may lose more than our national sovereignty—we may lose our life support. This interdependency requires everyone, including China, to understand the origins and content of the

ideas that, along with material goods, have been imported and to work toward mutual respect and coexistence on a shrinking planet.

Nationalism was never part of that critical counterculture in the West. In fact, Marcuse, Arendt, and Jonas all abhorred violent xenophobia and regarded themselves as citizens of the planet. They were not concerned about saving what Kenneth Clark, author of the book *Civilisation*, had in mind: Western art, philosophy, and architecture. Instead, they worried about the rise of authoritarian, anti-democratic, anti-liberal, Nazi-like regimes anywhere in the world. "If we do not succeed in establishing an ecologically balanced 'alternative civilization,'" Fetscher warned, "we face not only the danger of 'nuclear destruction' but also the possibility of an authoritarian and autarkic 'ecological dictatorship'" that could spread everywhere on the earth.⁶

A similar fear of nationalism stirred the economist Robert Heilbroner, who in 1976 published *The Human Prospect*. "The rise of 'iron' governments, probably of a military-socialist cast," he warned, might emerge in response to an environmental crisis brought on by runaway technology. Heilbroner observed that "the pressure of political movement in times of war, civil commotion, or general anxiety pushes in the direction of authority, not away from it."⁷

The most provocative of the internationalist, countercultural, anti-technological thinkers was Hans Jonas. Born in Germany to a Jewish family, he taught philosophy from 1955 to 1976 at the New School for Social Research in New York City. Jonas's most important book, *The Phenomenon of Life*, is a densely argued treatise on ontology, which deals with core ideas in biology and their importance to the humanities. Jonas wanted to break down not merely social hierarchies but also the root hierarchy, as he saw it, at the heart of Western civilization—the ontological dualism of humans over nature. That dualism had made a sharp moral distinction between *Homo sapiens* and other forms of life,



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and from that act of separation, Jonas believed, stemmed all the environmental abuse and degradation, all the tyranny and conquest, and all of the enslavement of species and human beings. The brain had become, not an equal, counterbalancing partner within the human organism, checking the more selfish passions, but a mere subordinate instrument serving the urgencies of power and appetite.⁸

Jonas ended *The Phenomenon of Life* with an epilogue titled "Nature and Ethics." His post-dualist ontology was meant to be the foundation for a new ethics. Bad ontology, he believed, had produced bad morals, which in turn had produced a bad civilization. He would restore humans to the rest of nature, extending human responsibility beyond our own species towards caring for and protecting life in general.

After publishing *The Phenomenon of Life*, Jonas went on to write a companion book, *The Imperative of Responsibility* (1984). "Before our time," he observes,

man's inroads into nature, as seen by himself, were essentially superficial and powerless to upset its appointed balance . . . Nature was not an object of human

responsibility—she taking care of herself and, with some coaxing and worrying, also of man; not ethics, only cleverness was applied to her.⁹

But that rule by human cleverness lacked any rational moral guidance, and now we must remedy the lack and learn responsibility. “An object of an entirely new order—not less than the whole biosphere of the planet,” Jonas wrote, “has been added to what we must be responsible for because of our power over it.”¹⁰

Past civilizations, Jonas pointed out, had preached moral responsibility, but they had in mind only the “neighborly virtues”—that is, tolerance, honesty, fair treatment of other humans, good citizenship, and so forth. With the scaling up of the power represented by technology, Jonas warned, must come a scaling up of virtue, or we will end up imprisoned in the technological civilization we have made, where civilization is ruled by individual desire rather than planetary virtue. We must seek the good of our neighbors, he argued, “but also the good of things extrahuman . . . beyond the sphere of man and make the human good include the care for them.” We must do so because through the sciences, especially the science of ecology, we now know the impact of our desire. “Power conjoined with reason,” Jonas concluded, “carries responsibility with it.”¹¹

The evolution of life has been first and foremost a material process, but as knowledge of that evolution has accumulated in recent centuries, moral responsibility, say Jonas and the others, should likewise expand. But knowing evolution cannot bring only the people living in the West to a new sense of responsibility. We have arrived at the point where everyone must understand and practice a common planetary ethic.

Is it possible that China has something important to offer toward a non-dualistic outlook? Pan Yue, for example, believed that it did have useful lessons for the practice of harmony and coexistence rather than dominion. That was why he favored a return to China’s traditions as a solution to his country’s environmental ills. One might question whether he was right or ask whether dualism might have been common in every civilization, Western or Eastern. But this much is undeniable: China has nurtured some critical attitudes of its own toward technology and toward the abuse of nature and human nature. Such attitudes have long been part of its unique civilization, even if they have been a dissenting tradition, and those teachings may be a valuable resource for reforming modern civilization in China and elsewhere.

China has nurtured some critical attitudes of its own toward technology and toward the abuse of nature and human nature.

Wang Lihua, a historian, is among those advocating a distinctly “Chinese” ecological civilization, calling for bringing back “the fine traditions and historical achievements of the Chinese nation of respecting, conforming to, and protecting nature.” Yet he admits that those “fine traditions” may have gone unheeded in the past by the common people and their leaders. It would not be the first time that people have ignored their teachers. Are westerners not liable to make the same error?¹²

Wang believes that China, like the West, has had many good teachers who advocated a different path. Some of those long predated Hans Jonas in seeking a non-dualistic consciousness and in advocating a sense of responsibility toward life in general. They have left China with diverse, complex philosophical and moral traditions from which both the Chinese and the West can learn. During the Tang and Song dynasties (628-1279 CE), for example, China went through an efflorescence of nature-affirming poetry and painting and did so much earlier than a similar flowering in the West. Sages went into the mountains to contemplate the landscape, and artists looked for unspoiled natural environments. There were, for instance, Wang Wei and Meng Haoran, Ouyang Xiu, and Su Shi, all critical artists going out to rediscover nature. There was no dualism in

their minds, as they floated across lakes and climbed mountains, seeking a life beyond the city's dust and dirt.

Hundreds of years earlier, during the Warring States period (476-221 BCE), when China's population stood at less than a hundred million, a similar turn toward celebrating nature swept the country. It resulted in a wild and wonderful collection of fables and allegories, the *Zhuangzi* (莊子), which appeared in the fourth century BCE. Their author was Zhuang Zhou, who challenged all the power that ancient Chinese civilizers wanted to exercise over nature. The story "Zhuang Zhou Dreams of Being a Butterfly," for example, rejected the dualism implicit in the very idea of civilization. If a man can dream of being a butterfly, Zhuang wondered, can a butterfly dream of being a man? The writer would not draw a rigid line between the species.¹³



Shitao, Spring on the Min River, 1697. Hanging scroll. [Wikimedia Commons](#). Public domain.

That nature affirmation became one of the main themes of the ancient philosophy of Daoism, along with the *Dao De Qing*, one of the most important contributions China has made to human thought. Daoism has been loosely called an "ecological philosophy," as Zhuang and his fellow Daoists believed, unlike many modern scientists, that humans could never acquire full and certain knowledge of anything. Science, they would say, should kowtow before the essential unknowability of the earth. Science must acknowledge that we will never be able to explain everything around us, that we will never be able to achieve full mastery over nature. We humans will get along best by humbling ourselves and learning to be responsible.

Seemingly contradictory to Zhuang Zhou was the famous philosopher Confucius, who was often the butt of Zhuang's humor. Nonetheless, Confucius too has been claimed as a headmaster in a new ecological civilization. Perhaps Zhuang Zhou would not have agreed; clearly, there have been deep fractures within China's intellectual traditions and many sharp differences in philosophy. Zhuang and his disciples looked with contempt at the overgoverned, overcivilized life that Confucius defended. Yet Confucius also taught the Chinese, especially their leaders, to practice a wider moral responsibility. Might his life and writings still offer us today some inspiration—lessons in protecting a planet that he never could grasp as a whole? Just as Confucius wanted to instill a sense of moral duty in China's leaders, might we all agree today on the need for personal responsibility for this earth over which we wield such power?

Civilization has led us to the possibility of a new ethic of coexistence, given us new knowledge to practice such an ethic, and raised new questions about the ends of human life.

We cannot lay all the blame nor give all credit to the old sages, poets, and painters for China's sometimes destructive environmental past, but the same must be said for Western sages, poets, and painters. In every nation, there have been powerful material pressures, deep biological urges, and insatiable human needs that have pushed us along, and they, more than philosophy or poetry, have usually determined history. Farmers hard-pressed to feed their large families have kept on expanding rice or millet production, the state has kept on raising taxes and armies, and battles have kept on raging. We should not ignore the power of those material forces arrayed against the earth. On the other hand, we should not dismiss all philosophies as irrelevant to the lives of ordinary people. Civilization has always pursued a dream of stability and security, but it has also led us to the possibility of a new ethic of coexistence, given us new knowledge to practice such an ethic, and raised new questions about the ends of human life.

If China's leaders truly want an ecological civilization to take root and grow, they should become more familiar with Western philosophers like Hans Jonas, who offered such penetrating diagnoses of modern technological civilization. At the same time, we who live in the West should become more familiar with China's traditions of moral responsibility and awe. All the world's civilizations need help, all the help they can get.

