

Thinking Like a Mountain

Supplement

The Earth is a Ruin

Giulia Rispoli

The deluge

Marjorie Hope Nicholson, a Columbia University professor who pioneered innovative approaches coupling science and literature in the 1940s, focused part of her research on the significance of mountains in aesthetics and the history of civilizations. In 1948, a year before the publication of Aldo Leopold's *Sand County Almanac*, Nicholson gave a series of lectures on how mountains had been the subject of diametrically opposed emotions. *Mountain Gloom and Mountain Glory*¹ documented these transitions in the perception of English poets throughout the eighteenth, nineteenth, and twentieth centuries. Among them, the work of Thomas Burnet (1635–1715) aroused particular interest due to his posing paradoxically contrasting reflections on the mountains, oscillating between outspoken denigrating criticism—describing mountains as ‘nature’s rubbish’—to moments of their great aesthetic exaltation. Walks across the Alps always stirred a sense of awe in him and indeed one of the sublime, standing before the spectacular magnificence of those mountain peaks that seem to touch the sky.

¹ Marjorie Hope Nicholson, *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite*, New York, W. W. Norton & Co., 1959.

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Burnet's work *Telluris Theoria Sacra (The Sacred Theory of the Earth)*, which was to become a text of reference for the Catholic orthodoxy, is a fundamental piece of eighteenth-century philosophy and indeed geology.² Here, Burnet argues that the Earth was originally very different to what it looks like today and that, at some point in its history, a cataclysm occurred: the underground water channels broke and all the water gushed to the surface, overflowing from the many springs and cavities within it. Burnet concluded that in its present appearance, the Earth arose from the ruins of its "primitive" version, which was as smooth as an egg, lukewarm, uniform, and perfect. Then, the Great Flood, a sort of global deluge, led to the dissolution of all things, before craters, rocks, and even mountains began to pop up all over Earth in what appeared as nothing but a sprawling ruin.

"In this smooth Earth were the first Scenes of the World, and the first Generations of Mankind; it had the beauty of Youth and blooming Nature, fresh and fruitful, and not a wrinkle, scar or fracture in all its body; no Rocks nor Mountains, no hollow Caves, nor gaping Channels, but even and uniform all over. And the smoothness of the Earth made the face of the Heavens so too; the Air was calm and serene; none of those *tumultuary motions and conflicts of vapours, which the Mountains and the Winds cause*

² Thomas Burnet, *The Sacred Theory of the Earth*, Printed by John Hook, London, 1691. The first English edition dates back to 1684. The second edition consulted here is available at the following link: <http://www.cedarcitylodge.org/books/sacred-theory-of-earth.pdf>.

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*in ours: 'Twas suited to a golden Age, and
to the first innocency of Nature.”³*

Perfection had thus prevailed initially, but the diversity of earthly forms generated in the wake of the Great Flood stood in contrast with the sinfulness of a now defaced environment that had lost its original innocence and which thus had to be refounded both in its humanity and geology.

In the second volume of *Telluris*, published in 1689, Burnet imagined a future Earth when, still half-flooded, at some point it would all go up in flames in a gigantic conflagration. The globe would only become a perfect sphere again like in the days of Eden later, once everything had once more settled down.

The mountain as a monument

Burnet describes one of the most profound planetary catastrophes ever imagined in Western philosophy, almost prophetic in predicting such calamities as rising water levels and global warming which form the kaleidoscopic impact that a slice of humanity has exerted on the planet. The concept of the Anthropocene makes this impact tangible insofar as it illustrates the accumulation of changing matter that hybridizes with the Earth's crustal layers, or "critical zone," and alters their fundamental functions. To these catastrophes, however, Burnet attributed natural and not anthropogenic causes. Nevertheless, there are hints that humanity, no longer as welcome on the new Earth as it was on the original one, had to regenerate and

³ Burnet, 1691, chapter VI, p. 65 of the online version: http://www.cedarcity-lodge.org/books/sacred_theory_of_earth.pdf (my italics).

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think in a new way. Humans were multiplying, and capacity—he said—was a theme bound up in the spaces and resources of the Earth: a reflection to be found in the thinking of Leopold and his contemporaries as well.

