

# Ours Is the Earth: Science and Human History in the Anthropocene

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## Abstract

History at one time drew unproblematically on records produced by human societies about themselves and their doings. Advances in biology and the earth sciences introduced new narrative resources that repositioned the human story in relation to the evolution of all else on the planet, thereby decentering earlier conceptions of time, life, and human agency. This essay reflects on what it means for our understanding of the human that the history of our species has become so intimately entangled with the material processes that make up the biosphere, while concurrently the temporal horizon of our imagination has been stretched forward and back, underscoring the brevity of human existence in relation to earthly time. I suggest that, despite significant changes in the resources with which we can rethink the human condition, drawing upon the sciences, history's fundamental purposes have not been rendered irrelevant. These center, as before, on the normative project of connecting past and future in ways that make sense of human experience and give meaning to it. In particular, the question of how humans should imagine the stewardship of the Earth in the Anthropocene remains an ethical project for history and not primarily the domain of the natural sciences.

## Keywords

Anthropocene – environmental history – co-production – sociotechnical imaginaries – posthumanism – future studies

## 1 The Decentered Human

Is historical thinking a revelation, a parting of the thick curtains of the past to reveal mysteries not understood before, but that, once seen, change everything; or is it a succession of cloudbursts, sudden storms that clear the air and leave the earth fresh and regenerated in ways that are satisfying precisely because they reconnect us to all those yesterdays that have gone before? Which mode of historicizing we embrace is a matter of disciplinary as well as normative commitments. The natural sciences often speak in the register of revelation, bringing transformative truths from outside the domains of ordinary human experience.<sup>1</sup> Their preferred narrative mode is rupture, a history punctuated by grand paradigm shifts. Humanists by contrast retell the past to situate experience within storylines that neither erase our role as narrators nor absolve us of the responsibility to connect what is and what will be to what has gone before. Central to those stories is an interpretation of human nature and human purposes, an exploration of what human lives are for that builds on slowly accumulated archaeologies. This essay follows that humanistic tradition in a time when humanity, the fellow-feeling that lies at the heart of collective moral judgment, seems endangered by science's disruptive and materialist thinking. It is a reflection on why it matters that we are not, after all, rocks or rivers or DNA or microbiomes, and why, gifted with language and reason, we may wish to reflect, critically and ethically, on what we owe to each other and to the planet that offers us a common abode.

Whatever its emotive register, history at any moment is an inflection point between two imaginations, the past and the future, both fictive in their way. One looks back to reconstruct what may have been and the other looks forward to what might yet be. It is in the intermediate, lost subjunctives, the unrealized might-have-beens, the roads not taken, the counterfactuals, the failed lives and movements, that history acquires its poignant or tragic cast, recognized in myth and scholarship in the Western world. We are reminded of Orpheus, who dared to visit the nether world with his lyre, who charmed the fierce dog Cerberus and Hades himself with his song, but who looked back at the last moment to catch a glimpse of his dead wife Eurydice lest he be doomed to a future without her at his side. That fateful backward look to the past sealed the death of his longed-for future. He returned without Eurydice, to be torn to pieces as one story goes by the fierce Maenads. And then we are reminded of Walter Benjamin, whose last work, "Theses on the Philosophy of History",

1 Lynda Walsh, *Scientists as Prophets: A Rhetorical Genealogy* (New York: Oxford University Press, 2013).

presented the arresting image of the angel of history propelled backward on storm-wracked wings into a future he could not see, while the wreckage of the past piled up before him in the name of progress.<sup>2</sup>

If Benjamin's angel *had* looked forward, attempting to discern the shape of the future from the present might have proved no less tragic. Maybe this is why, as Benjamin notes in his final thesis, "the Jews were prohibited from inquiring into the future".<sup>3</sup> We may recall here too the doomed figure of Cassandra, whose foretellings no one believed, possibly because she more keenly than anyone else remembered the patterned data points of the past and projected them into a future whose mysteries others did not have the gift to decipher as she did. She may have been the ancient world's first modeler and scenario builder, but like many futurists she faced skepticism from empiricists whose imaginations were firmly circumscribed by facts as seen in the here and now. Warned and burdened by such examples, how should we build our histories in a moment when the moral significance of the human is itself in question? Why even bother with humanity when we are but a short blink in the eye of time, when our genes so little differentiate us from other species, and when our imprint on the planet seems no different in kind from catastrophic physical events, such as asteroid strikes and mass extinctions?

Human history today seems caught up in one of those Benjaminian presents that have little to do with how things *actually* are (however one might define actuality): a *Jetztzeit* that seems at once cataclysmic and detached from any continuous record of time's passage. The year 2020 came to an Earth already burdened by the threat of climate change. A slowly forming specter of end time, it "dethroned" the threat of nuclear war, as noted by the historian Alex Wellerstein.<sup>4</sup> Climate change is huge, encompassing, profoundly disruptive in its imagined consequences, and yet impossible to track and predict with any specificity. Not surprisingly, it has elicited commentary in prophetic and apocalyptic registers, as if ordinary language cannot fully capture its meaning. The environmental journalist Elizabeth Kolbert used the death-of-nature theme to frame her 2006 book on climate, *Field Notes from a Catastrophe*.<sup>5</sup> The

2 Walter Benjamin, "Theses on the Philosophy of History", in his *Selected Writings, Volume 4: 1938–40*, eds Howard Eiland and Michael W. Jennings, trans. Edmund Jephcott et al. (Cambridge, MA: Harvard University Press, 2003), 392.

3 Benjamin, "Theses", 397.


4 Alex Wellerstein, "Five Ways That Nuclear Weapons Could Still Be Used", *The Guardian*, 6 August 2015, <https://www.theguardian.com/commentisfree/2015/aug/06/nuclear-weapons-70-years-bombing-hiroshima-war> (accessed 30 June 2020).

