



# Living Earth Community

## Multiple Ways of Being and Knowing

EDITED BY

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Sam Mickey, Mary Evelyn Tucker, and John Grim, eds, *Living Earth Community: Multiple Ways of Being and Knowing* (Cambridge, UK: Open Book Publishers, 2020), <https://doi.org/10.11647/OBP.0186>

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ISBN Paperback: 978-1-78374-803-7

ISBN Hardback: 978-1-78374-804-4

ISBN Digital (PDF): 978-1-78374-805-1

ISBN Digital ebook (epub): 978-1-78374-806-8

ISBN Digital ebook (mobi): 978-1-78374-807-5

ISBN XML: 978-1-78374-808-2

DOI: 10.11647/OBP.0186

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# 6. The Obligations of a Biologist and Eden No More

Thomas E. Lovejoy

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*This chapter is based on two previously published pieces, 'The Obligations of a Biologist', and 'Eden no more.'<sup>1</sup> 'Obligations' was written in 1989 (before social media and cell phones and luggage with wheels!) and the world was on an encouraging but unfulfilled trajectory of environmental consciousness and action. A lot happened in 1992 with the Earth Summit, the three conventions, the Global Environmental Facility (GEF) and, later, the Sustainable Development Goals. 'Eden no more' was written as the Convention on Biological Diversity published its first global biodiversity assessment (2019), highlighting the progress made in biodiversity and, to a much lesser extent, climate change. The situation was better than in 1989, or in 1980 when I did the first projection on species extinctions, but the challenges had grown substantially.*

## The Obligations of a Biologist

All I ever really wanted to do was explore the wonders of tropical nature, combining the advantages of a latter twentieth century perspective with the enthusiastic thrill of nineteenth century naturalist exploration. Yet, like many, including every contributor in this volume, I have been unable to ignore the havoc being wreaked upon the biology of our planet. In consequence, I turned my hand to conservation, and my science to conservation biology.

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<sup>1</sup> Thomas E. Lovejoy, 'The Obligations of a Biologist', *Conservation Biology*, 3.4 (1989), 329–30, <https://doi.org/10.1111/j.1523-1739.1989.tb00235.x>; 'Eden no more', *Science Advances*, 5.5 (2019), <https://doi.org/10.1126/sciadv.aax7492>, <https://advances.sciencemag.org/content/5/5/eaax7492.full>

The global crisis will essentially be played out in the decade we are about to enter. The very intensity of the problems raises difficult tensions and complex questions about the proper role of science. The venerable British Ecological Society, or at least some of its leaders, takes the view that as a scientific society, it should have nothing to do with conservation. For example, in a letter in the February 1989 *British Ecological Society Bulletin*, L. R. Taylor and J. M. Elliott, honorary editors of the *Journal of Animal Ecology*, wrote: 'The British Ecological Society is a Scientific Society, not an Environmental Protection Society. [...] We are supposed to produce the factual information used for whatever purpose, including environmental protection, but equally for environmental destruction if that is where mankind is heading.'<sup>2</sup> Nevertheless, statements we would have made purely on a scientific basis in the past take on a policy significance in today's world. An awareness of this public role, whether sought by ourselves or thrust upon us uninvited, is essential. We do not help either science or society by evading our social responsibilities as experts.

It is the very basis of science that it progresses in a dialectical fashion: evidence, counterevidence, new interpretations, new facts, and testing of long-held points of view. Naturally, this can be a source of confusion. The general public, for example, must sort out, on the one hand, that the greenhouse effect is something that must be taken with utmost seriousness, and, on the other hand, that some disagreement persists as to whether the warming has begun and that it is impossible to state with any authority how climate will change in any particular spot. Because the human tendency for denial is so great, it is critical that scientists involved in environmental issues, as we are, put in true perspective the new developments and minority opinions that contradict generally held conservation beliefs.

A good example is set for us by those working on the greenhouse effect problem. When most scientists state that the chance of a catastrophic global climatic change is greater than 50%, they explain that they are making a professional judgment. It is proper to go on to explain, however, that nobody would board an aircraft judged to have such a likelihood of major problems and would be reluctant even if the airplane had only a 5% chance of failure.