As Nicholson herself points out, an ambivalent view toward post-deluge nature pervades Burnet's cosmogony, and the presence of mountains is the main emblem of this dichotomy. Mountains are repulsive deformations of the Earth, yet at the same time they are the highest peaks from which to appreciate the rest of creation.

“[...] on the tops of the Mountains, where we shall have a more free and large Horizon, and quite another face of things will present it self to our observation. The greatest objects of Nature are, methinks, the most pleasing to behold; [...]. And yet these Mountains we are speaking of, to confess the truth, are nothing but great ruines; but such as show a certain magnificence in Nature; as from old Temples and broken Amphitheatres of the *Romans* we collect the greatness of that people.”⁴

Laying waste to the Earth

In 1864, American diplomat George Perkins Marsh considered nature far from being a picture to be admired, but neither was it a true that it was ours to freely inherit. He believed the physical appearance of our planet was not just the result of natural phenomena as claimed by most geologists of the time. Mountains, rivers, and oceans

⁴ Burnet, 1691, chapter XI, pp 110.

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were instead largely the product of the influence exerted by human beings.

In the book entitled *Man and Nature*, later reprinted as *The Earth as Modified by Human Action*⁵ (1874), Marsh incorporated observations made as a young man in Vermont and on his travels through the Middle East, where he understood that human beings were agents of change in the natural environment on a par with a geomorphological force. And with his findings, he was among the first to describe the interdependence of environmental and social relationships. Marsh also supported nature conservation works, as reflected in a letter he sent to botanist Asa Gray in 1849:

“I spent my early life almost literally in the woods; much of the territory of Vermont was, to my recollection, covered in natural forests; and having been personally engaged to a considerable extent in the clearing of land and in the production and trade of timber, I have been able to observe and feel the effects resulting from an unjust system of the management of woodlands and forest products.”⁶

Marsh realized how societies' thoughtless actions had had an unprecedented impact on the organic world, exterminating numerous animal and plant lifeforms and contributing to large-scale biodiversity loss. He identified industrial development as the powerhouse behind Earth's changing geography and the physical decay of land,

⁵ John Perkins Marsh, *The Earth as Modified by Human Action*, London, Sampson Low & Co., 1874.

⁶ Marsh, G. P. (1888) *Life and Letters of George P. Marsh*, Caroline Crane Marsh (ed.), C. Scribner's Sons, New York.

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water, and sands due to manmade projects (which today we would call geoengineering) encroaching on forests and undermining their stability. Man, he asserted, has too long forgotten that the Earth was given to him only for use, not for consumption, much less for wasting.

Although for Marsh, indigenous peoples were less interesting to safeguard than the natural world—and this is a notion he would share with Leopold—he did note that European colonization had marked the start of the degradation of natural systems. Natives, he said, interfere relatively little with the arrangements of nature, and while the early dawn of civilization was characterized by the domestication of the organic world, the conquest of inorganic nature belongs almost exclusively to the more advanced stages of artificial culture.

Not surprisingly, Marsh had a rather broad idea of civilization that included not only the Western world but also, for example, Islamized cultures. *The Earth as Modified by Human Action* was thus a pivotal text in geo-cultural thought, ushering in a form of proto-environmentalism and forest management that would precede the equally pioneering work of Rachel Carson, among the first American ecologists in the 1960s to condemn the “control” of natural production mechanisms by “mankind” through the specific behavior of the pesticide industry.⁷ But also of Margaret Murie who, amid the peaks of Alaska, fought to protect Arctic ecosystems and extend the size of nature reserves and parks.

Telluric currents

On the other side of the world, Marsh’s contemporary the

⁷ Rachel Carson, *Silent Spring*, 1962.

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Italian geologist Antonio Stoppani raised the stakes by referring to humanity as an earthquake. Devoted to the study of glaciers and high peaks, Stoppani was a timid conservationist who incited mountaineering and a love of nature, which he conceived of as an organic and harmonious whole.

