

## CHAPTER 13

*Does nature matter? The place of the nonhuman  
in the ethics of climate change*

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## I INTRODUCTION

Ethical discussion about climate change has focused on two highly significant sets of questions: questions about justice between existing peoples and nations, and questions concerning the moral responsibilities of existing people to future people. However, given the likely planetary effects of climate change, one might also expect to find a third area of ethical debate: questions about the impact of climate change on the nonhuman world directly. But on this subject, very little has so far been said. Of course, ecosystems and species have been important in existing political and ethical debate about climate, because climate change may affect them in ways that have serious implications for human beings. Floods and droughts may cause widespread human hunger; invasive species can spread human disease; loss of biodiversity may threaten ecosystem services. But in all these cases, the nonhuman world is understood to be of *indirect* moral concern; to use a distinction made by Jan Narveson, even though the *object* of the concern is ecosystems or species, the *ground* of the concern is human beings.<sup>1</sup> Here, in contrast, I'm concerned with the ethical implications of climate change for species, ecosystems, organisms, and sentient animals *directly*, independently of the possible harms that such impacts might cause humans.

Certainly, concerns about the impact of climate change on the nonhuman world directly have been expressed, both by environmentalists and by ethicists. The Nature Conservancy, for instance, aims to "safeguard Nature from irreversible harm from a changing climate."<sup>2</sup> The Humane Society of the United States (HSUS), in a recent declaration on climate change, worries that "climate change is already adversely affecting animals around the globe . . . increasing numbers of extreme weather events are displacing or

<sup>1</sup> Jan Narveson, "On a Case for Animal Rights." *Monist* 70 no. 1 (1987): 35.

<sup>2</sup> Jonathan Hoekstra for the Nature Conservancy at: [www.nature.org/initiatives/climatechange/features/art26193.html](http://www.nature.org/initiatives/climatechange/features/art26193.html).

killing unprecedented numbers of farm animals, companion animals and wildlife.”<sup>3</sup> Some ethicists writing about climate change have similar concerns. Stephen Gardiner notes that “deciding what trajectory to aim for [in terms of long-term global carbon emissions] raises issues about our responsibilities with respect to animals and nature.”<sup>4</sup> John Broome emphasizes that, independently of effects on humans, “damage to nature may well be one of the most harmful consequences of climate change.”<sup>5</sup> The White Paper on the Ethical Dimensions of Climate Change, an influential, collaboratively written document intended to influence climate policy, maintains repeatedly that climate change raises ethical questions about “harm to,” and “duties to protect” plants, animals, and ecosystems directly, and that their interests should be taken into account alongside humans’ in climate policymaking.<sup>6</sup>

But although many claims of this kind have been made, there have been few attempts to work through what such claims might actually mean – and how far they are right.<sup>7</sup> Will climate change really “harm nature”? If so, which parts of nature, and in what ways? Are wild animals, and the world’s natural systems, really facing a “crisis of immense proportions,” as the HSUS claims? In this paper I will take some first steps in investigating these claims. I will argue, in particular, that we cannot always move straightforwardly from anthropogenic emissions of greenhouse gases to morally significant harms to the nonhuman world. Though climate change does raise ethical problems in a nonhuman context, these problems are more restricted in scope and more complex in form than we might intuitively think.

## 2 THREE ASSUMPTIONS

Given the limited space available here, I will begin by bracketing three issues about which I will make assumptions rather than present arguments. These

<sup>3</sup> Humane Society of the United States at: [www.humanesociety.org/about/policy\\_statements/statement\\_on\\_climate\\_change.html](http://www.humanesociety.org/about/policy_statements/statement_on_climate_change.html).

<sup>4</sup> Stephen Gardiner, “Ethics and Climate Change: An Introduction.” In *Wiley Interdisciplinary Reviews: Climate Change* ed. Michael Hulme. Draft version online at <http://faculty.washington.edu/smgard/index2.shtml>.

<sup>5</sup> John Broome, *Valuing Policies in Response to Climate Change: Some Ethical Issues*, 2009, [www.hm-treasury.gov.uk/d/stern\\_review\\_supporting\\_technical\\_material\\_john\\_broome\\_261006.pdf](http://www.hm-treasury.gov.uk/d/stern_review_supporting_technical_material_john_broome_261006.pdf) p. 12.

<sup>6</sup> Donald Brown *et al.*, *White Paper on the Ethical Dimensions of Climate Change*, 10, 16, 18. <http://rockethics.psu.edu/climate/whitepaper/whitepaper-intro.shtml>.

<sup>7</sup> The two fullest accounts I can find are Robin Attfield, “Mediated Responsibilities, Global Warming and the Scope of Ethics.” *Journal of Social Philosophy* 40, no. 2 (2009): 233–235, and Dale Jamieson, “Climate Change, Responsibility and Justice.” *Science and Engineering Ethics* (Forthcoming). Jamieson mentions the loss of wild nature as a problem for climate change in a number of places, including prominently in Dale Jamieson, “Ethics, Public Policy and Global Warming.” *Science, Technology and Human Values* 17 no. 2 (1992): 139–153.

issues are controversial (although to different degrees) but have been widely discussed elsewhere. Setting them on one side here will allow me to focus on the less-explored ethical issues in which I'm principally interested.