5 Elizabeth Kolbert, *Field Notes from a Catastrophe: Man, Nature, and Climate Change* (London: Bloomsbury, 2006).

American writer and environmental activist Bill McKibben invented a whole new planet, the “two-a Eearth”, to replace the old Earth with one “a” that no longer exists after climate change:<sup>6</sup> “We have carbonized it out of existence”.<sup>7</sup> The Canadian social activist Naomi Klein adopted a more strident rhetoric in her polemic, *This Changes Everything*,<sup>8</sup> targeting capitalism as the source of Earth’s imminent destruction and advocating for a wholesale retreat from long-entrenched ideas of profit and growth. How to do this, however, remains an excruciating challenge, one that economists have embraced with their practical instruments for marketizing greenhouse gas emissions. Yet, years before Klein published her call for revolutionary change, Mike Davis, Southern California’s angry apostle of environmental disaster, ridiculed the presumption that something called “the market” could solve the problem of climate change given the imbalances of power and money that configure the dynamics of that supposedly autonomous institution.<sup>9</sup>


The coronavirus pandemic in the first few months of 2020 offered a sudden glimpse of what it might mean to address the climate activists’ foreshadowings, or nightmares, on a global scale. Almost overnight, with barely a whimper of political opposition, nation states enacted many of the recommendations that climate change activists had been proposing for years. To slow or stop the spread of a malignant, invisible, invincible germ, people accepted restrictions on personal liberty in February and March that could hardly have been thought possible in January. On 3 April 2020, the *New York Times* reported in a widely circulated briefing that half the planet was on lockdown pursuant to draconian stay-at-home orders.<sup>10</sup> However briefly, the virus slowed down the human species as a planetary force. Planes stopped flying,<sup>11</sup> cruise ships

6 Bill McKibben, *Eaarth: Making a Life on a Tough New Planet* (New York: Henry Holt, 2010).

7 Paul Greenberg, “Hot  Cold Facts”, *New York Times*, 7 May 2010, <https://www.nytimes.com/2010/05/09/books/review/Greenberg-t.html> (accessed 30 June 2020).

8 Naomi Klein, *This Changes Everything: Capitalism vs. the Climate* (New York: Simon and Schuster, 2014).

9 Mike Davis, “Living on the Ice Shelf: Humanity’s Meltdown”, *Tomgram*, 26 June 2008, [https://www.tomdispatch.com/post/174949/mike\\_davis\\_welcome\\_to\\_the\\_next\\_epoch](https://www.tomdispatch.com/post/174949/mike_davis_welcome_to_the_next_epoch) (accessed 30 June 2020).

10 *New York Times*, “Half the Planet Is On Lockdown, But Not Every U.S. State Is, Even After Alabama Issues an Order”, 3 April 2020, <https://www.nytimes.com/2020/04/03/world/coronavirus-news-updates.html?> (accessed 30 June 2020). 

11 Anthony Faiola, “The Virus That Shut Down the World”, *Washington Post*, 26 June 2020, <https://www.washingtonpost.com/graphics/2020/world/coronavirus-pandemic-globalization/> (accessed 30 June 2020).

were abandoned, car traffic dropped to record lows,<sup>12</sup> tourism fell, fossil fuel use diminished, meat shortages forced even rich people to eat more legumes, skies cleared, and wildlife had a field day in what some biologists evocatively (if not quite felicitously) named the “anthropause”.<sup>13</sup> Others were already calling the slowdown of human activity in response to the pandemic “the Great Pause”. The newer term not only claimed the period of viral ascendancy as a thing for science to study but put it in conversation with other scientific histories of humanity’s sojourn on Earth.

The anthropause of 2020 placed a temporary hold on conventional understandings of human primacy. It can be seen in this respect as a caesura in the unstoppable flow of the Anthropocene, a term that surfaced in our discourse, appropriately enough, at the millennium. It achieved with supreme irony a double flip, at once elevating humanity’s planetary footprint and displacing history’s focus on human agency and experience. It is well-chronicled by now that the term Anthropocene, coined by the Nobel-laureate atmospheric chemist Paul Crutzen and his co-author Eugene Stoermer, appeared in an article of just over a page in a little-known scientific periodical in 2000.<sup>14</sup> Tracing their idea to those of visionary predecessors such as the Russian geologist V.I. Vernadsky and the French Jesuit mystic and paleontologist Pierre Teilhard de Chardin, the authors gestured toward the size and scope of the cumulative changes wrought by our species upon the biosphere. Grounding their notion in a dry litany of numbers, and putting it forward mainly as a provocation to the esoteric science of stratigraphy, Crutzen and Stoermer could hardly have imagined the immense pull it would have on scientific and scholarly imaginations across an array of previously unconnected fields: geology and the earth sciences, for sure, but also environmental history, moral philosophy, and the human sciences writ large. Nor could they have foreseen that people increasingly fearful of nature’s destructive force would be so taken with the thought of an age defined by the total subjugation of nature to the rise of the human.

Consistent with the theme of this special issue, my essay reflects on what it means for our understanding of the human that the history of our species has become so intimately entangled with the material processes that make up the

12 Farhad Manjoo, “I’ve Seen a Future Without Cars, and It’s Amazing”, *New York Times*, 9 July 2020, <https://www.nytimes.com/2020/07/09/opinion/ban-cars-manhattan-cities.html?> (accessed 10 July 2020).

13 Christian Rutz, Matthias-Claudio Loretto, Amanda E. Bates et al., “COVID-19 Lockdown Allows Researchers to Quantify the Effects of Human Activity on Wildlife”, *Nature Ecology and Evolution*, 4:8 (2020), 1156–1159.

14 Paul J. Crutzen and Eugene F. Stoermer, “The ‘Anthropocene’”, *Global Change Newsletter*, 41 (2000), 17–18.



biosphere, while concurrently the temporal horizon of our imagination has been stretched forward and back, underscoring the brevity of human existence in relation to earthly time. The crisis of climate change, Dipesh Chakrabarty wrote in 2009, compels us to revisit the basic assumption of “the continuity of human experience” that connects past, present, and future. It undermines the very purpose of “humanist histories”: to “produce meaning through an appeal to our capacity not only to reconstruct but ... to reenact in our own minds the experience of the past”.<sup>15</sup> A new “we” has arisen, Chakrabarty argues, at the level of the species, with its history no longer separable from that of nature. Do these overlapping disjunctions and erasures leave humanity without a history? Or does it, as Foucault more subtly suggested in *The Order of Things*,<sup>16</sup> free up the historical imagination for a new kind of hermeneutics that makes a virtue of the fragmentation of human experience into separate strands of economic, biological, and linguistic history, no longer bound to the single chronology of human progress?