In his *Corso di Geologia* (1871), he describes the present period as the “Anthropozoic” and refers to mankind as a new telluric force, which in power and universality holds its own against the other major forces of the globe.⁸

Characterized by humanity’s growing power and impact on the Earth system, the definition of Anthropozoic was most likely based on Marsh’s work, and the latter was aware of it:

“In a previous chapter I spoke of the influence of human action on the surface of the globe as immensely superior in degree to that exerted by brute animals, if not essentially different from it in kind. The eminent Italian geologist Stoppani goes further than I have dared to go and treats human action as a new physical element entirely *sui generis*. According to him, man’s existence constitutes a geological period that he designates as the Anthropozoic era. The creation of man—he says—was the introduction of a new element into nature, of a force wholly unknown to previous periods.”

However, Stoppani argued that humans had not

⁸ Antonio Stoppani, *Corso di geologia*, Milan, Bernardoni, published by Brigola, 1871, (p. 327).

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existed long enough to leave a trace in the fossil records of the Earth's crust. No sedimentary evidence of this transition has yet been found, he claimed. There is no "human monument" attesting to their passage. Indeed, Stoppani does not refer to the Anthropozoic as a geological era but as a historical one, thus the stuff of archaeology rather than geology.

Interestingly, the Anthropocene theory has for years been based on the search for some geo-stratigraphic legitimacy that relies on the collection of sedimentary evidence—markers—of the action exerted on the global environment by human activity.

To a certain extent, Stoppani's hypothesis was confirmed by the International Commission on Stratigraphy in February 2024, which ruled against the proposal to find a starting date on the geological timescale for the Anthropocene. This proposal, accompanied by a dense report based on decades of research and analysis, was put forward by a multidisciplinary group of scientists known as the Anthropocene Working Group (AWG), according to whom the key fossil elements of this transition are the radionuclides left over from the nuclear explosions that occurred in the 1950s.⁹

Stoppani's insight was thus a delicate prediction that still provides the backdrop for lively debate. But from his far-sighted observations, an anthropocentric view emerges that is well suited to a patriot and an abbot, in which *mankind* is the recipient of the world, despite his undertaking to plunder nature (*mankind is a great thief*).

⁹ The AWG report, their spokesperson and secretary claim, was not even analyzed in the vote, and the decision to reject it was made without the process being subjected to proper critical, transparent, and democratic analysis.

Communication exchanged between the author, Simon Turner (AWG scientific coordinator), and Colin Waters (AWG secretary) on June 24, 2024 at the Max Planck Institute for Geoanthropology in Jena.

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And nevertheless, his idea that human beings are interpreters of nature and, at the same time, the nature bears the marks of human history seems extremely innovative.

Perhaps inspired by Stoppani's work and that of a contemporary of his named Joseph le Conte, the environmental historian William Cronon used the metaphor of the medieval palimpsest in the 1970s to explain the common ground of human history and natural history. He argued that change to a landscape over time might be compared to a layer corresponding to a page in a parchment manuscript. Not all pages are always available because often, once used, they are scratched out and erased, only to then be reused for other documents. But if one learns how to do this and practices, one can always discern what was written on the pages underneath, and so slowly one will unveil the underlying picture.

This metaphor is very striking by virtue of its versatility, the palimpsest also being used in architecture and archaeology to refer to an object that has been created for a certain purpose and later reused for another; for example, monumental brass, the back of which might be engraved upon anew.

Environmental history is thus one of adaptation, just like biological history, the study of which has brought to light the importance of a non-adaptationist, functionalist view of evolution. The end is not predetermined but instead open to the infinite possibilities of history, just as birds' wings were not created to fly, and nor were eyes to see.¹⁰

Cronon added that in a certain sense, geology, ecology, and human history, through different and discipline-specific narratives, tell one overarching story made up of layers.

¹⁰ See Simone Ferracina's contribution to this Magazine.

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The last catastrophe

Also in 1948, ecologist and ornithologist William Vogt published a lengthy essay on the ecological state of the world we live in. The text, labeled by Betsy Hartmann as the debut of apocalyptic environmentalism, was titled *Road to Survival*.¹¹ For the first time, Vogt described our planet as an organic, global entity threatened by a humanity that is transforming its entirety, from Mexico to Yugoslavia, through its pervasive interconnectedness. According to Vogt, our planet is sick, and the cause of this sickness is human ignorance.

