



## Special Issue: The Ethics of Mass Species Extinction

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Earth is currently undergoing rapid, massive, and in many ways unprecedented environmental changes. Over the course of the twentieth century, the human population increased 300% while the size of the global economy ballooned 2400% (McNeill & Engelke, 2014). Industrial expansion in agriculture, manufacturing, fishing, mining, and energy production and use have radically transformed the land, seas, and atmosphere. The impacts of human activities are so pervasive—chemically, geophysically, biologically, ecologically—that the International Commission on Stratigraphy is considering formally recognizing the Anthropocene as a new geological epoch, with its formal base around 1950.

This Great Acceleration in human numbers and economic activity, which continues unabated, has been accompanied by pervasive ecological degradation and huge declines in Earth's biodiversity (IPBES, 2019). Across all taxa, vertebrate populations are estimated to have declined ~60% since 1970. There are more than 125,000 species on the IUCN Red List of threatened and endangered species, including 40% of assessed amphibians, 34% of conifers, 33% of reef building corals, 26% of mammals and 14% of birds. Current extinction rates are estimated to be 1000 times above the baseline rate and the synergistic impacts of habitat loss, pollution, overharvesting, and climate change are trending toward even faster biological depletion (Pimm et al., 2014). The consensus among conservation biologists is that we are entering a period of mass species extinction, the sixth in the 600-million-year history of multicellular life on Earth and the first to be knowingly caused by a single species: us.

In recent decades, excellent work has been done in environmental ethics, environmentally informed political philosophy, and philosophy of biology related to spe-

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cies and biodiversity (Rolston, 2020). Yet the philosophical dimensions of large-scale ecological loss have been relatively neglected. Massive biodiversity loss is underappreciated as a philosophical problem, particularly in comparison to climate change, and underthought as an ethical and policy challenge. This special issue on the ethics of mass extinction attempts to begin to address these lacunae.

In particular, the papers that follow extend previous philosophical work related to conservation of discrete species and ecological spaces by considering mass extinction and biological depletion that is geographically widespread and phylogenetically diverse, and that is likely to include the loss of higher taxonomic groups and distinctive ecosystem types. The first four papers focus on conceptual analysis and value theory, while the final three focus on policy analysis.

Ronald Sandler’s “On the Massness of Mass Extinction” considers whether causing a mass extinction is ethically problematic above and beyond the sum of the individual extinctions involved and, if it is, whether this is relevant to evaluating potential approaches to limiting or preventing such extinctions. He argues that “massness” is significant because it involves transition to an altogether different planetary state, and that partiality toward our current planetary state is justified by human relationships, dependencies, and histories.

In “Extinct and Alive: Towards a Broader Account of Loss,” Christopher Preston uses case studies to explore the extent to which conceptions of extinction are flexible and may need revision in light of both mass extinction and novel “synthetic age” conservation technologies such as gene editing and gene drives. He argues that more expansive conceptions of extinction are needed and that they can in some cases offer hope in the context of biological loss, since species may be extinct in one sense but carry on in another.

Gregory Mikkelson’s “Abundance and Variety in Nature: Fact and Value” explores value theory as it relates to biodiversity. He advocates for a variable value view grounded in richness theory in which the value of any given entity varies according to the abundance of entities of that type. Thus the value of individuals of threatened species is greater than that of individuals of common species, even if they have comparable capacities and welfare. This view helps make sense of why we should value species richness and avoid a human-dominated world. Mikkelson also shows how this approach to value theory fits well with the Living Planet Index’s approach for assessing progress in reducing biodiversity loss.

“Incalculable Instrumental Value in the Endangered Species Act,” by Ian Smith, explores how different theories of value could support the way in which the US Endangered Species Act (ESA) has been operationalized to protect endangered species even when the costs of doing so appear to outweigh the benefits. Some philosophers have argued that this only makes sense if the ESA implicitly postulates that species have intrinsic, final, or non-instrumental value. Smith argues that other types of value—particularly incalculable instrumental value—can justify such protection as well. In doing so he aims to show that the market costs of species conservation can be justified by more diverse types or forms of value than is commonly supposed.

Turning to policy issues, Philip Cafaro argues that “Reducing Human Numbers and the Size of Our Economies is Necessary to Avoid a Mass Extinction and Share Earth Justly With Other Species.” Scientific analyses show that excessive human numbers

and economic demands are the primary drivers of biodiversity loss and suggest that techno-managerial solutions are insufficient to avoid even greater losses. So fewer people and smaller economies are necessary to forestall mass extinction. According to Cafaro, while there are significant ethical costs associated with degrowth, the ethical costs of mass extinction are worse, in terms of both interhuman and interspecies justice.

In light of high extinction rates and limited resources, some conservationists have called for prioritizing the protection of species with high evolutionary distinctiveness, as is being done, for example, by the Zoological Society of London's EDGE of Existence programme. Clare Palmer and Bob Fischer consider whether this prioritization is justified in "Should Global Conservation Initiatives Prioritize Phylogenetic Diversity?" They critically evaluate several arguments meant to establish the value of phylogenetic diversity, including arguments based on option value, ecological value, conservation value, historical value, and aesthetic value. Palmer and Fischer conclude that an absolute prioritization for conserving phylogenetic diversity over other forms of diversity is not warranted, but that under some conditions prioritizing phylogenetic diversity can be justified.

In "Owl vs Owl: Examining an Environmental Moral Tragedy," Jay Odenbaugh also takes up issues related to conservation policy and units of conservation priority. He considers whether it is justified to kill barred owls, a common and expanding species in the US Pacific Northwest, to protect northern spotted owls, a threatened and declining species. Odenbaugh advocates a policy shift toward conserving endangered ecosystems rather than individual endangered species. He provides an account of endangered ecosystems that is conceptually coherent and argues for the practical priority of conserving them.

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The contributions to this special issue address only some of the salient philosophical issues associated with mass extinction and biological depletion. They are just a start. Our hope is that they will encourage others to take up the philosophical problems associated with mass extinction and that this work will encourage more and better practical efforts to avert or reverse biodiversity loss. There has been an enormous proliferation of illuminating philosophical work in response to the challenges posed by global climate change. We need the same sort of effort for global biodiversity loss.

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