Below, I address in three passages the conundrum of the human seen now as both constituting and constituted by the decenterings of planetary history. How we position humans and human agency remains, I argue, a profoundly normative choice, and it is in part a choice guided by disciplinary perspectives. To illustrate, I first set the arrival of the Anthropocene within a longer trajectory of narrating the human place in nature. There have always been multiple stories in play, but running through all of them is a concern for questions of care and stewardship that relate, in turn, to theses about who “we” are in Chakrabarty’s sense, and who gets to define it: individual, community or species; intending or unintended users of nature’s resources; distinct from nature or part of it. A specific problem for the history of humans in nature is the interplay of environment with economics, two concepts that aggregate human activity from very different epistemic and normative standpoints without necessarily acknowledging their interrelations. I then turn to two examples of contemporary environmentalism, one from Germany and one from India, to show how, in each, understandings of the human past are interwoven with questions of responsibility that have become the centerpiece of environmental history in our time. I conclude by resituating historical thinking about human-nature relations within the social sciences as they have begun to reorient themselves in the so-called posthuman era.

15 Dipesh Chakrabarty, “The Climate of History: Four Theses”, *Critical Inquiry*, 35:2 (2009), 197, 220.

16 Michel Foucault, *The Order of Things: An Archaeology of Human Knowledge* (New York: Vintage, 1994), 368–373.

## 2 The Co-Production of Nature-Culture

In looking back twenty years, it is as if humanity at the millennium, conditioned by a generation of space exploration, was thirsting for a new term to capture its suddenly demoted place in creation. The Brundtland Commission, not otherwise given to rhetorical flights of fancy, wrote poetically of that decentering effect in its 1987 report on sustainable development, *Our Common Future*: “From space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery, and soils.”<sup>17</sup> The global expert body likened the moment to an earlier scientific revolution: “Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset humans’ self-image by revealing that the Earth is not the centre of the universe.”<sup>18</sup> The Anthropocene label seemed to do just that, retaining a nominal focus on humanity (*anthro-pos*) while downplaying the specialness of social life and subordinating human concerns to the dynamics of an abstractly patterned, dehumanized Earth, its land and water masses and its swirling atmospheric system made readable and monumental from space.

The tension between humans morphing into nature and humans still dominating nature has reverberated through environmental thought in the intervening decades. It colored Crutzen’s own views, though evidently without generating self-conscious internal conflict. In a 2011 coauthored essay, ten years after his original intervention, the renowned earth scientist asserted, “The long-held barriers between nature and culture are breaking down. It’s no longer us against ‘Nature’. Instead, it’s we who decide what nature is and what it will be.”<sup>19</sup> In other words, the collapse of the nature-culture boundary in the Anthropocene only underscored for this eminent scientist what the Christian tradition already took to be true, that godlike humans still retain the upper hand over the rest of creation. Yet Crutzen evidently deemed this immense power of control to be completely consistent with the abandonment of “human hubris” that he also associated with the Anthropocene. The scientific label signaled to him a need for a revitalized ethical stewardship by our species, but stewardship exerted through still more intensive, technologically driven cultivation of Earth’s resources. Confronting the prospect of dwindling supplies

17 World Commission on Environment and Development (WCED), *Our Common Future* (Oxford: Oxford University Press, 1987), 1.

18 WCED, *Our Common Future*, 1.

19 Paul J. Crutzen and Christian Schwägerl, “Living in the Anthropocene: Toward a New Global Ethos,” *Yale Environment* 360, 24 January 2011, [https://e360.yale.edu/features/living\\_in\\_the\\_anthropocene\\_toward\\_a\\_new\\_global\\_ethos](https://e360.yale.edu/features/living_in_the_anthropocene_toward_a_new_global_ethos) (accessed 10 July 2020).



on an increasingly populous and hungry planet, Crutzen advocated for a more “modest, renewable, mindful, and less material lifestyle” for the rich. But his call for belt-tightening at the individual level accompanied an imagination of systemic control at the level of humankind. Borrowing a term from Alexander von Humboldt, Crutzen imagined a total redesign of the “world organism”. This would require vastly increased investments in science and technology, he said, on the scale of global military investments, to engineer the Earth’s atmosphere, its renewable energy sources, and its bioeconomy to support the needs of a burgeoning humanity. If Foucault concluded that human history had become detached from economic, biological, and linguistic histories in the nineteenth century, Crutzen’s aim in the new millennium seemed nothing short of reversing that reversal, by reuniting all the strands once again *scientifically* to serve humanity’s common purpose – its own survival. Scientific language would be the potent unifier: the force of the term Anthropocene would offer a rationale for us humans to reshape our biological and economic destinies to suit *our* purposes, our visions of sustainability, with all “our intellect and our creativity”.<sup>20</sup>

Crutzen, in short, wants us to accept a new scientific characterization of planetary transformation in order to reform human behavior, from personal dietary habits to state funding of research and development, in keeping with the implications of this new geohistorical reality. It would be hard to imagine a clearer display of what I, along with others in science and technology studies (STS), have characterized as the phenomenon of co-production.<sup>21</sup> Put briefly, co-production calls attention to the integrated ways in which epistemic understandings of what the world is like, or consists of, evolve with normative understandings of how we think those worlds should be ordered and governed: “co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it”.<sup>22</sup> In this respect, co-production flies in the face of Enlightenment modernity’s signature achievement, the creation – through the “scientific method” – of a space of objectivity from which the world can be perceived independently of any contaminating subjective beliefs, and the consequent separation of fact from value<sup>23</sup> or nature from

20 Crutzen and Schwägerl, “Living in the Anthropocene”.

21 Sheila Jasanoff, “Ordering Knowledge, Ordering Society”, in Sheila Jasanoff (ed.), *States of Knowledge: The Co-Production of Science and Social Order* (London and New York: Routledge, 2004), 13–45.

22 Sheila Jasanoff, “The Idiom of Co-Production”, in Jasanoff (ed.), *States of Knowledge*, 2.

23 See, for instance, Alasdair Macintyre, *After Virtue*, 3rd ed. (Notre Dame, IN: University of Notre Dame Press, 2007), 79–87.



culture.<sup>24</sup> The burgeoning literature on the Anthropocene amply illustrates the fluidity of the boundary between *is* and *ought* that has resulted from making humans a defining force in Earth's stratigraphy.

In challenging the universal objectivity claimed by the natural sciences, and eagerly appropriated by the human and social sciences, STS scholarship has followed the path of constructivism, broadly defined.<sup>25</sup> Facts on this view are made, not found. Therefore, much historical and sociological research has concentrated on excavating the work done by scientists, sometimes in collaboration with other powerful social actors, to establish the demarcation between facts and non-facts. Frequently, disciplinary controversies must be resolved to establish a fact,<sup>26</sup> a paradigm or an accepted experimental method, and these involve games of power and strategy.<sup>27</sup> As Foucault crisply put it in his discussion of history and genealogy, "[D]evotion to truth and the precision of scientific methods arose from the passion of scholars, their reciprocal hatred, their fanatical and unending discussions, and their spirit of competition – the personal conflicts that slowly forged the weapons of reason".<sup>28</sup> Meanwhile, scientists engage in ongoing struggles, or boundary work, to defend the purity of an inside they regard as science against an outside that is somehow other,<sup>29</sup> either because it is bad or impure science, or because it is not science at all but politics, advocacy or fraud.<sup>30</sup> The rise of the figure of the expert from the beginnings of the modern era points to the pervasiveness of such boundary work

24 Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993).