The book was a great commercial success, albeit not as enduringly so as Leopold's *Almanac*. But the two, who held each other in high esteem, were united by the same sentiment of criticism of population growth which would sooner or later lead to catastrophe, and by a longing for a pristine "wilderness" that earned them disturbing epithets for their underlying support of Malthusianism.¹² It was one of the apocalyptic aspects noted by Hartmann, who placed the myth of overpopulation at the center of her work, and how populational control was a coercive tool deployed by the powers-that-be at the expense of women and the lower classes.

It must be said that in Leopold and Vogt, their love of nature was coupled with a rejection of industrial policies and a critique of capitalism. It is no coincidence that by the 1950s, the curves of many parameters had shifted from linear to exponential growth, with a surge known as

¹¹ William Vogt, *Road to Survival*, Sloane Associates, University of California, 1948.

¹² For further exploration of these aspects, see M. A. Powell (2015). "Pestered with inhabitants": Aldo Leopold, William Vogt, and more trouble with wilderness," *Pacific Historical Review*, 84(2), 195–226.

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the Great Acceleration.¹³ The effects of this curve were best known at the level of the biosphere, hence the desire for the preservation of nature as original heritage. But the good principles of forestry ethics to which Leopold (and Marsh before him) was committed were worthless in the face of the occupation of Native American lands and their marginalization to make way for mining projects. And what these ecologists lacked—according to environmental justice scholar Dina Gilio-Whitaker—was the very acknowledgement that Native cultures were underpinned by intelligent land management practices that ensured their long-term survival in healthy ecosystems.

Be as it may, the systemic conception underlying the work of Leopold and Vogt that ushers in a new way of understanding the relationship between humanity and the global environment would prove fundamental to the development of Earth System Sciences (ESS), which provide the theoretical framework for Anthropocene studies.¹⁴

In fact, the use of the term “Anthropocene” in science dates back to the year 2000 in Cuernavaca, Mexico, during a conference of the International Biosphere-Geosphere Program (IGBP) that had articulated the entire ESS undertaking since the 1980s. This interdisciplinary perspective is based on the principle that the Earth’s spheres—the atmosphere, hydrosphere, cryosphere, biosphere, etc.—interact on the basis of continuous energy exchanges and flows that enable their self-regulation as a unified body. Thus, if we take a step back, the ecological storyline that Leopold wove by “thinking like a

¹³ W. Steffen, W. Broadgate, L. Deutsch, O. Gaffney, and C. Ludwig (2015), “The trajectory of the Anthropocene: The Great Acceleration,” *The Anthropocene Review*, 2 (1), 81–98.

¹⁴ Warde P. et al. *The Environment, A History of the Idea*, John Hopkins University Press, 2019.

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mountain” would prove critical in forging the realization that the Earth as a system is an emergent object of analysis that provides a suitable background for understanding humanity as a disruptive element in the planetary biogeochemical balance. Indeed, the Anthropocene illustrates how the technological systems and infrastructure that characterize much of human productive activity, which of course is far from homogeneous, have for some decades represented the most disruptive element in this arrangement, the impact of which is now the favorite subject of the ESSs.

In Cuernavaca, Paul Crutzen, a Dutch atmospheric chemist known for his research on the thinning of the ozone hole that won him a Nobel Prize in Chemistry (1995), nervously argued that the current epoch, the Holocene, no longer falls within the parameters of the geological epoch as named, which coincides with the latter part of the Quaternary. The Holocene was a mild and stable epoch. Today, he argued, population growth, followed by the inordinate use of resources and the ensuing pollution is proceeding at a pace that will disrupt the entire planet and its fundamental processes, its energy reserves and its biosphere. Crutzen’s estimates were already very disturbing in 2000 and ended on the alarming note that unless an even more catastrophic event such as a meteorite impact (or even a pandemic) occurred, humanity would remain the most powerful destructive force on Earth for centuries to come.¹⁵ This “humanity,” he concluded, represents only twenty-five percent of the world’s population.