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2 L. R. Taylor and J. M. Elliott, 'Letter to the Editor: Animal Experimentation and Environmental Issues', *Bulletin of the British Ecological Society*, 20 (1989), 15–27, at 20.

I would further assert that science must take on an advocacy role with respect to environment. If science does not, we deserve and can expect the future censure of society, for indeed it is our responsibility, as those who understand best what is happening and what alternatives exist, to sound the tocsin about environmental deterioration and conservation problems in all their variety. As conservation biologists, we have a very special role, for the biota is the ultimate assay of the environmental health of our planet. In essence, we should always be the first to know there is a problem. And we need to build a margin of error into our recommendations. How can we expect to be aware of all there ever will be to know when we recommend a minimum population size for some endangered species? Should we not double the figure to hedge against the limitations of our current ignorance? If we explain what we are doing, we in no way compromise our scientific credibility.

What makes this so particularly difficult is that nothing in our training as scientists has prepared us for a perspective generated by the era of planetary environmental crisis. Because we are both advocates and scientists, we must fight to protect our capacity for searching self-criticism; this is the only way our science can remain true to itself.

## Eden no More

The first official report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), released on 6 May 2019 in Paris, provides the first modern authoritative assessment of planetary biodiversity and related contributions of nature to people (CNP) — dubbed ecosystem services.<sup>3</sup> Ecosystem services are those charities of nature, both nebulous and tangible, that serve as the backbone of human well-being: food, fresh water, clean air, wood, fiber, genetic resources, and medicine.

The IPBES is being called the IPCC of Biodiversity, with the IPCC referring to the Intergovernmental Panel on Climate Change, the recognized assembly of the United Nations created in 1988 to provide global leaders with regular scientific assessment of the implications and risks of climate change. The IPBES, founded in 2012, came slow on

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3 IPBES, *Global Assessment on Biodiversity and Ecosystem Services*, 2019, <https://ipbes.net/global-assessment-report-biodiversity-ecosystem-services>

the heels of the IPCC for a variety of reasons but in large part because grappling with, gathering data for, and analyzing the myriad features of global biodiversity and ecosystem services are astoundingly complex endeavors.

A scientific assessment of the state of biodiversity and ecosystem services in the context of climate reveals that all are inextricably intertwined, united yet dispersed, invaluable yet monetizable, reflecting nature in its holistic role as the bedrock of human civilization. The 2005 Millennium Ecosystem Assessment served as an early appraisal of the state of life on Earth.<sup>4</sup> The IPBES synthesis is today's report card, and it tells a short story: Eden is gone. While the planetary garden still exists, it is in deep disrepair, frayed and fragmented almost beyond recognition.

Not unexpectedly, the specific findings are depressing. More species are threatened with extinction than any time in human history. Ever growing human populations and their activities have severely altered 75% of the terrestrial environment, 40% of the marine environment, and 50% of streams and rivers. The health of freshwater biodiversity has been particularly neglected because freshwater is widely understood and managed more as a physical resource vital to survival rather than as the special and delicate habitat that it provides for an extraordinary array of organisms.

The primary drivers of negative trends are also no surprise: in descending order, these adverse impacts include rapid changes in land and sea use, direct exploitation of natural resources, climate change, pollution, and invasive species. Of monumental note is that, collectively, significant destructive forces arise from the actions of impoverished peoples living at the edges of society, working to eke out an existence often with little choice but to have minimal concern for environmental impact.

The role of climate change in biodiversity loss is also severely underestimated because of the lag between rising levels of CO<sub>2</sub> concentration and the equivalent accumulation of the radiant heat that leads to warming and biological impact. Ironically, climate change is also, in part, the consequence of biodiversity destruction: the amount

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4 Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis* (Washington, DC: Island Press, 2005), <https://www.millenniumassessment.org/documents/document.356.aspx.pdf>

of carbon in the atmosphere from degraded and destroyed ecosystems is now equal to what remains in extant ecosystems. The additional CO<sub>2</sub> emanating from the combustion of fossil fuels is in fact ancient solar energy that was trapped and converted by ancient ecosystems and is now being released in a geological instant.