- (1) I'll assume that climate change really is happening and that human beings are largely causally responsible for it. So, I'll reject general skepticism about climate science. I'll also assume that, despite recent controversy, the IPCC (Intergovernmental Panel on Climate Change) 2007 reports provide our best source of reliable information on the likely impacts of climate change. See the introduction to this book for detailed discussion.
- (2) When we think about climate ethics, problems are raised not only with respect to the *effects* of climate change, but also in terms of the complicated way in which human beings are *actors*. Unlike many ethical problems, in the case of climate change causal responsibility is distributed over many actors, over long time spans, and over space. However, I don't have space to discuss this "causal end" of the problem here. I'll just assume here that human beings *do* have moral responsibility for climate change.
- (3) Thirdly, and most controversially, I'll assume that the nonhuman world, or at least parts of it, can be of direct moral relevance, independently of its usefulness to humans. Specifically, I'll assume that there are four possible objects of direct moral concern: species, ecosystems, nonconscious living organisms, and conscious, sentient animals. I'll restrict the way in which I understand moral concern by focusing only on claims about *moral considerability*. I take moral considerability in Harley Cahen's sense to mean "the moral status  $x$  has if and only if (a)  $x$  has interests, (b) it would be *prima facie* wrong to frustrate  $x$ 's interests (to harm  $x$ ) and (c) the wrongness of frustrating  $x$ 's interests is direct."<sup>8</sup> I'm not, therefore, directly concerned with accounts of nature's "existence value," nor with some interpretations of "intrinsic value" in nature, where these are distinct from claims about morally important interests (though what I say may be relevant for these kinds of accounts as well).

Of course, I recognize that the claim that species, ecosystems, and nonconscious living organisms (less so sentient animals) have morally relevant interests is highly controversial. I'm not persuaded myself of such claims, except in the case of sentient animals. But what's interesting here is that *even if we grant* that these parts of the nonhuman world are morally considerable,

<sup>8</sup> See Harley Cahen, "Against the Moral Considerability of Ecosystems." In *Environmental Ethics: An Anthology* ed. Holmes Rolston and Andrew Light (Oxford: Blackwell Publishers, 2003 [1988]), 114.

this doesn't always get us directly to the position that climate change causes harm. And it's this that I want to explore further. As even my very superficial study here will indicate, the ways in which human-originating climate change are likely to affect the nonhuman world generate puzzling and difficult ethical problems. Much more work will be required in order to draw satisfactory conclusions with respect to these problems.

### 3 CLIMATE CHANGE AND THE NONHUMAN WORLD: FIVE KEY FACTORS

I'll begin here by highlighting a number of important and related factors we need to consider when thinking about the impact of climate change on the nonhuman world:

- a) *Harm and change*: On this account, for climate change to be directly morally problematic, it must set back interests, or *harm*. But with respect to at least some of the entities at issue here it's not clear what might be "in" their interests, and whether climate change is the sort of phenomenon that actually might harm them – as opposed, for instance, to bringing about a particular form of *change*.
- b) *Climate change as productive*: Climate change is usually viewed as a *destructive* force. But it is also *productive*, bringing new things and beings into existence that would not otherwise have existed. Inasmuch as these things and beings have the same capacities or properties that we think makes existing things and beings morally relevant – in this case, being interest-bearing – some of what climate change *produces* will be morally relevant as well as what it eliminates.
- c) *Numbers questions*: Climate change may have an impact on *numbers* of particular things and beings in the world. Climate change might alter total numbers of organisms, total numbers of particular kinds of organism, and numbers of things and beings of different complexity and psychological sophistication.
- d) *Non-identity questions*: Climate change will have substantial global impacts. One result of this is that *different* things and beings will exist in the future than would have existed had climate change not occurred. But this raises questions about whether things and beings can be harmed by phenomena that were actually responsible for, or necessary conditions of, their existence.
- e) *Uncertainty questions*: The future effects of climate change on the nonhuman world are highly uncertain. For instance, we know very little about the temperature tolerance of many species. Some of the concerns

that might be of interest to ethicists (such as: Will climate change result in the existence of more or fewer psychologically complex beings in the world?) are not the kinds of question that current scientific researchers are addressing, are likely to address, or would know how to go about addressing. So, there's little hope of any progress on reducing uncertainty in some areas that are especially ethically relevant.

Having introduced these factors here, I'll now consider the ethical questions climate change raises with respect to each of the four possible "objects of moral concern" – species, ecosystems, nonconscious living organisms, and experiencing animals – in turn. To reiterate: I'm not attempting here to defend arguments that these beings and entities *actually are* of moral relevance, in the sense that they have interests that can be set back, and can thus be harmed. I'm asking what climate change might mean ethically *if we accept that they do* have morally relevant interests.