Acknowledgments

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Notes

¹ Sheila Jasonoff and Sang-Hyun Kim, eds., *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015). See also "The Sociotechnical Imaginaries Project," Harvard University, Program on Science, Technology and Society, accessed 22 November 2022, <https://sts.hks.harvard.edu/research/platforms/imaginaries/>.

² Among the many commentaries on the subject are the following in English: Jiahua Pan, "The Development Paradigm of Ecological Civilization," in Jiahua Pan, ed. *China's Environmental Governing and Ecological Civilization* (Berlin: Springer-Verlag, 2016), 29–49; Martin Schönfeld and Xia Chen, "Daoism and the Project of an Ecological Civilization," *Religions* 10, no. 11 (November 2019): e630, <https://doi.org/10.3390/rel10110630>; and Mette Halskov Hansen, Hongtao Li, and Rune Svarverud, "Ecological Civilization: Interpreting the Chinese Past, Projecting the Global Future," *Global Environmental Change* 53 (November 2018): 195–203, <https://doi.org/10.1016/j.gloenvcha.2018.09.014>.

³ Rachel Carson may not have read those European philosophers, but she dedicated her most famous book to one of their fellow travelers, Dr. Albert Schweitzer, quoting his words, "Man has lost the capacity to

foresee and to forestall. He will end by destroying the earth." See Carson, frontispiece of *Silent Spring* (Boston: Houghton Mifflin, 1962). Similarly, the American founder of environmental ethics, Aldo Leopold, must be counted among the counterculturalists because of his influential essay "The Land Ethic," in *Sand County Almanac* (New York: Oxford University Press, 1949), 201–226.

⁴ From Fetscher, the ecological civilization imaginary traveled first to Russia and China through "green socialist" channels. All along, however, the imaginary was framed in distinctly Western terms. Fetscher was steeped in German philosophy and politics. Other prominent advocates include American theologian John Cobb and Australian philosopher Arran Gare, who published *The Philosophical Foundations of Ecological Civilization* in 2017. Both define ecological civilization in strongly Western terms—Cobb as part of the legacy of Alfred North Whitehead, and Gare looking to Friedrich Schelling and postmodernist critics of science.

⁵ Xi Jinping, "Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era," delivered at the 19th National Congress of the Communist Party of China, 18 October 2017, http://subsites.chinadaily.com.cn/npc/2021-12/24/c_693899.htm. See also Eileen Crist, *Abundant Earth: Toward an Ecological Civilization* (Chicago: University of Chicago Press, 2019).

⁶ Iring Fetscher, *Überlebensbedingungen der Menschheit*, 3rd ed. (Berlin: Dietz Verlag, 1991), 7. This book is a synthesis of Marx, Engels, Ernst Bloch, the Frankfurt School, along with contemporary writers on ecology. See also Theodore Roszak, *The Making of a Counterculture: Reflections on the Technocratic Society and Its Useful Opposition* (New York: Doubleday, 1969).

⁷ Robert Heilbroner, *An Inquiry into the Human Prospect: Looked at Again for the 1990s* (New York: W. W. Norton, 1991), 30, 132–133. The very popular first edition was published in 1974 and updated twice.

⁸ Hans Jonas, *The Phenomenon of Life* (New York: Harper & Row, 1966), 26, 282–284.

⁹ Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (Chicago: University of Chicago Press, 1984), 4. See also Theresa Morris, *Hans Jonas's Ethic of Responsibility: From Ontology to Ecology* (Albany: State University of New York Press, 2013).

¹⁰ Jonas, *The Imperative of Responsibility*, 7.

¹¹ *Ibid.*, 8, 138.

¹² Wang Lihua, "中国环境史研究为构建生态文明体系提供资鉴, 作者" [Chinese Environmental History Research Provides Lessons for the Construction of Ecological Civilization], 中国社会科学网-中国社会科学报 [Chinese Social Science Today], http://ex.cssn.cn/zx/bwyc/201908/t20190813_4956425.shtml.

¹³ For a good recent translation see Zhuangzi: *Basic Writings*, trans. Burton Watson (New York: Columbia University Press, 2003).

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CITIES BY THE SEA: A TALE OF QINGDAO AND LOS ANGELES

Shen Hou

Springs
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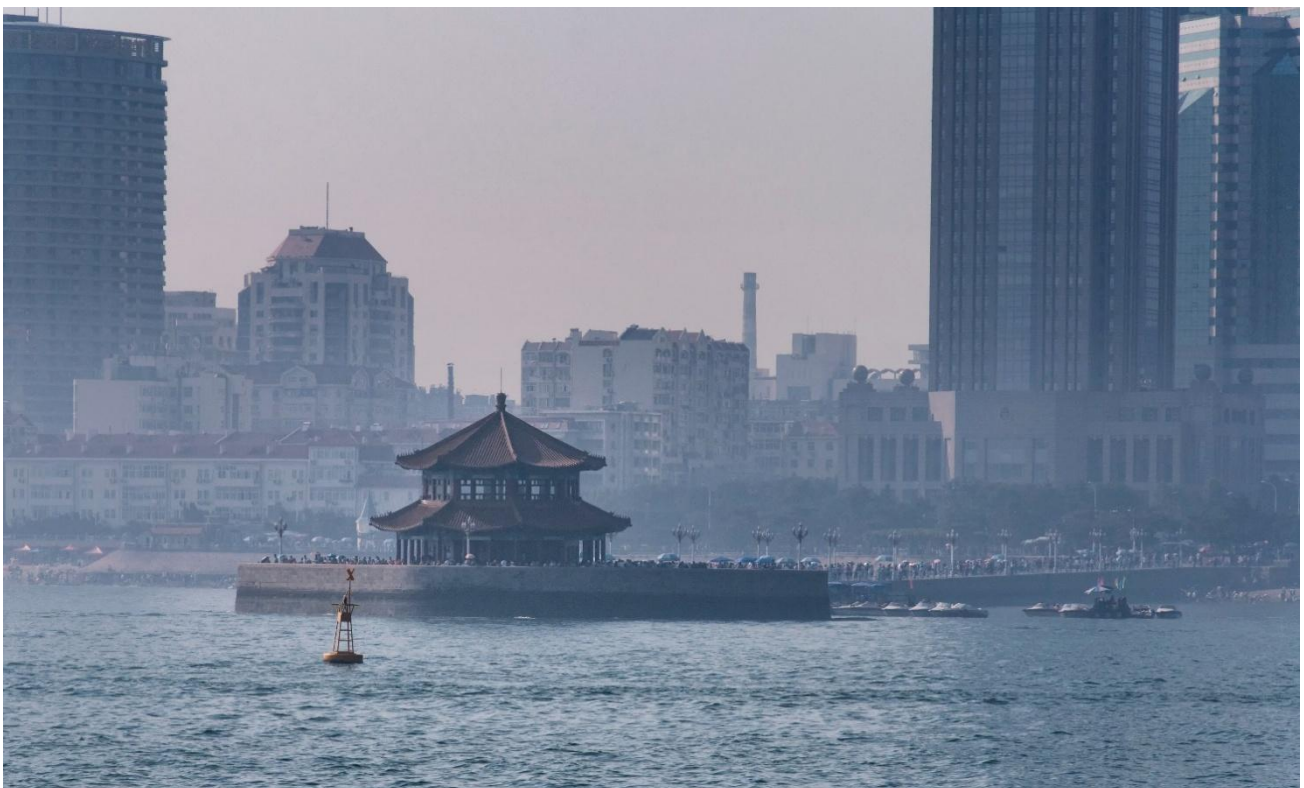
2 • 2022

Shen Hou

When Georg Franzius, a German hydraulic engineer, traveled northward along the Chinese coast in 1897 to settlements scattered around Kiaotschou Bay (today Jiaozhou Bay), he was not particularly excited by what he saw. Although Qingdao, the name of the area he was heading to, translated as “green island,” there was little green. The region had only a thin layer of soil to support vegetation and, although it was not densely populated, its residents had overexploited the natural tree cover for fuel. In his report to the German government, Franzius described the vegetation of the site as “bleak” and “desolate”, but when he was gazing at the seascape, he did recognize the sublime beauty of how the dark blue ocean contrasts with the reddish-brown mountains. Meanwhile, he noted the bay’s potential to be transformed from a site of agriculture and fishing into a new hub for maritime trade, connecting the hinterlands and markets of China with Germany and the rest of the world.

When he was gazing at the seascape, he did recognize the sublime beauty of how the dark blue ocean contrasts with the reddish-brown mountains.

The next year, German colonists started constructing a port on this strange site, envisioning a city with a comprehensively planned environment. As an industrial power, the newcomers anticipated building infrastructure such as shipyards, textile factories, and even a brewery in the colony, as well as a railroad to connect their new city with the resources of northern China. Yet, they wanted more.