25 For a philosophical account of the multiple meanings of constructivism, see Ian Hacking, *The Social Construction of What?* (Cambridge, MA: Harvard University Press, 1999). For a more sociological interpretation, see Michel Callon, "Four Models for the Dynamics of Science", in Sheila Jasanoff, Gerald E. Markle, James C. Petersen and Trevor Pinch (eds), *Handbook of Science and Technology Studies* (Thousand Oaks, CA: Sage, 1995), 29–63.

26 Ludwik Fleck, *Genesis and Development of a Scientific Fact*, eds Thaddeus J. Trenn and Robert K. Merton, trans. Fredrick Bradley and Thaddeus J. Trenn (Chicago: University of Chicago Press, 1979).

27 For a well-known, if much criticized, example, see Bruno Latour's rendition of Louis Pasteur as master strategist in building alliances to support his microbial theory of disease. Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1988).

28 Michel Foucault, "Nietzsche, Genealogy, History", in Michel Foucault, *Aesthetics, Method and Epistemology: Essential Works of Foucault 1954–1984, Volume 2*, ed. James D. Faubion, series ed. Paul Rabinow (New York: New Press, 1998), 369–391.

29 Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999).

30 Debates of this sort frequently arise when science is put to use in justifying highly consequential public policy decisions. See Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge, MA: Harvard University Press, 1995).

and societies' need for authorized actors who can reliably make the demarcations that will allow knowledge problems to be solved in ways that cohere with our collective values.

If the universalism of science is not found in nature but is made by humans through struggles over diverse ways of knowing, then what alternative accounts of reality, besides those of the natural sciences, can history make visible? One branch of critical theory has sought to locate that search for alternatives in identifiable standpoints from which the world is differently experienced and leads to different knowledges about it. Standpoint theory posits that, instead of accepting science's authoritative claims, we need to lay bare the distorting moves through which the univocal effect of value-free knowledge is achieved, whether from feminist,<sup>31</sup> postcolonial,<sup>32</sup> subaltern, Marxist, or other critical perspectives. Better histories, according to these varied schools of thought, would situate the dominant natural sciences back within the specifics of their times and places, and point out where extant structures of power affected the representation of nature in particular ways (e.g., masculine, secular, non-living, material, extractable, individually owned, with or without rights), and thereby suppressed other possible ways of knowing the same phenomena or objects (e.g., feminine, sacred, living, systemic, imbued with spirit, common property, having rights of its own).

The framework of co-production differs from these influential lines of critique in not taking any particular standpoint as *the* place from which to attack the presumption of scientific universalism, but rather to query how particular nature-culture orderings come into being and are sustained with relative stability over periods of time.<sup>33</sup> This angle of vision leads to its own emphases in investigating some elements of order more intensively than others. Thus, the co-productionist theorist is likely to become more interested in how some subjects and standpoints originated in the first place than in the implications of being or thinking like a subject from some fixed position in society. Epistemologies and ontologies are of interest, then, mainly as windows onto

31 Evelyn Fox Keller, *Reflections on Gender in Science* (New Haven: Yale University Press, 1985); Sandra Harding, *The Science Question in Feminism* (Ithaca, NY: Cornell University Press, 1986); Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature* (London: Routledge, 1991).

32 W. Anderson and V. Adams, "Pramoedya's Chickens: Postcolonial Studies of Technoscience", in Edward J. Hackett, Olga Amsterdamska, Michael E. Lynch, and Judy Wajcman (eds), *The Handbook of Science and Technology Studies* (Cambridge, MA: MIT Press, 2008), 181–204; Sandra Harding, *The Postcolonial Science and Technology Studies Reader* (Durham, NC: Duke University Press, 2011).

33 Jasanoff, "Ordering Knowledge", 20, 31–32.

the social arrangements that not only sustain them but that they reciprocally help sustain, including a society's moral and political imaginaries. Nature on this account is always an arbiter of human values. Something as mundane as a sugarcane variety can incorporate a transition from one to another form of colonial hegemony, as William Storey describes in his account of nineteenth-century British imperial agriculture in the West Indies.<sup>34</sup> Because of sugar price fluctuations, manufacturers in Mauritius started paying lower prices for the Uba cane variety traditionally grown by small farmers, who then threatened to riot. Metropolitan British science swung into action, producing a hybrid cane that satisfied both farmers and manufacturers and convinced imperial scientists and administrators that these were great times for the sugar industry. This solved the immediate social flare-up in Mauritius, but left intact a system of colonial oppression whose foundations none challenged. Through sugarcane breeding, Storey argues, "politicians, planters and scientists produced new plants and new ideologies together, resulting in a strongly interventionist policy of paternalistic scientific development".<sup>35</sup> Legacies of similarly co-produced formations of science and politics persist in contemporary efforts to promote science-driven solutions to today's global problems of climate change, hunger and disease.<sup>36</sup>

Richard Ashley, an international relations scholar who embraced postmodern critical theory early on, provided an account of the rise of world modeling in the 1970s that can be seen as co-productionist *avant la lettre*. The use of computer simulations to model natural and social phenomena on global scales was political through and through, Ashley argued, although "the world modeling community is strikingly superficial in its attempts to grasp its own historical place, political content and practical implications".<sup>37</sup> In contemporary STS parlance, Ashley called attention to the lack of reflexivity in the sciences that disable those who are doing the empirical and descriptive work of world-building from acknowledging, perhaps even perceiving, the political wellsprings of their work, even when it is as plain as the Club of Rome's

34 William K. Storey, "Plants, Power and Development: Founding the Imperial Department of Agriculture for the West Indies, 1800–1914", in Jasanoff (ed.), *States of Knowledge*, 109–130.

35 Storey, "Plants, Power and Development", 128.

36 Robert Paarlberg, *Starved for Science: How Biotechnology is Being Kept Out of Africa* (Cambridge, MA: Harvard University Press, 2008); Ian Scoones and Dominic Glover, "Africa's Biotechnology Battle", *Nature*, 460 (2009), 797–798.