#### 4 CLIMATE ETHICS AND THE NONHUMAN: SPECIES

I'll begin by considering species, because they are one of the (somewhat) more straightforward cases here. If we accept the idea that species are in some sense interest-bearing, and that the possession of interests is sufficient for moral status, then it does seem as though climate change *could* harm species in morally significant ways.<sup>9</sup>

First, let's sketch the current and projected effects of climate change on species. Already, climate change has probably affected species; some have become more abundant and widely distributed; others have become less abundant; a handful may have already become extinct. Future climate change, involving alterations in the timing of seasons and in rainfall patterns, and increases in temperature, ocean acidification, and extreme weather events, is likely to have significant effects on the range, habitat, and survival of many more species.<sup>10</sup> It will also affect the bodily forms of species members; for instance, recent research indicates that many US bird species are smaller in size and weight, and have shorter wings, than 50 years

<sup>9</sup> David Hull, among others, argues that a species is a kind of individual. See David Hull, "A Matter of Individuality." *Philosophy of Science* 45 no. 3 (1978): 335–360. Some environmental ethicists have built on this argument to maintain that a species is morally considerable. See Lawrence E. Johnson, "Future Generations and Contemporary Ethics." *Environmental Values* 12 (2003): 471–487. However, this argument is problematic. Ron Sandler and Judith Crane, "On the Moral Considerability of *Homo sapiens* and Other Species." *Environmental Values* 15 (2006): 69–84, put forward a persuasive critique.

<sup>10</sup> See the discussion in Jean Christophe Vie, Craig Hilton-Taylor, and Simon N. Stuart, "Species Susceptibility to Climate Change Impacts." *Wildlife in a Changing World: An Analysis of the 2008 IUCN Red List of Endangered Species* (Gland: IUCN, 2009), 77–89.

ago (though their populations remain constant), an alteration attributed to changes in climate.<sup>11</sup> Climate change may also result in the loss of some species; the IPCC Fourth Assessment Report notes that “There is medium confidence that approximately 20–30% of species assessed so far are likely to be at increased risk of extinction if increases in global average warming exceed 1.5–2.5°C (relative to 1980–1999).”<sup>12</sup>

However, the actual proportion of the world’s existing species that may become extinct on account of climate change is widely contested; major uncertainties relate to how slowly and how modestly climate will actually change, and how climatic changes will interact with other human-originating factors that already threaten species, such as habitat fragmentation and loss.<sup>13</sup> For my purposes here, however, firm numbers are not critical. It seems safe to assume that climate change will commit some species to extinction. Further, recent research suggests that rates of species loss are already outstripping rates of species evolution (though it’s not clear how much of this is currently a consequence of climate change).<sup>14</sup> So, fewer species overall are likely to exist, at least in the medium-term future. Inasmuch as climate change will cause at least some species extinctions, and threaten others with extinction, this looks to be a relatively straightforward way in which climate change is of direct moral relevance in the nonhuman context.

We should not move too quickly here, though, because while in this “broad-brush” sense climate change does look as though it will harm some species in morally significant ways, further questions are raised. First, what actually is “in the interests” of a species? The most plausible primary interest of a species must surely be in not becoming extinct. But even this is not always obvious. Suppose that for some species to continue to exist, all the individual organisms that would compose it, present and future, would have such extremely painful, distressing lives that, as individuals, they would be better off dead, since their lives are not worth living. Would it still be in the interests of the *species* to persist, even though it would not be in the

<sup>11</sup> See Josh Van Buskirk, Robert S. Mulvihill, and Robert C. Leberman, “Declining Body Sizes in North American Birds Associated with Climate Change.” *Oikos* 2010 (on early view).

<sup>12</sup> IPCC *Climate Change 2007 Synthesis Report: Summary for Policymakers* at: [www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_synthesis\\_report.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm).

<sup>13</sup> Chris D. Thomas *et al.*, “Extinction Risk from Climate Change.” *Nature* 427 (2004): 145–148 predicted that climate change would doom 15–34 percent of species to extinction. However, these figures are contested. See O. T. Lewis, “Climate Changes, Species-Area Curves and the Extinction Crisis.” *Philosophical Transactions of the Royal Society B* 361 (2006): 163–171.

<sup>14</sup> Simon Stuart, Chair of the International Union for the Conservation of Nature’s Species Survival Commission. Quoted at: [www.telegraph.co.uk/earth/earthnews/7397420/Worlds-nature-becoming-extinct-at-fastest-rate-on-record-conservationists-warn.html](http://www.telegraph.co.uk/earth/earthnews/7397420/Worlds-nature-becoming-extinct-at-fastest-rate-on-record-conservationists-warn.html).

interests of *any* of the members of the species that would ever live? Or take a case suggested by Bryan Norton, and perhaps a more plausible concern with respect to climate change: Would it be in the interests of a species to come under a steady adaptational pressure that both fuels its decline in population and, simultaneously, increases the likelihood that it will speciate before it becomes extinct?<sup>15</sup> Does a species have an interest in speciation? Because of the kind of thing a species is, even if one thinks it does have morally relevant interests, there are cases relevant to climate policy where it is difficult to work out what those interests actually are.