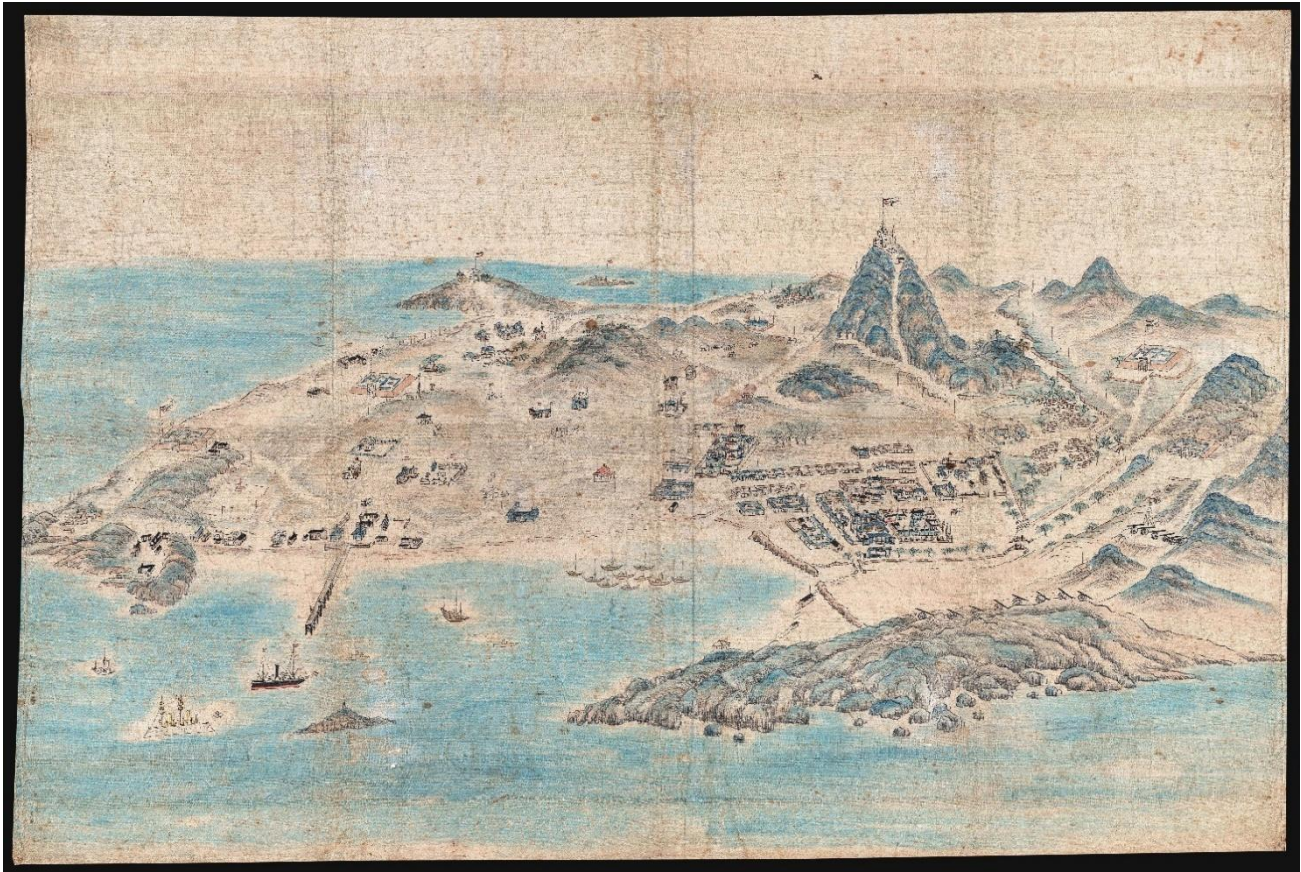


Zhanqiao Pier, Qingdao. © Dan on Adobe Stock. All rights reserved.

Despite Qingdao's poor vegetation, a deficiency they hoped to fix in a decade or two, they brought with them a century's worth of European Romanticism. Seeing the area through this lens, they eventually discovered its stunning landscapes—its long winding coastline, rugged rocky shore, and wide flat beaches. The rolling hills would cause headaches for their engineers, but they would also inspire architects and builders. Equally important, the sea, beaches, mountains, and mild climate offered recreational possibilities for the modern consumer-oriented society that Germany was becoming. Encouraged by those attractions, the colonizers, who came from a land of dense forests, dreamed about building a Mediterranean-style city with Far Eastern characteristics.

Such a city was alien to the Chinese who had worked over thousands of years to build a successful agricultural society. Their aesthetic traditions had long celebrated lakes, mountains, and rivers as ideal forms of beauty. But the sea had been too remote and mysterious to be loved and embraced. The coast had been marginal to Chinese ideals, while those who relied on the sea for a living were a marginalized people. There were a few port cities, like Quanzhou and Ningbo, but they functioned merely as commercial sites for trading with the rest of Asia, while mainstream China paid little attention to the sea or shore.

The Europeans had likewise discovered little to attract them in the ocean or seaside until the late eighteenth century. For centuries, with few exceptions, the sea symbolized danger, terror, fear, and catastrophe. Such negative feelings haunted the Europeans for a long time, even those living around the Mediterranean Sea and in island nations like Britain, who had grown more comfortable with the sea, at least more so than the continental nations. After the Enlightenment, modern science and Romanticism changed that mentality. Europeans began to find a promise of health, beauty, and recreation in the ocean, and built new resorts by its side in Britain, France, Italy, and Greece. The Germans, with fewer coastal areas of their own, absorbed this new understanding of the sea. And now here they were at the eastern end of the Eurasian continent, on the rim of the Pacific Ocean, undertaking to create a new city by the sea.



Manuscript view of Qingdao. Anonymous, 1899. [Wikimedia Commons](#). [Public Domain](#).

Even today, the Pacific Ocean is a recent phenomenon in many people's eyes. For a long time, it was too wide and too deep for even the most imaginative to know and navigate. It defied any empire's reach or any individual's ambition. Not many people found interest in the seaside or had the technology to exploit the wealth lying in the deep. There had been Indigenous peoples venturing out onto the ocean, driven by various reasons, such as the quest for food or power. Some of them like Polynesians even crossed parts of the ocean and founded new settlements in Australia, Hawaii, and New Zealand, but they became isolated from the rest of the world along with their knowledge about the ocean. For most people living on both sides of the Pacific Ocean, they preferred to make a living on a plain along a big river that was easier to understand and control. Therefore, much of the rim of this ocean had been left more or less wild except for a few scattered fishing villages living in rhythm with the waters offshore.

It was only in the late nineteenth century that a process of intensified discovery and urbanization of the Pacific Rim began, with Qingdao becoming a leading example of a coastal settlement. What had been a handful of fishing villages became a thoroughly modern city in the early twentieth century, and by the twenty-first was an ocean-facing metropolis with more than ten million inhabitants, six million of them living in the city proper—a process that occurred within a mere 120 years.

Qingdao was not an old-style port from which a famous admiral like Zheng would sail to Asian and African countries to demonstrate the power and benevolence of the great Chinese Empire. Nor was the new Qingdao a quaint seaside resort with antique ruins, supplying good air and romantic scenery. It grew up as both a port and a modern resort. From its beginning, it transformed into a "cosmopolis"—a planetary city interacting with the ocean and other places around the Earth. It was based on the conquest of nature, exuding great confidence in technology, but also promoting a modern appreciation of the natural world that embraces the wildness, grandeur, and tranquility of

the nonhuman. Since the earliest days of German colonization, people have come to Qingdao from many countries to consume nature in terms of health, recreation, and even fashion, all the while exploiting and degrading the environment.

The ocean that connects Qingdao and Los Angeles is the biggest on earth, and for a long time it was too wide for travelers to cross rapidly and compare their societies, as they had done so often with the Atlantic.

The Chinese shoreline city was not alone in this age of coastal settlement. On the other side of the Pacific, we find its counterpart in the United States—in Los Angeles, the City of Angels. The ocean that connects Qingdao and Los Angeles is the biggest on earth, and for a long time it was too wide for travelers to cross rapidly and compare their societies, as they had done so often with the Atlantic. But since the discovery of gold in California in the 1840s, there has been a growing number of crossings, not only through immigration, trade, and exchange of knowledge and technologies, but also through people coming to share a common environment made up of many species, ocean currents, and deep tectonic movements.

As countries, it may be that China is old while the United States is young, making comparisons more difficult. Yet, when we look at these two cities, Los Angeles and Qingdao, we find that both grew up about the same time (although LA began as a city more than fifty years before Qingdao). For much of their precolonial histories, the two areas supported a limited population, who subsisted mainly on the food they acquired from the local sea and shore and who lived in sync with the rhythms of nature, although there was some trade between them and other regions. Neither of them grew up along major rivers flowing from a deep interior. Before railroads replaced rivers, neither settlement could expect to become a big hub in an inland or transoceanic network. Both were surrounded by hills and plains, and both were short of a large, reliable water supply and thus grew up thirsty for water from elsewhere. Most importantly, both were on the rim of the Pacific Ocean, and that ocean became the leading reason for their existence.