37 Richard K. Ashley, "The Eye of Power: The Politics of World Modeling", *International Organization* 39:3 (1983), 495–535, at 497–498.

sponsorship of the studies that led to the influential *Limits to Growth*.<sup>38</sup> Describing worlds can never be value-neutral on this account, regardless which discipline commands the prime authorial seat.

The idiom of co-production thus theorizes a phenomenon that narrative historians of the environment have long seen and understood. Historicizing human relations with nature inevitably involves normative judgments about the paths that humanity has traveled. As William Cronon remarked in his reflections on competing histories of the Dust Bowl,<sup>39</sup> how one tells the story of that disastrous period in the American West depends on whether one wishes to feature a “rising” tale of individual human resourcefulness, grit, and technological ingenuity,<sup>40</sup> or a “falling”, declensionist tale of greed, misunderstanding, and overexploitation of nature.<sup>41</sup> The former celebrates utilitarianism, whereas the latter deplores the excesses of capitalism, as Naomi Klein and Mike Davis among others have done with respect to anthropogenic climate change. In choosing which stories to tell, the historian according to Cronon becomes a moralist: “However passionately we may care about the nonhuman world, however much we may believe in its innate worth, our historical narratives, even those about the nonhuman world, remain focused on a human struggle over values”. Echoing the title of his breakthrough first book, he adds, “Our narratives take changes in the land and situate them in stories whose endings become the lessons we wish to draw from those changes”.<sup>42</sup>

Cronon here insists on a point that Crutzen, the natural scientist, elides in his 2011 essay, namely, that every act of narrativizing involves profoundly consequential choices – from when one begins and ends one’s story to the multiple emphases and erasures needed to convert a linear catalogue of facts (a bare chronicle) into a structured history. In choosing a beginning, one also chooses, or at least hints at an ending. Thus, the Euro-American historians of the Great Plains and the Dust Bowl did not start their stories back before the settlers

38 Donella H. Meadows, Dennis L. Meadows, Jergen Randers, and William W. Behrens III, *The Limits to Growth: A Report for The Club of Rome’s Project on the Predicament of Mankind* (Washington, DC: Potomac Associates, 1972); see also Ashley, “Eye of Power”, 496.

39 William Cronon, “A Place for Stories: Nature, History, and Narrative”, *The Journal of American History*, 78:4 (1992), 1347–1376.

40 Matthew Paul Bonnifield, *The Dust Bowl: Men, Dirt, and Depression* (Albuquerque: University of New Mexico Press, 1979); Walter Prescott Webb, *The Great Plains* (New York: Grosset and Dunlap, 1931); James Claude Malin, *The Grassland of North America: Prolegomena to its History* (Ann Arbor, MI: Edwards Brothers, 1947).

41 Donald Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979).

42 Cronon, “A Place for Stories”, 1370.

came, and their stories of resilience or exploitation thus had no place for the poignant lines Cronon quotes from the mouth of a Crow Indian chief, Plenty Coups: “when the buffalo went away the hearts of my people fell to the ground, and they could not lift them up again. After this nothing happened”.<sup>43</sup> This stark end-of-history narrative was simply and completely asynchronous with the Dust Bowl narratives that started the human encounter with the Great Plains *after* the advent of White settlers from Europe.

In terms of method, however, history’s practice of letting actors such as Plenty Coups speak to their own experiences of nature, time and social order has much in common with the STS co-productionist’s commitment to tracing actors’ understandings of their place in the world. Social order is not after all imposed from outside but is experienced and reproduced from within, and there is necessarily an ethnographic dimension to critical STS analysis that seeks to calibrate authoritative knowledge created from external viewpoints against the knowledge of those living within the Earth’s changing natural order. One way that people understand themselves is by being their own informal historians, connecting pasts and presents to futures, desired or undesired, through what I have called sociotechnical imaginaries.<sup>44</sup> Two examples of such contemporary storytelling will allow us to return to the essay’s central question – whither the human in the Anthropocene – with renewed insight.

### 3 *Cospudener See: A Lake of Memory*

Tourist brochures for Leipzig, the city of Johann Sebastian Bach in former East Germany, advertise in addition to the city’s many musical and cultural attractions a visit to the *Cospudener See*, a recreational lake about twenty kilometers south of the city center. Come-ons include sandy beaches, water sports, a marina for boating, golfing, even a narrow-gauge railway ride around the lakeshore. Already a popular resort, naturalized into Leipzig’s larger urban landscape, Lake Cospuden holds up a blue mirror to a most unexpected future – a new lake district in place of the raw, open-cast coal mines that served East Germany’s urgent need for fuel until they closed in 1990 in response to popular demand. People have begun to forget that before 2000, when the lake

43 Cronon, “A Place for Stories”, 1366.

44 Sheila Jasanoff and Sang-Hyun Kim (eds), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015).

was filled, Cospuden was part of a blasted moonscape of abandoned strip mines that scarred Saxony's visible surface.



Memory was not always so fickle. In the early years of the twenty-first century, visitors to Cospuden would have seen an odd sight: a mailbox in the middle of the lake, where boaters occasionally dropped letters for delivery by the Federal Post. Emptied once a week, the letters would be date stamped with the last date when mail was sent from that site. For before it was a lake or a mine, Cospuden was a tiny manorial village, named in 1216 after its first recorded owner, Heinricius de Kozebude. For the next 500 years, Cospuden peeps in and out of history, mainly in deeds and documents. We learn that in 1599 then lord of the manor Otto von Dieskau established a paper factory that supplied laid paper to Saxony's legal practitioners.<sup>45</sup> Bach mentions the patched coats worn by poor and unfortunate Cospudeners in his lighthearted Peasant's Cantata of 1742. A centuries-long story is chronicled, mostly of quiet habitation away from the great events of the world, but one destined to end in the 1970s. By 1978, Cospuden was taken over by the state in the name of progress, its 38 inhabitants relocated as were the residents of many other small townships in an idyllic meadow and forest landscape that became, through socialist enterprise, a vast strip mining district for brown coal. Today, the memory of that earlier time, before the 1970s, is kept alive mainly through an association and register of "lost places" (*verlorene Orte*).