Second, there's a further question about what recognizing species' interests would commit us to. Is the primary claim just that species should not be harmed? Or can species' interests be weighed against one another to produce best outcomes? And other things being equal, would it be better if there were more species in the world rather than fewer? These questions are difficult, and not presently addressed in the ethical literature on species, but they seem to be important questions in policy terms.

So, for instance: It might be that our primary goal with respect to species – roughly speaking, a deontological one – is not to *harm* them. On this view, harms to one species could not be weighed against benefits to another. On an alternative view – a broadly consequentialist one – the aim might be to bring about the maximization of the flourishing of species' interests – either by promoting or protecting the flourishing of existing species, and/or by creating new species, and/or by allowing/promoting speciation, as appropriate. Climate change, of course, could be problematic on both deontological and consequentialist views. But it's more obviously a difficulty on a broadly deontological view than on a consequentialist one. Of course, on the consequentialist view, climate change still looks problematic, since it seems implausible that, overall, climate change would promote the flourishing of species. Even though some will benefit, more will lose out, as speciation won't keep pace with extinction, at least not on any humanly comprehensible time scale. (Over millennia, though, speciations may well overtake extinctions, so on a long time frame we might think the losses now will be made up in the future.)<sup>16</sup> But even in the shorter term, if species' interests can be weighed against one another, wider policy options present themselves than if avoiding species harms is the central focus.

<sup>15</sup> Bryan Norton, *Why Preserve Natural Variety?* (Princeton University Press, 1992), 171.

<sup>16</sup> Over *geological* time, human-induced extinctions may shape evolutionary processes. See David Jablonski, "Lessons from the Past: Evolutionary Impacts of Mass Extinctions." *Proceedings of the National Academy of Sciences* 98 no. 10 (2001): 5393–5398.

Climate change will be “good for” some species and “bad for” others. “A species’ individual susceptibility to climate change depends on a variety of biological traits including its life history, ecology, behavior, physiology, and genetic make-up.”<sup>17</sup> Species that are habitat generalists, tolerant of wide temperature ranges, not dependent on very specific environmental triggers or cues for processes such as breeding, and resilient in the face of extreme weather events, and that can disperse or colonize new habitats relatively easily, are likely to flourish in a changed climate, even as other species are threatened.<sup>18</sup> Climate change is not, therefore, unequivocally “bad for” species – even if some of the species for which it might be thought to be “good” are not ones that humans generally welcome, such as the American dog tick, a primary vector for Rocky Mountain spotted fever. Some species are likely to benefit from the very same phenomena that harm other species. And if harms and benefits can be balanced to produce best overall outcomes, it might be better (in resource terms, for instance) to reintroduce a wild species that is now extinct, for instance, from seeds in a seed bank – such as the recent reintroduction of the Malheur wild lettuce into Oregon – rather than to expend substantial resources to prevent a different, currently endangered, species from being harmed by becoming extinct.

In general, though, if one accepts that species can have morally relevant interests, then climate change does threaten at least some of those interests, even though it promotes others. The difficulties here concern the theoretical framework within which one understands those interests, and thus what this might mean in terms of policy responses. But in terms of harms, at least, species raise less troubling ethical questions than some of the other possible objects of moral concern that I’ll now go on to consider.

##### 5 CLIMATE ETHICS AND THE NONHUMAN: ECOSYSTEMS

It is very likely that climate change is already affecting many of the world’s ecosystems. The IPCC Fourth Synthesis Report notes with “high confidence” that “recent regional changes in temperature have had discernible impacts on physical and biological systems.”<sup>19</sup> In particular, there have been changes in Arctic and Antarctic ecosystems, especially those based around sea ice; spring peak discharge in snow and glacier-fed rivers is earlier and higher; events such as leafing, migration, and egg-laying in birds are also happening earlier. These changes, and many others to come, including the

<sup>17</sup> Vie, Hilton-Taylor, and Stuart, “Species Susceptibility,” 77–89. <sup>18</sup> *Ibid.*, 79.

<sup>19</sup> IPCC “4th Synthesis Report: Summary for Policymakers”, 31.



effects of more extreme weather events, floods, and fires, will have a significant impact on ecosystems. Some existing ecosystems may change their nature altogether (so, for instance, some coastal ecosystems are likely to become part of marine ecosystems). Many ecosystems will be rather different on account of human-originating climate change in the future than they are now, and than they otherwise would have been.

But are these changes of direct moral relevance? On the terms with which I've been working, to answer this question positively we would need to think *both* that ecosystems are, in some sense, directly morally considerable (that they have interests, and can be benefited and harmed in morally significant ways) *and* that, if they are morally considerable, then the effects of climate change would actually *be* of ethical significance – primarily, that climate change would *harm* at least some of them. Since we're *assuming* the moral considerability of ecosystems, let's focus on the second issue here. What's at stake here is the kind of alteration that anthropogenic climate change is likely to cause.