In terms of the usual historical criteria, these two cities had little in common, other than the fact that both began as colonies of European imperialism: Qingdao was colonized by the Germans and LA by the Spanish and Americans. The American coastal metropolis was in part the product of a free, competitive, individualistic market economy. Qingdao, in contrast, developed under more rigid controls and planning, from the German era to Japanese ownership after Germany's retreat from the Far East in 1914, to the Republic of China's period of governance and today's rule by the People's Republic of China. Even in its precolonial past, Qingdao's small fishing villages belonged to an empire centered a long way off, compared to the Native Americans living in the Los Angeles basin, scattered in small, competing bands that answered to no outside authority. The two cities are not, therefore, alike in their economies or politics.

These important contrasts, however, make comparing the two cities' history more, not less, interesting: Why did two cities, radically different in their cultural origins, come to resemble each other in size, cityscape, and perhaps even in temperament? Why has each grown from inconspicuous beginnings to a giant metropolis over the past century, and why have they attracted millions of inhabitants?



Cityscape of Los Angeles. © ablokhin on iStock. All rights reserved.

The Pacific Ocean unites them. Trading ports and navy bases are important functions for both cities, but the ocean serves as much more than a vehicle for commodities and warfare, or as a depot for natural resources like fish, oil, minerals, and energy or commodities like hay and rice, refrigerators, and computer chips. Both cities are complex human-reconstructed ecosystems, comprising geology, climate, ocean currents, fauna, flora, microbes, and people. But when a peninsula around Jiaozhou Bay became the city of Qingdao, and when a Tongva village named Yang-na (meaning “poison oak place”) became Los Angeles, when settlers from Germany, Japan, China, Spain, Mexico, and the midwestern US arrived and began building their city by the sea, they created an invisible bond across the Pacific Ocean.

Undoubtedly, many people have gone to these cities seeking jobs. But that alone has not determined the tides of migration. Newcomers wanted lives filled with sunshine, surfing, beaches, and mountains, facing outward to the world, and yet close to nature. Does that search simply echo Western Romanticism or traditional Chinese ideals? Or does it go beyond culture to reflect some universal need for the ocean?

Ancient people shunned the ocean precisely because it seemed beyond their control. That insecurity and uncertainty stopped them from settling in large numbers close to the ocean so that they could observe its changes and enjoy its beauty. Modern technology has made a life on the edge of the sea possible; it has helped dissipate old fears and provide new security. Twentieth-century residents managed to reclaim parts of the sea to make new land and to withstand the force of typhoons, hurricanes, earthquakes, droughts, and many other dangers that come from living along the Pacific. Whether real or illusory, these technological means have encouraged a feeling on both shores that living there is now safe.

Living by the sea has come to stand for a more prosperous, glamorous life, yet that life brings new environmental vulnerability.

There is a distinctly modern paradox in both Qingdao and Los Angeles. It goes beyond the antinomies created by colonial imperialism—the benefits and costs that imperial power brings. At the core of the novel contradiction lies a tension between zealous celebration of the ocean and the high risks that people must encounter to live by its side. Living by the sea has come to stand for a more prosperous, glamorous life, yet that life brings new environmental vulnerability. This vulnerability comes from the fact that in an age of human-made climate change, which is causing glaciers to melt and seas to rise by centimeters or even by meters, any city located by any sea is now among the most dangerous places on earth.

In China, coastal people are vulnerable to climate change not only in Qingdao, but also in Dalian, Tianjin, Shanghai, Hong Kong, and Guangzhou, all prominent shoreline cities. In the United States, 127 million people live in coastal counties. And yet migration toward seaside living continues in the United States and China. The cities of LA and Qingdao continue to grow despite scientists' warnings that, in future, seas may rise and invade agricultural fields, densely packed streets, homes, and industries, and pound them with violent storms that the warming waters spark. Thus, the modern desire to live close to the sea brings a kind of vulnerability and risk-taking that is new to history.

We need to think about urban environmental history in a more ocean-conscious way. For here on the edge of the sea much of human experience is rewritten, and we can no longer think about cities without thinking about the planet around them.

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MONARCHS OF THE GREAT PLAINS: PLANT POWER AND COLONIAL LEGACIES IN NORTH AMERICA

Sara M. Gregg

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Sara M. Gregg

Resplendent in shades of orange and black as they float along the breeze, migratory Monarch butterflies have ridden the gusts of transformation over the last centuries on the Great Plains. Known as “milkweed butterfly” because of its close relationship with its host plant, milkweed (*Asclepias* spp.),¹ the Monarch is perhaps North America’s most charismatic insect, and its delicate appearance belies a resilience and endurance that defies expectations. Indeed, the erratic demographic history of the migratory Monarch butterfly (*Danaus plexippus plexippus*) adds an unexpected insight to the legacy of European settlement of North America.



Milkweed (*Asclepias* spp.). © Sara M. Gregg. All rights reserved.

Twenty-first-century concerns about the survival of these butterflies take on a subtle irony in light of the boom in Monarch numbers during the early decades of Euro-American settlement on the Great Plains. Milkweed expanded steadily, propagated by seeds moving eastward upon prairie zephyrs, feeding ever-larger numbers of Monarch caterpillars. The herbaceous plants and their insect partners proliferated alongside US and Canadian settler-colonists and their industrial machines during the second half of the nineteenth century and into the twentieth century.

During the early decades of Euro-American settlement on the Great Plains, milkweed expanded steadily, feeding ever-larger numbers of Monarch caterpillars.

During the summer months, Monarchs feast on nectar plants, steadily accumulating the fat reserves that allow migrating adults to fly for a dozen hours straight, crossing up to a thousand kilometers without feeding.² In spite of their fragile appearance, these butterflies routinely travel up to four thousand kilometers from the northern Great Plains into the mountains of Michoacán, where in 1976 Indigenous citizen-scientists helped locate the butterflies' long-sought Mexican overwintering grounds.³ In the spring these adults head north from the coniferous forests of the Sierra Madre de Oriente. From there they shift to the west, toward the Trans-Mexican Volcanic Belt, where they spend the winter.⁴



Monarch butterfly (*Danaus plexippus plexippus*). © Sara M. Gregg. All rights reserved.

These charismatic butterflies have long attracted the attention of scientists, who chronicled Monarchs' feeding patterns and startling feats of strength, hypothesizing about butterfly migration as early as the 1850s.⁵ *The American Naturalist* published a description of the migration in 1877, with a correspondent noting a "continuous line of passing butterflies flying in a direct course towards the south, and at the height of thirty or forty feet above our heads."⁶ Other observers remark that during the fall they ride the prevailing winds, flying south in large numbers and launching upon "the first favorable wind to start upon their journey." They sailed along rapidly on southerly breezes, but "as soon as the wind changed its course all butterflies descended," so that it appeared to be "rain[ing] butterflies."⁷ Weather systems played a significant role in determining the timing of the migration—as prevailing winds and storm systems hold significant power to force a pause in their north-south movement.

In 1889, a report from Minnesota made note of the weathered adults who arrived in early spring, observing that "specimens looked bleached and had but few scales upon their wings . . . indicating a long flight." For the Monarch, survival is the upmost priority at this vulnerable moment, and these

butterflies “flew about rapidly, evidently in search of food, which at this time was scarce,” moving on as the flowers of wild cherries and plums ceased to blossom in one location and came into bloom further north.⁸

Yet milkweed thrives on disturbance, and it flourished as the steady westward movement of aspiring settler-colonists opened new ground for its airborne seeds to take root.

We now know that while the Monarch feeds on a wide range of flowers, its success is entangled with the fate of milkweed, a resilient, promiscuous perennial characterized by milky sap and elongate leaves.⁹ The butterflies’ intimate relationship with the milkweeds native to the Great Plains has long been clear to curious observers. Historical populations were in fact limited by access to milkweed, since the larval stage relies exclusively on this plant, which prior to the advent of settler-colonial agriculture comprised only a small share of prairie biomass. Yet milkweed thrives on disturbance, and it flourished as the steady westward movement of aspiring settler-colonists opened new ground for its airborne seeds to take root.