The resettled survivors of Cospuden were not the only ones keeping its memory alive. The village itself has long since vanished under successive and overlapping human imprints: first, digging for fuel to feed the Promethean temptation of fire; then a citizens' initiative ("Stop Cospuden") to end the digging as part of Germany's *Wende*, or turn toward democracy; and finally filling the excavations with water to wash away the insults of strip mining in a new lake district that satisfied land-locked Germans' yearning for beaches and the sea. In all of these iterations, this little patch of the Earth's surface captured imaginations of how lives ought to be lived in relation to what humans regard as natural. But, as in the multiple envisionings of the American Great Plains and the Dust Bowl that Cronon speaks of, those imaginings were tied materially and temporally to actors who were in a position to inscribe their particular narratives onto the land, calling it their own. Two of these bear eloquent witness to the normativity of history, even in the process of its being made. The first stresses novelty, a leap into the unknown raising questions of risk and a

45 See "Cospuden", in Markkleeberg – SEENsationell in Sachsen, [http://www.markkleeberg.de/de/stadt\\_verwaltung/leben/geschichte/verlorene\\_orte/cospuden.html](http://www.markkleeberg.de/de/stadt_verwaltung/leben/geschichte/verlorene_orte/cospuden.html) (accessed 10 July 2020).

balancing of gains and losses to actors in the present; the second focuses on an esthetic and moral understanding of the place of Cospuden within a deep history of time and the responsibility of architects and designers to pay homage to memory.

Lake Cospuden and its environs are, on one level, a material manifestation of the Anthropocene, a purposefully reclaimed landscape designed to afford new utilities to out-of-work East German miners, new homeowners, recreational water users, and the businesses that serve them. Citizens and planners alike welcomed the ambitious transformation in an economically depressed district. Yet, much about the project remained necessarily unplanned as nothing quite like it had ever been attempted before. As Matthias Gross recounts in his analysis of the sociology of environmental ignorance,<sup>46</sup> the lake flooding project grew out of negotiations between political imaginations of need and desirability and scientists' and engineers' imaginations of what could be safely accomplished within the limits of time and resources. A plan to allow the basin to fill with natural groundwater was abandoned when the cities of Leipzig and Markkleeberg decided to open the reclaimed area to public use in conjunction with their participation in the millennial exhibition, EXPO 2000.<sup>47</sup> Moving forward under speeded-up conditions demanded "the right dose of intuition and nerve".<sup>48</sup> A local planner whom Gross interviewed summed up the situation from the actors' perspective in that decisive moment:

It might sound strange, but it was the only realistic possibility that we had. The other alternative would have been to try to move further along the usual path in water management, which would have been cost intensive with all the negative effects for regional development. Back then, we had to expect that things could go wrong. However, this can be seen as an opportunity.<sup>49</sup>

To fast-flood Cospuden in time for the 2000 opening, water tables at two nearby mines, Zwenkau and Profen, had to be lowered, although the consequences for water quality in the new lake were not knowable in advance. Surprises happened. Greater than predicted acidification called for a switch between the

46 Matthias Gross, *Ignorance and Surprise: Science, Society, and Ecological Design* (Cambridge, MA: MIT Press, 2010), 128–143.

47 "From the open pit to the lake oasis", Leipzigseen.de, <https://www.leipzigseen.de/en/the-lakes/cospudener-lake/the-emergence-of-the-cospudener-lake> (accessed August 2020). See also Gross, *Ignorance and Surprise*, 142.

48 Gross, *Ignorance and Surprise*, 142.

49 Gross, *Ignorance and Surprise*, 141.



two sources, with water from Profen providing better results. Heavy metal concentrations, probably leached from abandoned uranium mines north of Zwenkau, turned out to be another unexpected problem.<sup>50</sup> In this case, nature resolved the trouble as the metals were adsorbed and deposited into lake sediments within which, experts agreed, they would likely remain captive for the foreseeable future. Judged as a work of economic recovery and reclamation, Lake Cospuden clearly repaid the planners' balancing of nerve and intuition. By 2020, the region was attracting around a half-million visitors a year.

The second narrative took a longer view, that of urban designers rather than city planners. It was conceived by the noted German-born architect Florian Beigel, founder of the Architectural Research Unit (ARU) at the London Metropolitan University (formerly Polytechnic of North London).<sup>51</sup> Beigel and ARU entered a number of competitions with what they presented as a "second nature" landscape, one that located itself in relation to the "various times that have given form to the landscape":

- 1st landscape – the expansive flatland river wetland that was formed by glacial action;
- 2nd landscape – the 18th and 19th century agricultural settlement of the land with landowners' villas and small villages;
- 3rd landscape – the large scale artificial nature of the process of the coal mining excavations made during the 20th century;
- 4th landscape – the new urban expansion of the city of Leipzig and the future region of lakes that will result during the next 40–50 years as the former mining holes become filled with ground water.<sup>52</sup>

Gliding from a distant glacial age to close to the present day, ARU sought to locate itself in imagined memory somewhere between the first and second natures. A vast, flat landscape of "extreme horizontality" confronted the architects, demanding the "revalidation of so-called 'emptied sites'": how then to fill that blank space?<sup>53</sup> Beigel imagined an infrastructure for future human activity, "designing the rug, but not necessarily the picnic".<sup>54</sup> As in legal judgments, the architects sought authority in the site's own history, for example, in a series of "solitaires" or 'lake villas' as some like to call these buildings [that] could be

<sup>50</sup> Gross, *Ignorance and Surprise*, 138.

<sup>51</sup> Daniel Rosbottom, "Florian Beigel Obituary", *The Guardian*, 13 September 2018, <https://www.theguardian.com/artanddesign/2018/sep/13/florian-beigel-obituary> (accessed 1 August 2020).

<sup>52</sup> Architectural Research Unit (ARU), "Kunstlandschaft Cospuden", <http://aru.londonmet.ac.uk/works/cospuden.1.html> (accessed 1 August 2020).

<sup>53</sup> Michael Spens, "Landscapes of the Second Nature: Emptiness as a Non-Site Space", *Architectural Design* 77:2 (2007), 88–97.