If we accept that ecosystems are morally considerable, then there must be some way in which ecosystemic interests can be set back, or in which ecosystems can be harmed. A clear-cut case of harm, on this view, would be the completion of a dam project that quickly and permanently inundated an entire grassland ecosystem, completely destroying it. The question is, though, whether climate change is likely to have this kind of harmful effect. At first sight, we might think not. After all, climate change is not nearly such a swift and dramatic process as inundation from a dam project. It seems more likely that the shifts precipitated by climate just push ecosystems to develop in one way, rather than another. Some species will do well, others will do badly, creating new ecosystem compositions. But why see a "push" in one way rather than another as "setting back their interests," as being "worse" for them than other disturbances and climate patterns that would have occurred in a different, non-anthropogenic, climate regime?

One response to this is to maintain that the ways in which climate change affects at least some ecosystems differs from the changes encountered in "normal" disturbance regimes. Many of those who argue that ecosystems have some kind of moral status draw on Aldo Leopold's account of the land ethic, published in 1949. A key part of Leopold's land ethic is the claim that "A thing is right when it tends to preserve the integrity, stability and beauty of the land community. It is wrong when it tends otherwise."<sup>20</sup> The concern raised by climate change, then, might be that it will upset the

<sup>20</sup> Aldo Leopold, *A Sand County Almanac* (Oxford University Press, 1989 [1949]).

integrity and stability of ecosystems, in “abnormal” ways. But we need to qualify this concern. Changing emphases in ecological theory since Leopold’s time have led to questions about the appropriateness of “stability” or “integrity” seen as measures of ecological “goodness” (or, for our purposes here, of ecological harm). It is unclear how much cohesion, regularity, and organization ecosystems have; they seem to exhibit “varying degrees of historical particularity, stochasticity, regularity, cohesion and hierarchical organization.”<sup>21</sup> Pickett and Ostfeld argue, influentially, that we should understand ecosystems to be open, unpredictably changing and variable, internally heterogeneous and patchy, and containing species redundancy. In light of these shifting ideas, J. Baird Callicott suggests that we should adapt Leopold’s land ethic to read: “A thing is right when it tends to disturb the biotic community at normal spatial and temporal scales. It is wrong when it tends otherwise.”<sup>22</sup> So, one thought here is that anthropogenic climate change could disturb biotic communities at *abnormal* spatial and temporal scales, more quickly, more dramatically, more comprehensively, and more permanently, than the fluctuations of regular disturbance regimes. These major *scale* changes to ecosystems, it might be argued, are what is directly morally problematic, and that we should think of as the “wrong thing” that results from climate change in the nonhuman world.

But in the context of climate change, this reworked land ethic is also problematic (as Callicott himself now maintains).<sup>23</sup> Much turns on the word “normal.” Certainly, in the past few centuries, global climate has been relatively stable. But analysis of pollen deposits and Greenland ice cores strongly indicates that abrupt climate change – on a human-relevant scale of a decade or two – has happened in the past. So, for instance, during the Younger Dryas 12,000 years ago, there was very significant and abrupt cooling, followed by fairly abrupt warming, over the space of about 50 years in northern Europe and North America, with some climate changes also recorded globally.<sup>24</sup> The National Academy of Sciences notes: “Recent

<sup>21</sup> Kevin De Laplante and Jay Odenbaugh, “What Isn’t Wrong with Ecosystem Ecology.” 11. [www.public.iastate.edu/~kdelapla/research/research/pubs\\_assets/wiwwee.pdf](http://www.public.iastate.edu/~kdelapla/research/research/pubs_assets/wiwwee.pdf).

<sup>22</sup> J. Baird Callicott, “From the Land Ethic to the Earth Ethic.” In *Gaia in Turmoil: Climate Change, Biodepletion, and Earth Ethics in an Age of Crisis* ed. E. Crist and H. B. Rinker (Cambridge, MA: MIT Press, 2009), 184.

<sup>23</sup> *Ibid.*, 178. Callicott’s argument differs from mine, however; he suggests that given the planetary scale and long time span over which climate change is likely to occur, we need a “Gaian ethics” rather than a land ethic, and that the land ethic is in this context irrelevant.

<sup>24</sup> There’s a large literature on this. See, for instance, Jeffrey P. Severinghaus, *et al.*, “Timing of Abrupt Climate Change at the End of the Younger Dryas Interval from Thermally Fractionated Gases in Polar Ice.” *Nature* 391 (January 8, 1998): 141–146.

scientific evidence shows that major and widespread climate changes have occurred with startling speed. For example, roughly half the north Atlantic warming since the last ice age was achieved in only a decade, and it was accompanied by significant climatic changes across most of the globe.<sup>25</sup> Such abrupt past climate changes are not, of course, thought to be anthropogenic. But – on the long time scale on which it seems appropriate to think about climate change – these climate changes are not *abnormal* either. Anthropogenic climate change, though different in origin, is not otherwise unlike at least some other “natural” episodes of climate change. So, if it’s the *normality* of spatial and temporal scales that matter, it’s hard to see how climate change would be “a wrong thing” in an ecosystemic context.