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In the summer, the various species of milkweed are capped by floppy tufts of flowers blooming in earthy tones of white, green, orange, and pink. As the long days of summer cool into autumn, the plant’s seed pods burst open, releasing tufted clumps of long white floss, each containing hundreds of seeds, that are carried to new terrain with each burst of wind.¹⁰ Wherever dislodged soil offers space for its airborne seeds to set root, milkweed seizes upon these openings to bypass the deep roots of the grasses and forbs that spread through rhizomes and subterranean networks.¹¹ While Indigenous farmers had cultivated intercropped gardens of plants with hoes, settler-colonists used imported agricultural methods and seeds and increased the area of land under cultivation. Each cut of the steel-tipped plow severed the root networks of acres of long-dominant prairie grasses, and into the edges of ever-expanding fields and farms crept this most opportunistic of the native prairie plants.¹²

Joel Asaph Allen described the quick pace of land-cover change in *The American Naturalist* in 1870: “No sooner is the sod inverted than scores of species of the original and most characteristic plants almost wholly disappear; in a few years the luxuriant wild grasses, overtopped with showy flowers . . . have become supplanted by the cultivated grasses and the cereals.”¹³

By replacing endemic diversity with imported row crops for sale to globalizing markets, the settler

farmers inadvertently opened new ground for the airborne milkweed seeds. These plants assumed an increasingly large role in the grassland mix along field edges, cuts for new wagon roads, and heavily grazed pastures.¹⁴

The multiplying milkweed nourished booming populations of Monarch caterpillars, which feed exclusively on the plant.¹⁵ During the spring and summer each female lays hundreds of eggs, solely on milkweed, and successful larvae mature into breeding adults in less than a month. Placing each egg on its own leaf, the breeding female ensures a jumping-off point for the caterpillar's ravenous consumption.¹⁶ Monarchs spawn several generations in rapid succession. Reproductive speed and choice of food plant are crucial to the butterfly's success, and the Monarch has been savvy in its choice of host plant. Milkweed is endowed with a powerful chemical defense, cardiac glycoside, a toxin that the Monarch ingests in its larval stage. This toxin courses through the plant and is absorbed into the tissues of the insect, making both caterpillars and adult butterflies distasteful and "virtually inedible" to predators.¹⁷



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Milkweed's expansive spread was cut short after World War II, as habitat loss and deforestation in the Monarchs' Mexican overwintering grounds, combined with postwar human inventions, wreaked havoc on the butterflies' once-soaring population.¹⁸ In the postwar era, cheap petrochemical inputs and farm consolidation once again transformed the landscapes of the Great Plains, and biodiversity declined under pressure from changing farm practices.¹⁹ This process has been magnified since the 1990s, as further technological innovations added novel weapons to the arsenal: genetically modified seeds that incentivize the use of herbicides and pesticides on plants bred to resist these chemical poisons, such as Monsanto's Roundup Ready crops. These practices represent a new generation of settler technologies that threaten the survival of a wide range of plants, as well as their insect and animal partners.²⁰

Monarchs are resilient, prolific breeders, and scientists still hold out hope that these latest threats to their survival represent setbacks, rather than the end of their dance on North American grasslands.

New genotypes and chemical formulations are only a part of the twenty-first-century challenge for the Monarch butterflies. Their success remains constrained by the risks inhering on the Great Plains, whose unreliable precipitation and extreme temperatures are now exacerbated by the erratic

weather caused by human-induced climate change. In fall 2012, a minute, drought-depleted contingent had arrived in Mexico only to face a devastatingly cold winter and a late, wet spring, and in 2013, the annual swarms of winged migrants from Mexico did not arrive on the Great Plains. An unusual confluence of events magnified the already monumental challenges of a thousand-mile migration up the continent, and fears intensified that the population was in imminent peril.²¹ But Monarchs are resilient, prolific breeders, and scientists still hold out hope that these latest threats to their survival represent setbacks, rather than the end of their dance on North American grasslands. The news in winter 2019 broadcast a hopeful 144 percent increase in overwintering acreage in Mexico, evidence of a promising breeding season, and a successful migration after a half-dozen years of desperate numbers.²²

This story of the migratory Monarch butterfly is emblematic of larger patterns on the Great Plains, and over the last two decades the uncertainty surrounding their survival has garnered significant public attention. Gardeners, conservation groups, and transportation officials are called upon to “Bring Back the Monarchs” by planting milkweed and other native plants in yards and along state and county highways.²³ Efforts at conservation are coordinated by nonprofit organizations and educators including Monarch Watch and Monarch Joint Venture, which cultivate networks committed to distributing seed, tagging migrant butterflies, highlighting the dangers of habitat loss and chemical overuse, and educating the public about native plants. The ecologists and entomologists who guide these organizations labor in concert with citizen-scientists, who share their passion for Monarchs and milkweed, bolstering the butterfly’s chance of survival.



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These groups seek to push policymakers into action: The Mexican government created the Monarch Butterfly Biosphere Reserve in 2008, protecting 56,259 hectares of overwintering grounds in the mountains of the state of Michoacán after sustained habitat destruction due to logging.²⁴ In 2014 the Xerces Society and other conservation groups petitioned the US Fish and Wildlife Service to list the Monarch butterfly as a threatened species under the 1973 Endangered Species Act, and the

Fish and Wildlife Service assigned “warranted-but-precluded” status to the Monarch in 2020. This acknowledged that the butterfly is deserving of protection, but due to other species taking priority, did not yet commit federal resources to preserve its habitat.²⁵

For the foreseeable future, Monarch Watch’s Chip Taylor recognizes, “habitat restoration will have to be funded by the private sector.”²⁶ Meanwhile, illegal logging continues to threaten the protection of some of the largest overwintering colonies in Michoacán, and in 2021 the International Union for the Conservation of Nature (IUCN) added the migratory Monarch to its “Red List,” noting, “The decision comes after decades of falling populations driven by losses in the plants they need as caterpillars and in the forests where adults spend the winter, combined with climate change.”²⁷ The situation has grown increasingly dire, but preserving habitat in Mexico and sowing new nectar plants in the United States and Canada may offer hope for the future.



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A central irony of the efforts to restore the insect’s habitat is that returning to the historic composition of prairie would likely not sustain the population of Monarchs who feed on milkweed from the Rocky Mountains to the Atlantic coast. Prairie restoration provides a path forward for the economy and ecology of the Great Plains, a means of reopening habitat and migratory corridors for grazing animals, and protections for endangered and threatened species, sustaining butterflies alongside other non-charismatic pollinators.²⁸ Replanting milkweed among other native grasses and forbs on damaged land would help return the Great Plains to a landscape that addresses the needs of other-than-human species alongside the diverse human communities in North America.²⁹

A systematic effort to convert agribusinesses to restored prairies would radically shift the distribution of species. One might expect that in recreated prairies, milkweed would comprise a larger proportion of biomass than in historical prairies, as all cultivated species would get an equal start. For the Monarch butterfly, the replacement of critical habitat may well ensure that these iconic insects could secure the vital sustenance needed to fuel their travel from Mexico to the Northern Plains.³⁰

The relationship between the fragile Monarch butterfly and the humble milkweed provides an apt illustration of the unexpected consequences of human modifications of the North American grasslands.

There is much to learn from the larger patterns in this natural history. Land-cover changes associated with settler-colonial expansion in North America drove the reproductive success of milkweed and, in turn, the Monarch butterfly. While the interwoven life cycles of milkweed and Monarch momentarily flourished, the boom was followed by sharp declines as colonial legacies further transformed the ecosystems of the Plains. The relationship between the fragile Monarch butterfly and the humble milkweed provides an apt illustration of the unexpected consequences of human modifications of the North American grasslands.

The symbiotic coexistence of milkweed and Monarch butterflies yields insights into success and failure that could be mobilized as humans navigate climate crisis, especially as we confront the uncertain future of the prairie biome, and serves as a reminder that colonization relies on disruption. This partnership also gives momentum to what has not yet been lost: mutualism and the possibility of regeneration. Monarchs' fortunes are often shaped by circumstances thousands of miles away. These ebbs and flows will continue as climate cycles and human-induced landscape change shape the reproductive patterns of both plants and insects.

Notes

¹ Asclepias comes from the name of the Greek god of medicine, Asklepios. Indigenous and Western societies have derived a wide range of medicinal uses for the milkweed plant. See Kelly Kindscher, *Medicinal Wild Plants of the Prairie: An Ethnobotanical Guide* (Lawrence: University Press of Kansas, 1992), 54ff.

² Andrei Sourakov, "Monarch Butterfly," Featured Creatures, University of Florida Entomology and Nematology Department, last modified 2021, <https://entnemdept.ufl.edu/creatures/bfly/monarch.htm>.

³ Fred A. Urquhart, "Found at Last: The Monarch's Winter Home," *National Geographic*, August 1976, 160-173.

⁴ Sourakov, "Monarch Butterfly."

⁵ Renowned lepidopterist Lincoln Brower dated the first reference to Monarch migration to 1857, placing it in the Mississippi Valley and referencing a description by d'Urban of the butterflies appearing in the Mississippi Valley in "such vast numbers as to darken the air by the clouds of them." William S. M. D'Urban, "Description of Four Species of Canadian Butterflies," *The Canadian Naturalist and Geologist, and Proceedings of the Natural History Society of Montreal* 2 (1 November 1857): 349; cited in Lincoln P. Brower, "Understanding and Misunderstanding the Migration of the Monarch Butterfly (Nymphalidae) in North America: 1857-1995," *Journal of the Lepidopterists' Society* 49, no. 4 (1995): 304-385, p. 306.

⁶ Wm. Edwards, "A Flight of Butterflies," *The American Naturalist* 11, no. 4 (April 1877): 244.

⁷ Otto Lügger, "On the Migrations of the Milkweed Butterfly," *Proceedings of the Entomological Society of Washington* 1 (1890): 256-58, p. 257.

⁸ Lügger, "Migrations of the Milkweed Butterfly," 256; "The Milkweed Butterfly," *Kansas Farmer*, 3 May 1893, 10.