While the IPCC reports have documented climate change and sounded warnings, the IPBES report highlights aspects of the degradation of planetary natural systems that equally warrant immediate attention and action. As dire as the findings in the assessment may be, they likely also hold the ingredients for possible solutions. For example, economists and decision makers are largely unaware of (or choose to ignore) the contributions of natural resources to the Gross Domestic Product (GDP) of Indigenous peoples or the poor; at the same time, many of those people are often equally reluctant to embrace the monetary value of local ecosystem services. Contributions of Nature to People (CNP) and ecosystem services are essentially two congruent valuation systems, and both are recognized by the IPBES assessment. The danger is that decision makers are often distant from the actual sites of valued biodiversity and ecosystems; as a result, they do not see actual monetized benefits from the sustainable use of natural resources, and so peg the value of these resources at, or near, zero.

Adding to the flaws in the calculus of conservation and sustainability is the surprising inattention to the value of new discoveries from biodiversity and ecosystems to life sciences research. For example, researchers recently discovered that a soil fungus in Nova Scotia can functionally disarm antibiotic-resistant bacteria, a discovery that could transform practices in medicine, agriculture, and beyond. About 70% of drugs used for cancer are natural or bioinspired products. The polymerase chain reaction aided by an enzyme from a Yellowstone hot spring bacterium may have generated close to a trillion dollars of benefit through rapid multiplication of genetic material. The list of treasures uncovered in the elements and processes of the natural world grows daily; at present, however, these kinds of contributions from natural resources to human health and life sciences are neither recognized nor accounted for and so are treated as free and without value.

The IPBES report findings are more than sobering: 35/44 assessed targets of the Sustainable Development Goals depend on authentic

transformational change to reverse trends of degradation. The assessment concludes that the current course of planetary degradation can be altered only with preemptive and precautionary actions, strengthened laws and related enforcement, dramatic changes in economic and social incentives, increased monitoring of biodiversity and ecosystems, and integrated decision-making across sectors and jurisdictions.

These dramatic changes will need to be supported by leaders, who themselves must promote new ways of understanding the meaning of 'quality of life', ones that value consuming less, wasting less, conserving more, and engaging truly novel approaches to global resource conservation and management. New tools will need to include technologies, creative economic models, and future-facing patterns of social behavior that are respectful of the diversity of needs, cultures, and local resources across the planet. These tools will need to be designed and applied to manage land use, agricultural development, and resource distribution in ways that will feed everyone adequately without further destroying nature.

Happily, the publication of the IPBES assessment coincides with new and hopeful visions emerging from the conservation community that adjust the scale and impact of collective efforts upward dramatically. The Edward O. Wilson Biodiversity Foundation's goal of Half-Earth was one of the first, with the aim of conserving half of the planet's lands and seas to safeguard the bulk of biodiversity, including humans. The National Geographic Society has a goal to place 30% of the planet in protected areas by 2030. The Global Deal for Nature,<sup>5</sup> is essentially coincident with the One Earth vision from the Leonardo DeCaprio Foundation.

The story of the unraveling of the planetary web of life has been told for decades, well before Rachel Carson's prediction of silent springs.<sup>6</sup> With its publication, the IPBES assessment, however imperfect, is now the most complete and comprehensive synthesis to date on the state of the health of the planet with all its natural resources and potential for contributing to human well-being. Readers at all levels of government, in the for-profit sector, and in civil society should heed its warnings and act on its vision and recommendations in haste. Together, we now sit at

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5 Eric Dinerstein et al., 'A Global Deal for Nature: Guiding Principles, Milestones, and Targets', *Science Advances*, 5.4 (2019), eaaw2869, <https://doi.org/10.1126/sciadv.aaw2869>

6 Rachel Carson, *Silent Spring* (London: Hamish Hamilton, 1963).

the fail-safe point and must decide what to do; collectively, all sectors must embrace the challenges raised by the assessment, rise to action, and do what we must do to ensure a viable future for our living planet and for humans and the extraordinary variety of life with which it and we are blessed.

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