But perhaps it’s not “normality” on which we should focus here. What’s important is surely whether we think that abrupt climate changes – whether “normal” or not, and whether they are of the natural or the human-originating kind – can set back the morally significant interests of ecosystems. If we think that they cannot, because, however dramatic these kinds of changes might be, they all constitute ecosystemic processes of change that cannot “harm” the system, then they are not of direct ethical concern whatever their origin (though they might be of critical *indirect* concern to *us*). But if we think that abrupt climate change *can* set back the interests of ecosystems, then for humans to create such climate change would be of direct moral concern. That such climate changes can also occur naturally would be, in this case, irrelevant. If a human arsonist were to ignite a deadly wildfire that predictably set back human interests by destroying property and lives, we wouldn’t think that the arsonist had no moral responsibility because lightning starts similarly destructive fires naturally. Likewise with human-originating climate change; humans are moral agents, so their actions can be morally culpable in ways that natural climate changes cannot be.

This, then, takes us back to the question: what kind of effect could climate change have that would harm ecological systems? This question is difficult to answer, partly because of our uncertainty about the effects of climate change, and, but more deeply, because of the problem, in the context of ecosystems, of identifying any sustainable distinction between changes and harms, especially over extended time scales. Of course, some cases – where changes are relatively quick and clearly destructive – are less difficult to assess. For instance, the sudden bleaching of a coral reef, leading to the loss of reef-dependent organisms and ecosystem function, does look

<sup>25</sup> See *Abrupt Climate Change: Inevitable Surprises*. Committee on Abrupt Climate Change, National Academy of Sciences, 2002. [www.nap.edu/openbook.php?record\\_id=10136&page=1](http://www.nap.edu/openbook.php?record_id=10136&page=1).

like a harm. But the slow extension of a forest ecosystem into what was previously a tundra ecosystem is much less obviously harmful. And ecosystemic processes can be maintained in systems that look very different from the ones we currently have, as Nott and Pimm argue: “We can imagine a future pantropical forest system composed of a few score of tree species, the same introduced insect, bird and mammal species. Such a world might exhibit acceptable ecosystemic processes, yet contain a tiny fraction of the current tropical biodiversity.”<sup>26</sup>

So, there are some cases where, *if* we think that ecosystems have morally relevant interests it looks as though climate change could cause harm. But it would be problematic to think that *all* such changes are harms, given our general lack of knowledge about ecosystemic change over time, and the difficulties of identifying both the boundaries and the identity of any particular ecosystem. It will be difficult, and controversial, to come up with anything like a set of conditions to separate ecosystem *harm* from ecosystem *change*.

An alternative way to think about the effects of climate change on the nonhuman world is to focus not on ecosystems, but rather on the organisms of which they are composed. We might think, more plausibly, that it’s individual organisms that will be harmed, rather than ecosystems. There is much wider general acceptance of the idea that living individual organisms – in particular sentient animals – are the kinds of beings that *can* be harmed, and it’s much easier in the case of individual organisms (rather than species or ecosystems) to identify what a harm actually *is*. So, I’ll now turn to consider the effects of climate change on individual organisms. Here questions about numbers, creativity, identity, and uncertainty in the context of climate change arise with particular force.

## 6 CLIMATE CHANGE AND THE NONHUMAN: INDIVIDUAL LIVING ORGANISMS

Before moving on to consider the effects of climate change on individual living organisms, I first need to comment on how the moral relevance of individual organisms is usually understood. On most accounts, what matters are the particular inherent *capacities* individual organisms possess (rather than, for instance, their relational properties, or some property

<sup>26</sup> M. P. Nott and S. L. Pimm, “The Evaluation of Biodiversity as a Target for Conservation.” In *The Ecological Basis of Conservation* ed. Steward T. Pickett, Richard S. Ostfeld, Moshe Shachak, and Gene Likens (New York: Chapman and Hall, 1997), 127.

that is not a capacity, such as species membership). Those who argue, for instance, that nonconscious living organisms are morally considerable, and have interests that can be set back, usually claim that living organisms are goal-directed or that they have their own goods. Those who argue that only certain animals are morally considerable maintain that capacities such as being able to experience conscious pain are what is morally important. Almost everyone agrees that the focus should be on capacities, even though they disagree about what the relevant capacities are. A further source of disagreement concerns whether some capacities are more valuable than others. On some views, the possession of sophisticated mental capacities gives an organism added moral significance. So, for instance, while a plant might have bare moral status because it is goal-directed, a chimpanzee's sophisticated psychological capacities give it a much higher degree of moral significance.

In what ways, then, might climate change have morally relevant impacts on individual organisms? Some possibilities are:

- (a) *Numbers*: Climate change may affect the *total* number of organisms that ever live.
- (b) *Identity*: Climate change means that different individual organisms come into being than would otherwise have existed. These organisms may have different capacities than organisms that would otherwise have lived (they might be more, or less, psychologically sophisticated, for example). In any case, climate change is a necessary condition of the organisms' existence.
- (c) *Harm*: Climate change may have harmful effects on those organisms that *actually do* live.

These three impacts are closely related to the difficulty of *uncertainty*. That is, we have no real idea what effect climate change will have in terms of (a) and (b) – at least.