⁹ Recent scholarship stresses an unequal relationship between these two organisms, with at least one evolutionary biologist characterizing the relationship as a battle between plant and insect. Anurag Agrawal, *Monarchs and Milkweed: A Migrating Butterfly, a Poisonous Plant, and Their Remarkable Story of Coevolution* (Princeton: Princeton University Press, 2017), 21.

¹⁰ Kindscher, *Medicinal Wild Plants of the Prairie*, 54.

¹¹ While fire, flooding, grazing, and human-induced landscape change had a material impact on grasslands for millennia, the changes induced by agricultural machines uprooted millions of acres of prairie grasses—

changing land cover at an unprecedented scale. Candace Savage, *Prairie: A Natural History* (2004; repr. Berkeley, CA: Greystone Books, 2011), 5.

¹² There are 72 catalogued species in North America, with 41 native to the “West.” “Milkweed Biology,” Western Monarch Milkweed Mapper, accessed 28 September 2022, <https://www.monarchmilkweedmapper.org/milkweed-biology/>.

¹³ Joel A. Allen, “The Flora of the Prairies,” *The American Naturalist* 4, no. 10 (December 1870): 577–585, p. 578; “Joel Asaph Allen,” in *National Cyclopædia of American Biography* (New York: James T. White & Company, 1893), 3:100.

¹⁴ John Thieret, *National Audubon Society Field Guide to North American Wildflowers, Eastern Region*, revised edition (New York: Alfred A. Knopf, 2001), 360. Original authors: William Niering and, Nancy Olmstead.

¹⁵ Scientists have attempted to gauge relative Monarch/milkweed populations by studying museum and herbarium collections, and these data have documented an increase that correlates with the increase in agriculture (as well as the movement of naturalists into the Great Plains). While the data on butterflies have been critiqued in other letters to PNAS, the consensus is that Boyle et al.’s analysis of milkweed trends is convincing. John H. Boyle, Harmony J. Dalglish, and Joshua R. Puzey, “Monarch Butterfly and Milkweed Declines Substantially Predate the Use of Genetically Modified Crops,” *Proceedings of the National Academy of Science* (PNAS) 116, no. 8 (5 February 2019): 3006–3011, pp. 3006–07.

¹⁶ Julia E. Rogers, “The Migration of the Monarch Butterfly,” *Country Life in America*, 1 August 1911, 48.

¹⁷ Amy McDermott, “To Fight Off Predators, Insects Evolved a Taste for Toxic Plants,” *Proceedings of the National Academy of Science of the United States of America*, 27 May 2022, <https://www.pnas.org/post/journal-club/fight-off-predators-insects-evolved-taste-toxic-plants>; Stephen Jones and Ruth Cushman, *The North American Prairie: A Guide to the Plants, Wildlife, and Natural History of the Prairie, Including Where to Hike and Camp* (Boston, MA: Houghton Mifflin Company, 2004), 169–70; Paul Opler and Amy Bartlett Wright (ill.), *A Field Guide to Western Butterflies*, 2nd ed. (Boston, MA: Houghton Mifflin Company, 1999), 369–70.

¹⁸ Anurag Agrawal, “Advances in Understanding the Long-Term Population Decline of Monarch Butterflies,” *Proceedings of the National Academy of Science* 116, no. 17 (23 April 2019): 8093–95; Boyle et al., “Monarch Butterfly and Milkweed Declines,” 3006–11.

¹⁹ Brower, “Understanding and Misunderstanding the Migration of the Monarch Butterfly,” 304–85.

²⁰ “The native population . . . has shrunk by between 22% and 72% over the past decade.” IUCN Press Release, “Migratory Monarch Butterfly Now Endangered—IUCN Red List,” 21 July 2021, <https://www.iucn.org/press-release/202207/migratory-monarch-butterfly-now-endangered-iucn-red-list>.

²¹ Jim Robbins, “The Year the Monarch Didn’t Appear,” *New York Times*, 22 November 2013, <https://www.nytimes.com/2013/11/24/sunday-review/the-year-the-monarch-didnt-appear.html>; Verlyn Klinkenborg, “Monarchs Fight for their Lives,” *New York Times*, 12 October 2013, <https://www.nytimes.com/2013/10/13/opinion/sunday/monarchs-fight-for-their-lives.html>.

²² Christopher Sherman, “Monarch Population Up 144 Pct at Mexico Wintering Grounds,” *The Associated Press*, 30 January 2019, <https://apnews.com/article/217a8d01ef384fa3847fd63baa96c201>.

²³ Some policymakers are urging farmers to convert the soy that was sold as a miracle crop to the United States for livestock feed in the postwar era—but which is under increasing competition from South America and hampered by restrictive Chinese tariffs on US goods—to milkweed and other native plants. “Hold the Soy, Save the Pollinators,” *Makewayformonarchs.org*, accessed 12 January 2019, <https://makewayformonarchs.org/i/archives/2917>; Robbins, “The Year the Monarch Didn’t Appear.”

²⁴ “Monarch Butterfly Biosphere Reserve,” UNESCO World Heritage Convention, accessed 10 November 2022, <https://whc.unesco.org/en/list/1290/>.

²⁵ “Petition to Protect the Monarch Butterfly (*Danaus Plexippus Plexippus*) Under the Endangered Species Act,” submitted 26 August 2014, https://xerces.org/sites/default/files/2018-07/14-058-01_monarch-esa-petition.pdf.

²⁶ “US Fish and Wildlife Service Finds Endangered Species Act Listing for Monarch Butterfly Warranted but Precluded,” US Fish and Wildlife Service Press Release, 15 December 2020, https://www.fws.gov/press-release/2020-12/endangered-species-act-listing-monarch-butterfly-warranted-precluded?ref=u.s.-fish-and-wildlife-service-finds-endangered-species-act-listing-for-&_ID=36817.

²⁶ Chip Taylor, "ESA Listing Decision for the Monarch," 15 December 2020, <https://monarchwatch.org/blog/2020/12/15/esa-listing-decision-for-the-monarch/>.

²⁷ "Migratory Monarch Butterfly Now Endangered—IUCN Red List," ICUN Press Release, 21 July 2021, <https://www.iucn.org/press-release/202207/migratory-monarch-butterfly-now-endangered-iucn-red-list>; Catrin Einhorn, "Monarch Butterflies are Endangered, Leading Wildlife Monitor Says," *New York Times*, 21 July 2022, <https://www.nytimes.com/2022/07/21/climate/monarch-butterflies-endangered-iucn.html?smid=url-share>.

²⁸ Many policy proposals focus on rebuilding the diverse ecosystems of the Great Plains and prairie province, dating back to many Indigenous nations' calls for Land Back (long before the current language became common), and resurging with Deborah and Frank Popper's 1980s call for a "Buffalo Commons."

²⁹ "Grassland Ecosystems," Bill Moyers Reports: Earth on Edge, <https://www.pbs.org/earthonedge/ecosystems/grasslands.html>; World Wildlife Fund, *Plowprint Annual Report 2016*, accessed 6 December 2022, http://assets.worldwildlife.org/publications/946/files/original/plowprint_AnnualReport_2016_GenInfo_FINAL_112016.pdf?1479923301.

³⁰ Sourakov, "Monarch Butterfly."

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EARTHWORM

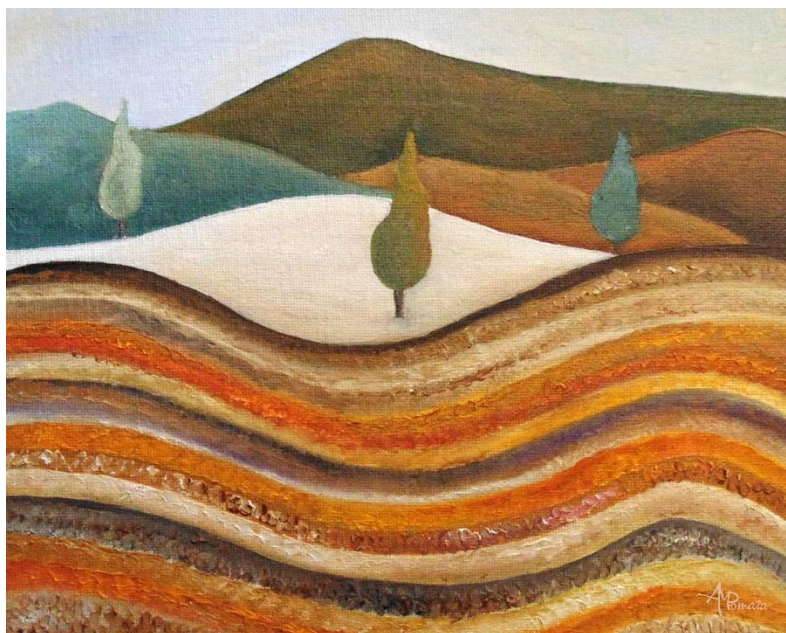
Sumana Roy

Springs

The Rachel Carson Center Review

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Sumana Roy



Ángeles Martínez Pomata, *Stratified Soil*, 2018. Oil on canvas, 24 x 19 cm.
Courtesy of the artist. All rights reserved.