<sup>54</sup> Rosbottom, "Florian Beigel".

seen as large stone boulders sinking in to the wetland, a reference to the vast geological landscape made by the glaciers and the sea”.<sup>55</sup> Architect and critic Michael Spens, however, saw here a working out of a literary rather than a geological precedent,<sup>56</sup> the poetic sensibility of Italo Calvino’s *Invisible Cities*: “The city’s gods, according to some people, live in the depths, in the black lake that feeds the underground stream”.<sup>57</sup> This was the vision of the altered urban landscape that opened to visitors in June 2000 – a product of altogether human imaginations, yet almost other-worldly in its blending of knowledge and non-knowledge, engineered interventions and the dynamics of nature, the utilitarian and the esthetic into a single infrastructure for “a postindustrial city on a recreational lake – a city of dreams”.<sup>58</sup>

#### 4 Ecology and Sustainability in Karnataka

Cospuden restored not only a ruined local landscape but a centuries-old history of nature and culture, reversing the human depredations of the recent past by reimagining the present in relationship with the place’s own much longer heritage. The disappearing grassland landscape of Karnataka in southern India tells virtually the opposite story, one in which living local uses, animated by gods and rituals, have been sidelined to feed a prospective imaginary of global sustainability that demotes the meaning of local land uses and cultural practices. What both stories have in common, though, is the human moral instinct to narrativize, and thereby also manage, nature in ways that make sense in the present, whether in Cronon’s terms as rising stories of progress or as falls from the grace of a past whose value the future seems unable to comprehend.

Unlike the German case, the Indian environmental story involves, as in the case of North America and parts of Africa, encounters between local lives and foreign (here both colonial and postcolonial) eyes that misread in accordance with their own prior experience and expectations the landscape they have invaded.<sup>59</sup> Specifically, British arrivals in South India saw the region’s ancient



55 ARU, “Kunstlandschaft Cospuden”.

56 Spens, “Landscapes of the Second Nature”, 90.

57 Italo Calvino, *Invisible Cities*, trans. William Weaver (London: Martin Secker and Warburg, 1974).

58 Spens, “Landscapes of the Second Nature”, 90.

59 On the American encounter, see particularly, William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983). On the African case, see James Fairhead and Melissa Leach, *Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic* (Cambridge: Cambridge University Press, 1996).

forest-grassland mosaic as the result of indigenous misuse that had converted former forests into degraded areas where nothing of commercial value could be cultivated. Commerce to these Western newcomers meant timber, and their first response was to import exotic, fast-growing trees, such as Australian acacia and eucalyptus, but also to attempt to “reforest” the grasslands with native seedlings. Not surprisingly, most of these colonial efforts failed as they were founded on misperceptions of the region’s ecology,<sup>60</sup> but in Karnataka the colonizing impulse, now imposed from Delhi, persisted long after the end of British rule.

Uniting the histories of environmental management before and after India’s independence is a shared disregard for traditional uses of the land as compared with newer imaginaries of technology-driven development. Challakere Science City, located in a small town 200 km northeast of Bangalore, offers one striking example. Here, in 2009, the Indian state appropriated 10,000 acres of grassland to establish a cluster of advanced scientific and military research institutions, such as a drone testing site, a uranium enrichment facility, and a branch of the esteemed Indian Institute of Science.<sup>61</sup> On the state’s view, energetically contested by local citizens and activists before the National Green Tribunal (NGT), the appropriated grasslands were unused wasteland, and hence available for taking in the public interest, with national defense serving as the linchpin for state action. Opponents of the development, such as Leo Saldanha of the Environment Support Group (ESG), argued to the contrary that these lands were part of a rich system of *kavals*, or pasturelands, that had supported domestic animals such as the Amrit Mahal cattle and wild life such as the Great Indian Bustard since the Vijayanagar Empire of the fourteenth to seventeenth centuries. ESG, in other words, told a story of continuous, sustainable habitation by humans and animals over many centuries, whereas the Indian state insisted, like the British invaders before it, that these were empty lands inviting more productive uses for a plentiful future.

The courtroom confrontation, as observers noted and as my own conversations with Saldanha and others have since confirmed,<sup>62</sup> concerned not only

60 Atul Arvind Joshi, Mahesh Sankaran, and Jayashree Ratnam, “‘Foresteering’ the Grassland: Historical Management Legacies in Forest-grassland Mosaics in Southern India, and Lessons for the Conservation of Tropical Grassy Biomes”, *Biological Conservation*, 224 (2018), 144–152.

61 Anjali Vaidya, “A Science City Rises as an Ecosystem Disappears”, *The Wire*, 6 October 2016, <https://thewire.in/environment/challakere-science-city-kaval> (accessed 1 August 2020).

62 Saldanha is a co-investigator on a project funded by the US National Science Foundation, “Governance of Sociotechnical Transformations”, Award No. 1856215, to explore transitions to sustainability. In that context, he and ESG organized a workshop to discuss some of these issues in Bangalore on 15 January 2020.

questions of present-day use and ownership, though the state's right to claim common land for national purposes was certainly at issue, but also radically different imaginations of the past and future of those lands. In one account:

Before the court, ESG and the Science City-planners conjured different worlds. ESG described the grasslands as bursting with life, from black-buck to foxes and chinkara, and as a potential habitat for the great Indian bustard. The Science City organisations described an unproductive wasteland, which they meant to "improve" with new plantations. ESG protested the loss of pastoralist livelihoods. The Science City planners promised new jobs, schools and a higher standard of living for the entire area.<sup>63</sup>

The NGT's final order came as a bittersweet victory to ESG and its local allies. While conceding the environmental damage inflicted by the state incursion, the court adopted a strictly utilitarian calculus with respect to the land's new uses. "[T]he principle ingrained in the Doctrine of Sustainable Development", the court declared, "is that if a project is beneficial for the larger public, the inconvenience caused to a smaller number is to be accepted. It was to be accepted as a proposition of law that the individual interest for that matter for smaller public interest [*sic!*] must yield to larger public interest".<sup>64</sup> Here, the national interest in defense and power generation proved controlling and was deemed to override the pastoralists' circumscribed local claims.

Challakere is not the only site in Karnataka where competing imaginations of how to connect past and future have come into conflict, nor the only one where local land use has yielded to claims of sustainability defined by the central state in relation to a global discourse of sustainability. Another dramatic example took shape in Pavagada Solar Park, a 13,000 acre development that claims to be the world's second largest solar park. According to a World Bank blog post,<sup>65</sup> the development was located in a semi-arid, drought-prone

63 Vaidya, "A Science City Rises".

64 *In the Matter of Leo F. Saldanha and The Union of India*, National Green Tribunal, Order of 6 August 2014, Para 196, <http://www.esgindia.org/sites/default/files/campaigns/press/ngt-final-order-6-12-2013apps-253-pages.pdf> (accessed August 2020). The NGT seems to be quoting similar language from *Kashinath Laxman Dagale v. Maharashtra Pollution Control Board*, National Green Tribunal, 18 February 2015, Para 228: "It has to be respectfully accepted as a proposition of law that the individual interest or, for that matter, smaller public interest must yield to the larger public interest", [https://www.casemine.com/judgement/in/5b17d55b4a93267801004a5c?locale=en\\_UK](https://www.casemine.com/judgement/in/5b17d55b4a93267801004a5c?locale=en_UK) (accessed 1 August 2020).