Let's begin, then, by thinking about *numbers*. One worry – on which I don't think we need linger – is that climate change might bring about a world in which fewer organisms ever live. For some consequentialist positions this could matter morally: a world in which fewer organisms ever lived would be, other things being equal, worse than a world in which more organisms ever lived. But this outcome is empirically very implausible. Certainly, *some* ecosystems may contain fewer individual living organisms (for instance, marine ecosystems affected by ocean acidification, or desertified land areas). But others will likely contain *more* living organisms. Recent research published in the UK, for instance, indicated that warmer, wetter weather between 1997 and 2007 virtually doubled the number of

invertebrate soil organisms in existence (although their diversity reduced).<sup>27</sup> We can't foresee (in the way that we might were we planning on causing a nuclear winter) that on account of anthropogenic climate change, fewer organisms will ever live. It seems unlikely that a *total numbers* argument should be seen as an ethical concern generated by climate change.

So, let's assume a roughly same-numbers future world. What ethical concerns might there be here? Two possibilities:

- (i) Although this is a same-numbers world, simpler nonconscious organisms will come into being instead of more complex nonconscious or conscious ones, and this is of ethical significance. Let's call this the *simplification worry*.
- (ii) Organisms will be harmed, and this is of ethical significance.

For the simplification worry to be of moral concern, we would need to think that some organisms have more moral significance than others, *and* that climate change was likely to result in organismic simplification. The idea that different living organisms have different value is not universally accepted. Paul Taylor, for example, argues that all (wild) living things have equal inherent worth and "all are held to be deserving of equal moral consideration."<sup>28</sup> On this view, that less complex beings come to replace more complex beings would not, in itself, be problematic. But there are many other ethicists who would be worried about organismic simplification. Robin Attfield argues that the flourishing of all living organisms has some value, the more complex the organism, the more valuable the flourishing. And, as a consequentialist, Attfield also maintains that good can be summed.<sup>29</sup> So one reading of his view would be that – other things being equal – a world in which more complex organisms flourished would be a more valuable world than one with the same number of organisms, but where at least some organisms were simpler.

Is it, though, empirically likely that climate change would actually bring into being simpler organisms than would otherwise be the case? In one sense, this is more plausible than the total numbers worry. Climate change is likely to endanger or make extinct some complex, psychologically sophisticated species whose members would be particularly important here. But on the other hand, climate change will also provide the necessary conditions

<sup>27</sup> Research from the Center for Ecology and Hydrology, UK National Environment Research Council as reported in "Weight of Bugs in Britain's Soil Has Nearly Doubled in Just Ten Years," *The Observer*, February 28, 2010. [www.guardian.co.uk/science/2010/feb/28/soil-biodiversity-invertebrates-countryside-survey](http://www.guardian.co.uk/science/2010/feb/28/soil-biodiversity-invertebrates-countryside-survey).

<sup>28</sup> Paul Taylor, *Respect for Nature* (Princeton University Press, 1986), 79.

<sup>29</sup> See Robin Attfield, *A Theory of Value and Obligation* (Kent: Croom Helm 1987).

for the expansion of the range of other complex, psychologically sophisticated, and potentially invasive species. It's very likely that in the plant world more "weedy" species will dominate. But again, these may be no more or less complex in terms of their morally relevant capacities than the native plants they displace. So although some species may become more abundant and others less abundant – or extinct – this doesn't in itself imply a loss of organismic complexity.

If the simplification worry did turn out, though, to have an empirical basis, it's surely a worry that humans could relatively easily fix – though not in ways that would necessarily please those morally concerned about the environment. After all, it's easy enough for humans to breed relatively complex and psychologically sophisticated organisms to make up for wild ones that are going extinct. Indeed, we could even breed more of ourselves. However simplification is read, it has no necessary relationship with "wildness"; the concern here is with lost individual capacities, not with lost relations or contexts. In fact, in expanding animal farming, we're likely already increasing the numbers of psychologically complex organisms in the world (though most versions of this view would also require that the organisms flourished, questionable in the case of intensive animal agriculture). The simplification worry, then, like the total numbers worry, need not detain us long.

Let's turn, then, to questions about harm, and here divide organisms into two groups: the nonconscious ones, such as higher plants and algae, and the sentient, experiencing ones, particularly mammals and birds. First: Will climate change harm nonconscious organisms? The answer to this question, again, isn't entirely straightforward. Undoubtedly, some organisms will be harmed or killed by the impacts of climate change. This is most obvious in the case of longer-living organisms such as trees; some existing trees will struggle to stay alive, and will (probably) die sooner because of changes in temperature, water availability, advancing pests, or extreme weather events.<sup>30</sup> It's much more difficult to make such claims about organisms with short lives of months or days, where the time scales on which gradually shifting climate impacts operate are just too long for effects to be felt (though even short-lived organisms could be negatively affected by extreme weather events such as storms, floods, or fires).

But climate change will also bring organisms into existence that wouldn't otherwise have existed, and will promote the interests of other organisms

<sup>30</sup> There are problems with the counterfactual (who knows what would have happened without anthropogenic climate change?), but I won't address this here.

that do actually exist. And climate mitigation policies (for instance, the use of some new energy-generating technologies), if implemented, are also likely to take some individual organisms' lives while preserving the lives of others.<sup>31</sup> One question here, then, is whether it is possible or appropriate to add together these deaths and new lives, these harms and benefits, to create some kind of overall sum of the organismic effects of climate change.