Earthworm

From here, life seems like background noise,
speech a fossil from a disobedient time,
cleanliness a bed for the frail and aging.
And light a lazy animal that often stops to rest -
it has no curiosity, it never travels underground.
Without skeleton, like the night,
without colour, like tanned water,
its form seems like a first draft.
Legs would be jail, ears too much to feed,
a resinous responsibility.
Not sun, not moon, not time's gossip,
but the faded dark gives it rhythm,
as if it were soil's translucent twin.
Like a straw it ferries soil,
secreting it as roundlets,
as if they were the earth's fleece.
The soil's saint,
it moves as if life were as
so that when severed into
it dies, almost apologetic for being alive,
hinting that not all parts of us die at the same time.

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POWER POVERTY: ENERGY INJUSTICE IN SOUTH AFRICA

Jane Carruthers

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Jane Carruthers

Reflecting on his arrival in Johannesburg from the Eastern Cape in 1941, Nelson Mandela recalled, “We saw before us, glinting in the distance, a maze of lights that seemed to stretch in all directions. Electricity, to me, had always been a novelty, and a luxury, and here was a vast landscape of electricity, a city of light.”¹ His thrill at seeing the brightly lit city reveals a stark contrast between the “landscape of electricity” and the lived reality of Black South Africans then subjected to apartheid.



Enkanini, South Africa. © mrnovel80 on Adobe Stock. All rights reserved.

Segregated into resource-poor and overcrowded parts of the country, Black communities had virtually no access to electricity or to many other state services. The services that were available to them, such as education or health, were designed for a second-class and subjugated population. Injustice and inequality were not only the norm, they were the law.

When apartheid ended in 1994, the new South African Constitution entrenched equality while also addressing restitution and redistribution. Among its benefits, the Constitution promised electricity to those who had previously been denied it. From the mid-1990s, tremendous strides have been made in this regard, raising the proportion of South Africans with access to electricity from just over half in 1996 to over 80 percent currently.² Some indigent households qualify for 50-100 kWh of free electricity each month (average monthly per capita consumption is around 287 kWh in South Africa).

Generation is insufficient to meet demand, and electricity remains an intermittent luxury for all South Africans, although entrenched injustice affects people's ability to cope with the faltering supply.

And yet, access has not guaranteed supply. Generation is insufficient to meet demand, and electricity remains an intermittent luxury for all South Africans, although entrenched injustice affects people's ability to cope with the faltering supply. Recently, a World Bank report reaffirmed that South Africa is the most unequal country in the world; lack of power, which constrains economic growth and opportunities, exacerbates inequality.³ The crime rate is the third highest in the world. Almost half the population survives on state support. Although the creation of employment opportunities is paramount, economic growth is barely discernible. As a consequence, the nation seethes daily with civil unrest—referred to as “service delivery protests.” Many street protests turn violent, with loss of life and damage to property. These issues of social inequality are bound up with concerns of environmental justice due to South Africa's overreliance on coal and environmental degradation caused by mining.

Electricity supply in South Africa lies in the hands of Eskom Holdings SOC Ltd., a centralised state-owned corporation founded in 1923, which absorbed all existing large generating plants in the Republic. Over time, Eskom has constructed its own plants and expanded transmission beyond South Africa to many parts of the African continent. By the late 1990s, Eskom was supplying 95 percent of South Africa's and 38 percent of the continent's power consumption.



Coal-fired power station in South Africa. © Willem on Adobe Stock. All rights reserved.

Along with Eskom's monopoly over the energy sector, coal—the largest energy source for electricity in South Africa—lies at the heart of the economy. In South Africa, coal is plentiful and cheap, and a high-value export product. Apart from abundant sunshine and unexplored shale gas, no alternative indigenous resources to coal exist. Natural gas, comprising 3 percent of the primary energy supply, comes via pipeline from fields off the Mozambique coast and is dedicated for use in liquid-fuel synthesis. Crude oil, imported mainly from Saudi Arabia and Nigeria, is refined to produce petrol, diesel, and other fuels. Thirteen coal-fired power stations produce 80 percent of the Republic's electricity.

Although South Africa's coal-fired power infrastructure ought to be able to provide enough electricity for some 60 million people, the country has experienced rolling blackouts since 2007 due to a failure of supply and insufficient reserves. When the grid is at risk and megawatts need to be conserved, Eskom publishes a schedule listing times for outages, staggered for different geographical areas, to reduce consumption and avoid a total blackout. This rationing, euphemistically called "load-shedding," results in blackouts lasting for 2.5 or 4.5 hours at a time. Power cuts affect every activity that relies on a dependable power supply.



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When power is down, cables and other equipment are frequently stolen or vandalised. Switching parts of the system repeatedly off and on creates surges and often damages the aging infrastructure, leading to even more power outages. The poor—and particularly women, who carry the burden of household management—are hit the hardest. Many South Africans despairingly but passively accept blackouts, while others take to the streets in radical protest. Rob Nixon's "slow violence"⁴ resonates throughout South Africa's energy regime. And literal power poverty emerges from the harmful effects of the country's electricity generation.⁵

South Africans have developed different ways of coping with this situation. Many middle-class households have made use of inverters or domestic solar supply, while large businesses have often installed backup diesel generators. However, it is illegal to feed any excess energy

into the grid. Many urban townships inhabited by poor Black communities display a sea of small solar roof panels that supply hot water. But only electricity from the grid can power technological devices and vital domestic appliances, such as a kettle, a stove, or lighting.

As French urbanist Sylvie Jaglin and geographer Alain Dubresson emphasise, many factors have created the current situation of insufficient energy generation, including large new plants that have been inadequately planned or badly constructed.⁶ Additional causes include incompetent and inefficient management at Eskom due to an acute skills shortage, expertise drain, and lack of maintenance; extensive patronage in employment; complications arising from the transformation of the coal industry from large to smaller suppliers; labour unrest; sabotage; non-payment by consumers (including municipalities); widespread theft; and, importantly, massive corruption.⁷

On top of that, current environmental crises have further destabilised the supply of electricity in South Africa. Many baseload plants use wet recirculation cooling technologies, which are extremely

wasteful of water.⁸ The Republic is arid, and water security is fragile. With even more intense drought anticipated as a result of climate change, the issue of energy security will become increasingly significant and, of course, even more detrimental to climate justice. For many reasons, the government has given little support to renewable energy. Fearing that any change to the status quo or privatisation will come with diminishing state control and price increases, the role for private enterprise in the industry has also been restricted.⁹

Widespread illegal “zama-zama” mining—extremely dangerous extraction in abandoned or closed mines—is increasing, aggravating the damaging effects of commercial coal mining.

Coal-mining regions suffer from extreme air pollution, poisonous old mine dumps, long-burning fires, water pollution, and acid mine drainage. There are 19 coalfields in South Africa. Most deposits lie in the northern and eastern parts of the country, where the large power plants are situated. New areas are being mined, and the government often signs contracts for new coal mines or extensions without restrictions, even in environmentally sensitive or conserved areas. Widespread illegal “zama-zama” mining—extremely dangerous extraction in abandoned or closed mines—is increasing, aggravating the damaging effects of commercial coal mining.¹⁰

Air pollution detrimentally affects those who are already economically disadvantaged or who live near power plants and coal mines. At times, the power stations in the east even contaminate the air over Johannesburg. The emission of toxic particulates in the southeastern province of Mpumalanga is among the highest in the world. The poor in South Africa, unable to escape these hazardous environments, suffer from sinus ailments, burning eyes, pulmonary infections, and other illnesses.¹¹

Mining also affects the landscape, leaving immense, visible scars. Although by law land must be rehabilitated when mining ceases, the law is rarely obeyed, and defunct mines cannot be made to pay. Section 24(b) of the Constitution provides that “everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation [and] promote conservation.” Despite excellent environmental laws—among the best in the world—lack of money, poor human capacity, and widespread corruption often prevent implementation.



Truck transporting coal. © Jane Carruthers. All rights reserved.

Citizens are working to improve the situation in various ways. In addition to social protests in the streets, South African youth are also raising their voices. The “#CancelCoal” campaign to block any new coal mining involves young activists linked to the African Climate Alliance, the Vukani Environmental Movement, the environmental justice organization groundWork, and the Centre for Environmental Rights.¹² Brave activists and some non-governmental organisations have formally held the government to account. In 2017, Earthlife Africa won a significant court case: a challenge to the government decision to build a new coal-fired power station, Thabametsi, in Limpopo province.¹³ In another victory, a 2019 Constitutional Court ruling prevented the construction of an opencast mine in the Mabola Protected Environment near Wakkerstroom in Mpumalanga.¹⁴ However, protesters run the risk of being persecuted, or even murdered, while recourse to the courts is prohibitively expensive for many activists.¹⁵

In addition to social protests in the streets, South African youth are also raising their voices.