65 Amit Jain, "Solar energy to bring jobs and prosperity back to parched villages", World Bank Blogs, 22 December 2015, <https://blogs.worldbank.org/energy/solar-energy-bring-jobs-and-prosperity-back-parched-villages-india> (accessed 1 August 2020).

region which small farmers were abandoning for more secure livelihoods in Bangalore. The region therefore seemed ripe for developing into a renewable energy resource that would convert the sun's unforgiving rays, the bane of subsistence farmers, into usable power in one of India's poorer and most climate-vulnerable districts. A dying form of organic life, tying villagers to seasonal cycles of back-breaking toil for meager, uncertain livings, would thereby yield to a stable and secure, non-organic economy of renewable energy to power India's growing industrial future. Or so its proponents claimed.

As always, there are counter-narratives that give one pause, complicating the optimism of power. Pavagada looks impressive enough to the naïve visitor, its rows upon rows of blue-hued solar panels stretching away as far as eye can see, like an ocean of standing waves under the hot Deccan sun, uncomfortable on bare skin even in mid-January. But the panels are already dusty and there are murmurings that all the generated power is surplus, far more than the region needs. Meantime, there are disruptions here and now. In one village we visited, the men complained of having nothing to do now that their farms are gone, and the smallholders do not get enough money back from the sale of their land to make ends meet. In twenty-five years, the projected life of the park, where will they be; and what of the land itself, stuck full of concrete posts to support the panels and hence rendered permanently unusable for growing anything else, fields sown with subterranean arrays of indestructible modern-day dragon's teeth? Humanity at any rate has been all but banished from this glassy landscape, though small herds of goats roam outside the park's barbed wire perimeter. Is this the future of sustainability, or is it a real-life demonstration of Crutzen's Anthropocene, the Earth's living surface transformed into a silent silicon valley by the human will to power?

## 5 Human, All Too Human

Time is to the historian what nature is to the scientist: a reservoir of meaning from which the diligent or impassioned excavator releases those findings that appear to possess the supreme quality of truth. *This* is how it was, or is, each voyager into the unknown wishes to say, whether the search engine is the historian's archive or the astronomer's telescope or the biologist's genotyping assay, and the recovered voices are those of lost civilizations or galaxies or mysterious coronaviruses. For much of human existence, the scientific and historical modes of truth-seeking were held apart. Chroniclers of the human condition saw nature, and eventually science, as being about things largely outside of human control, with trajectories that could be detached from social

circumstances and truthfully represented as if evolving on separate lines of agency, causation, and temporality. Even when historians and sociologists of science discovered that science has a thickness and sociality beyond abstract theoretical paradigms,<sup>66</sup> nature was still deemed to function apart from human influences, in those patterns of clouds and greenery that the Apollo mission photographs brought back to Earth, with such dramatic impact on our self-recognition. This cleavage between dynamics of nature and society is what environmental history has sought to dissolve, with the naming of the Anthropocene as the latest phase in an awakening of human consciousness to a fuller acknowledgment of its material imprints and consequences.

Building humans so deeply into Earth's history has led some observers to call this the posthuman age, one in which we might as well tell history from the standpoint of a virus or a mosquito. Some of this impetus to de-humanize history comes from the life sciences, where the DNA molecule has burst forth since the mid-twentieth century as a teller of historical truths, from facts about individual parentage to linguistic genealogies to tales of distant population migrations that have left no written traces in the libraries of human narration.<sup>67</sup> "We" humans have emerged from these findings as not materially distinctive enough to claim a special place at the top of the tree of life. The earth and planetary sciences have written their own parallel chapters, not only reducing the length of human history to a blink in time, but foregrounding the dynamics of systems once thought to be outside history – winds, ocean currents, continental drift, and today, overshadowing other concerns, the changing climate. This is one long declension story, in a sense, of humans' fall from the apex of creation to a modest place, as but one force among many that have shaped and will continue to shape the future of the planet. In allowing science to open up our imagination of the past, some humanists have succumbed to a new temptation that comes from eating the fruits of the tree of knowledge: to cede to science control over making sense of life in moral terms, and hence the right to decide what life is *for* along with determinations of what life *is*.

Far from taking humans out of history, the findings of long co-evolution seem only to have fitted out the scientific and technological imagination with a more pronounced sense of human agency and control. Whether propelled horror-struck into the future like Benjamin's angel, with only the wreckage of the past as guide, or, like the architects of Lake Cospuden, lovingly bringing the past back into view through allusions to glacial landscapes, or the Indian

66 Fleck, *Genesis and Development*.

67 D. Reich, *Who We Are and How We Got Here: Ancient DNA and the New Science of the Human Past* (Oxford: Oxford University Press, 2018).

government reclaiming wasteland for sustainable, renewable energy, science continues to find in nature powerful validation of the stories it wishes to tell of life's histories and purposes. If anything, the identification of a new geological era marked by "human activity and edifice"<sup>68</sup> has spurred yet more ambitious designer visions, as in Crutzen's boast that "it's we who decide what nature is and what it will be".<sup>69</sup> We see such grandiose visions instantiated in the creation of a new lake district from strip mines in central Germany and the attempted capture of the sun in the endless, dusty, silicon sea of India's Pavagada Solar Park.

Through all these developments, however, the constant that remains is humanity's love of story-telling and humankind's insistent awareness that the storylines matter because they are carriers of value and moral valence. When a Leo Saldanha takes the Union of India to court, it is to win state support for a particular history that ties pastoralist land claims to cultural practices extending back into the long-gone kingdoms of Karnataka and Mysore. When the citizens of Germany's *verlorene Orte* plant a makeshift mailbox in the middle of Lake Cospuden, they, like ESG, are asserting the continued moral relevance of the humble lives once lived there, a right *not* to be forgotten. In the end, this perhaps remains history's, even environmental history's, prime obligation – to restore these voices that had a dying fall, like Plenty Coups' lament for the buffalo's disappearance from the Great Plains, and thereby to direct our attention to human practices, whether unchecked capitalism or renewable energy development, that reduce the possibility of sustainable futures. For who knows? In some of the dissident memories recorded in texts of law, literature or the creative arts may lie more promising answers to humanity's persistent disappointments and discontents than in all of science's disruptive, prophetic work.

68 WCED, *Our Common Future*.

69 Crutzen and Schwägerl, "Living in the Anthropocene".