The catastrophe of the Anthropocene appears to echo Burnet’s omen. Industrial operations have covered

¹⁵ Crutzen, P. “Geology of mankind.” *Nature* 415, 23 (2002).
<https://doi.org/10.1038/415023a>.

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the Earth in holes to extract raw materials and are turning it inside out. Fracking creates deep fractures in the Earth's crust as rivers of oil and gas gush from underground to the surface like fountains of black lava. Ice mountains deform as they buckle under the weight of greenhouse gases. Waters cover cities and submerge the coastal perimeters of continents. It is estimated that through extreme events alone, floods could lead to nine million deaths by 2050, and many coastal cities like Miami are at risk of being submerged within a few decades. The same fate may soon befall Mexico City, Venice, and St. Petersburg.

Burnet speculated that the Deluge would produce an immense boiling ruin. Now the Earth will be submerged again and the water-covered cities and mountains will become the rubble of our era like those of ancient submerged civilizations.

But today we struggle to recognize the Anthropocene as a key term in illustrating this scenario. The idea that humanity has pushed the Earth to the edge of its equilibrium brings together supporters and deniers from a very wide disciplinary background who still hesitate to try and bridge the gap between different ways of interpreting and conveying knowledge of the Anthropocene. But while the definition of geologic epoch has been rejected at the upper echelons of international geostatigraphy due to bureaucratic inertia, literature and the arts have fueled this tension, fanning the flames.

In this regard, historian Julia Adeney Thomas gives us a curious and informative picture of the different positions defending and accusing the notion of the Anthropocene by titling the phenomenon an "anything goes story."¹⁶ In this case, "anything goes" refers to the array

¹⁶ J.A. Thomas "Introduction: The Growing Anthropocene Consensus," In: J.A.

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of imaginative alternative terms that have been proposed to replace the term “Anthropocene.”¹⁷ It is hard not to agree with her when she points out that this proliferation of words conceals the insidiousness of maintaining a conservative tradition in which the environment is still seen as a backdrop against which societies act rather than as an integral part of terrestrial processes; in other words, a covert form of the humanity/natural environment dualism that allows us to persist in destroying the elements on which we depend, such as air and water.

The Anthropocene calls for a new framework for productively addressing a planetary system in which humanity is unfortunately the most disruptive component but is also the only one that can act as a collective political subject. Not setting out from this point means taking steps backward from Leopold, but above all it means taking the mountain for granted once more, while we know it is already too late.

Thomas (ed.) *Altered Earth: Getting the Anthropocene Right*. Cambridge University Press; 2022:1–18.

¹⁷ In essence, Thomas believes that while the actors involved in this proliferation of substitutes such as the *Capitalocene*, *Chtulucene*, *Plantationocene*, *Growthocene*, *Econocene*, *Pyrocene*, *Necrocene*, *Wasteocene* and the like have problematized and to some extent enriched the current debate on the economic, social, and political dynamics that led us into the Anthropocene, on the other hand, they have fragmented any possible attempts at interdisciplinary collaboration between various forms and practices of knowledge, both scientific and humanistic, thus slowing down the front of the critical mass and common action.

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Biographical Notes

Giulia Rispoli is a historian of science at Ca' Foscari University in Venice, in the department of Philosophy and Cultural Heritage, where she teaches Environment, Science and Global Politics as well as History and Philosophy of Science in the Anthropocene. Furthermore, she is a visiting scholar at the Max Planck Institute for the History of Science in Berlin where she has been a research scholar for many years. She has studied and published on topics concerning the history of systemic theories, the twentieth-century emergence of the concepts of biosphere, earth-system, and planetary consciousness, the history of the theory of the Anthropocene and geo-stratigraphic markers, and the dialogue between art and science in the ecological and geocultural fields. She is currently involved in research titled "Planetary Genealogies," financed by the Rita Levi Montalcini ministerial program, which she was awarded in 2022, as well as in a project titled "Nuclear Anthropocene," financed by the national SPIN program.