International pressure may stimulate a change in South Africa’s energy mix. At COP26, a deal was announced, promising \$8.5 billion to help end the country’s reliance on coal. While President Cyril Ramaphosa called it a “watershed moment,” a lack of clarity remains regarding how this assistance will be utilised.¹⁶ Additionally, South Africans fear job losses if the energy environment is altered to focus on renewables. Already, a third of the population is officially unemployed, including almost two-thirds of those between the ages of 15 and 24.¹⁷

A new COP meeting is underway in November 2022, and although many people inside South Africa are saying that green energy is a colonial plot, it seems that a realistic government plan was unveiled in Sharm El Sheikh, Egypt.¹⁸ However, due to legal hurdles, a lack of technological expertise, and insufficient popular support, it is questionable whether renewable energy can ever be generated on a scale that would bring about a just energy transition for South Africa’s society and its environment.

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WHY I SLEEP OUTSIDE

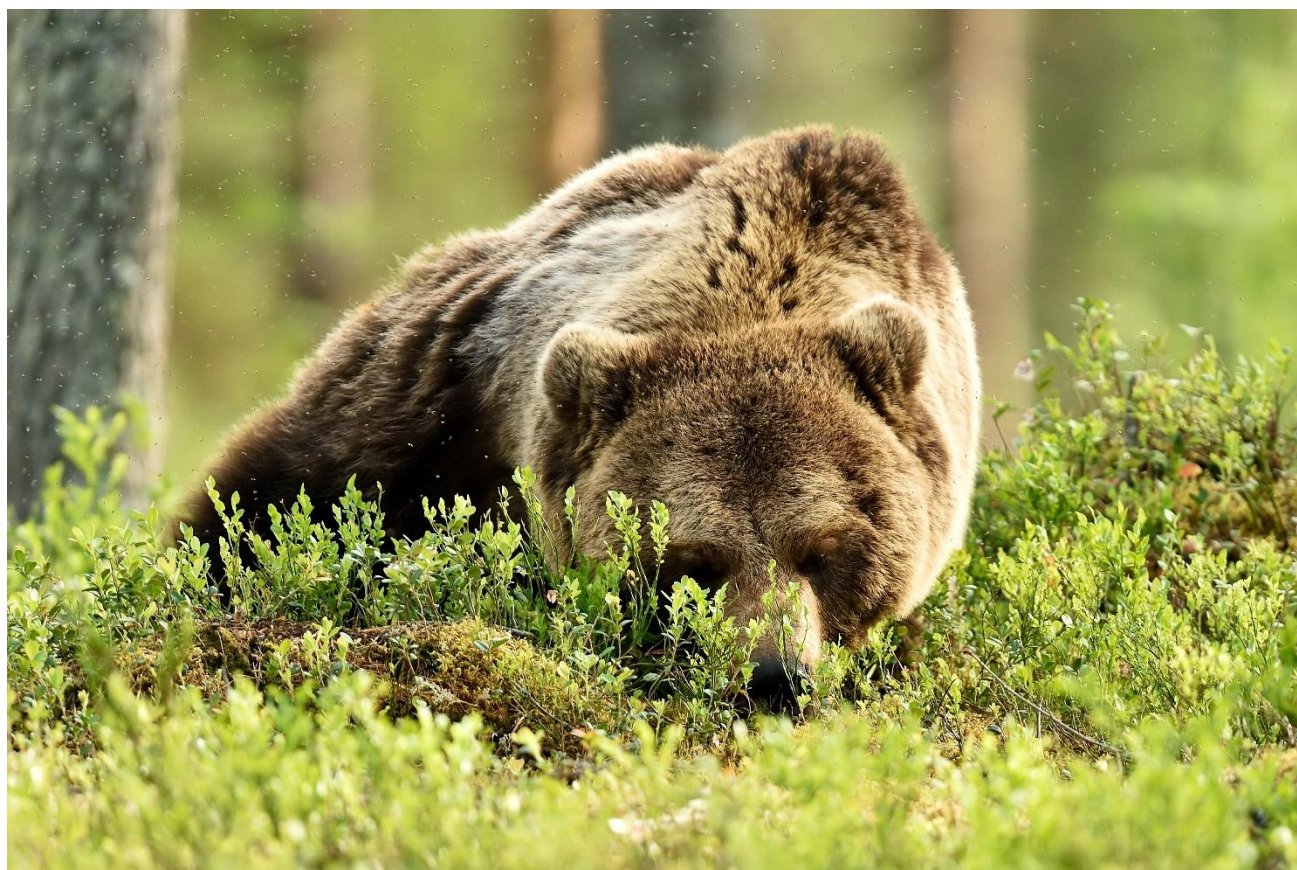
Elin Kelsey

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Elin Kelsey

I can't quite remember when I first pulled a camping mat and sleeping bag under my covered back deck and hunkered down for the night. That makeshift arrangement has evolved into a full-size bed, down duvets, and a secure sleeping space. But I do know why I sleep outside. I do it because I am nature: Because I am less than whole when separated from the wind, the rain, the scent of earth, the rising crescendo of geese calling as they migrate through the night. I sleep outside because I am less alive within the sterile confines of monochromatic walls and temperature-controlled interiors, no matter how much I admire and appreciate their aesthetic design and beauty. I sleep outside because I cannot stand to miss even a single morning of spring birdsong, the chill of winter on my nose, or the moment when dusk turns to night. I sleep outside because I like the shock of leaving my cozy bed to hurry to the bathroom across a frozen, moonlit night, and the joy of returning to the warmth of my outdoor nest.



Sleeping brown bear. © ErikMandre on iStock. All rights reserved.

Experiencing the dry crack of subzero temperatures, the deluge of endless rain, or relentless blistering heat fuels my awe for other species. I watch a hummingbird rise high above my snow-drenched backyard, moving into a day with no provisions, no backup, utterly dependent on its relationships with other species and our collective agency. "Birds have no pockets," I tell myself. I have turned this wondrous idea over and over again in my mind for many years, like a well-worn river stone, each time encountering its significance anew. That bird's life, and mine, are not isolated entities. We are both only breathing because of ocean plants creating the oxygen in the air and the fish that disperse the seeds of rainforest plants when the Amazon River floods. I would go

hungry were it not for the winds that blow the pollen grains of wheat, oats, rice, and so many other plants that I eat. The hummingbird's body undergoes a semi-hibernation every night.¹ Its heart rate and temperature may drop dramatically, and still it loses about a tenth of its weight before the morning.² This bird would go hungry were it not for the insects that also feast on those same crops.

When I close my eyes and snuggle beneath the covers, I like to imagine the gentle breathing of grizzly bears asleep in their mountain dens, and babies in Nordic countries napping as snowflakes blanket their prams. Like those babies, I am privileged to sleep in a safe place.³ I have the resources to make conscious, responsive choices about where to position my bed, what I wear, and how many blankets I need. The same is true for Finnish mothers in a study by Marjo Tourula and colleagues who demonstrated a fluency for reading the northern winter environment and creating calm, peaceful sleep experiences that honored their children as part of nature.⁴



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The practice of outdoor sleeping was actively promoted in Finland as an intervention in response to high infant mortality rates in the 1920s.⁵ The challenges and advantages became so self-evident that outdoor sleeping for children is now an embedded cultural practice, a norm in Finnish culture.

In recent years, an avalanche of published studies have revealed the physical, mental, emotional, and social benefits of time spent outside.⁶ The delights reveal themselves. Sleeping outside is restorative. It promotes relaxation and a contagious sense of well-being.⁷ We become more attentive to the needs of each other as we grow more aware of subtle changes in the weather and the seasons.⁸ How can I convey the luxurious sensation of air so thick with lavender, I can taste it on my breath, coupled with the heady realization that an individual bumblebee comes to tend those fragrant blossoms each morning, making micro-adjustments to the time it arrives exactly in sync

with shifts in the timing of sunrise as spring gives way to summer? “Look,” says my daughter, pausing to sniff a clump of dahlias on her way to join me for a movie. We watch as individual bees fly into their own individual flower, bedding down for the night as the petals close tightly around them.

True, I could also tell tales about rats and blaring sirens and all-night parties, but those stories would be collaged with my growing appreciation of the social and emotional capacities of rats,⁹ and the unexpected beauty of listening to my neighbor, a professional musician, practicing her trumpet in the early hours before dawn, unaware that I was outside too, drifting in and out of sleep to Mahler’s *Blumine* movement.

I used to be shy about telling people that I sleep outside. But not anymore. As wild swimming, forest bathing, urban birding, outdoor kindergartens, and other nature-based movements rapidly gain popularity, so too does momentum for conserving and restoring biodiversity. In the midst of converging crises of biodiversity loss, climate change, the global pandemic, and so many other urgent issues, the key role that nature-based solutions play in tackling climate and biodiversity goals is increasingly being recognized and mainstreamed.¹⁰

Lately, I’ve taken to asking friends and colleagues to sleep outside with me on their balconies or porches when I visit them in big cities. It’s a quiet gesture; a sleepy form of activism; a way of connecting to the planetary community of 8.7 million species. I invite them to sleep outside because where we lay our heads is where we belong.

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