Forms of consequentialism that value the lives of nonconscious organisms would accept that such calculations are appropriate; what matters from such consequentialist perspectives is whether climate change *actually will* promote or frustrate organismic interests overall. Here the critical problem is one of deep uncertainty, where we can't even be clear about what outcomes are *likely*. But other non-consequentialist ethical approaches maintain that what's of moral importance is not the increase or decline in overall organismic well-being, but rather the human duty not to harm organisms that have a well-being; for Paul Taylor, for example, this is the central principle of non-maleficence.<sup>32</sup> On *this* view, if climate change harms organisms, and humans are responsible for climate change, then climate change is a direct wrong to some organisms in the nonhuman world.<sup>33</sup> Since it seems very likely that climate change will directly harm some living organisms, on views like Taylor's, climate change is ethically problematic. However, this ethical problem may not persist over time. That is, it may only apply in the case of organisms *currently in existence* to which climate change may cause harm. It may not apply to organisms if the effects of climate change are a necessary condition of their existence. To avoid repetition, I'll return to this shortly when discussing sentient animals, for at least some of what I say about this problem in the animal case may also apply to nonconscious organisms.

To move on to conscious, experiencing animals then, it's widely accepted that mammals and birds have interests that matter to them. In this sense, arguments about the effects of climate change on animals can be distinguished from those relating to species, ecosystems, and nonconscious living organisms, where there's much deeper skepticism about moral considerability. But there's still work to do, even accepting that sentient animals are morally considerable and that they can be harmed in morally significant

<sup>31</sup> The Natural Resources Defense Council produced a set of maps in 2009 showing areas of the western USA where the development of alternative energy would threaten endangered wildlife such as the western sage grouse. [www.nrdc.org/media/2009/090401a.asp](http://www.nrdc.org/media/2009/090401a.asp).

<sup>32</sup> Taylor, *Respect for Nature*, 172.

<sup>33</sup> Although, as noted, mitigation may also harm individual organisms.



ways, in reaching the conclusion that climate change – in any general sense, at least – produces morally significant harms to them.

Let's think first about the effects climate change is likely to have on sentient animals. Inevitably, it will cause some animals to suffer (from heat, lack of water, melting ice, lack of food, reduction in or disappearance of usable habitat, flooding, fires, climate-related disease, or other extreme weather events). Climate change will kill some animals. The majority of these animals will be undomesticated, and will live in relatively wild places. Climate change will also benefit some sentient animals. It will reduce their suffering, and result in more food, warmth, and more, or more suitable, habitat. Some of these benefited animals will be wild, others feral; changing climate and ecosystems will permit some animals to move into and colonize new territories. On yet other animals, climate change is likely to have little impact: experimental animals and others that live mainly inside climate-controlled buildings will be largely unaffected (even if their lives go experientially very badly or very well for other reasons).

Some similar issues arise here as with nonconscious organisms. One way of thinking about the effect of climate change on sentient animals is, essentially, consequentialist – a focus on producing best outcomes.<sup>34</sup> Even if some animals suffer and die, climate change might result in an overall net gain in pleasure, or preference satisfaction (for instance) in the context of sentient animals. This may be unlikely, but it's not impossible. Certainly, climate change may result in fewer American pika and more brown rats; but while many human beings would dislike this outcome, from the perspective of how sentient animals experience their own lives – how their lives go “from the inside”, there's no good reason that we know of to privilege “pika” experience over “brown rat” experience. What matters, on this view, is whether climate change creates a worse or better world, overall, over time, in terms of whatever is thought to be directly valuable about the experience of sentient animals.

An alternative view – say, a rights view that accepts animals as rights-holders – would reject this “summing” approach. Here the worry is about infringing animals' basic rights, such as their right to life.<sup>35</sup> If climate change kills animals, or harms them by, for instance, depriving them of vital habitat, then the fact that some *other* animals benefit does not make good the harm. If climate change seriously harms animals – as it plausibly does –

<sup>34</sup> Although not all forms of consequentialism are totalizing in this way.

<sup>35</sup> Tom Regan is the best-known exponent of such a view. See Tom Regan, *The Case for Animal Rights* (Berkeley, CA: University of California Press, 1983).

and humans are responsible for it, then those chiefly responsible are wronging animals (in similar ways, it might be argued, to the ways in which fellow humans are also being wronged by climate change: few of them benefit, they carry a disproportionate burden, some are extremely vulnerable, and so on).

But we need to be careful when considering exactly how this claim about harm is framed, since it raises what's called – in the human case – the “non-identity problem.”<sup>36</sup> Climate change will not only harm some existing animals and benefit others. It will also cause different particular individual animals to come into existence than would otherwise have been the case. Just one example: birds that migrate earlier will likely meet different mates than they would otherwise have done, and will produce fertilized eggs from different sperm. So, different individual birds will end up existing. And the more wide-ranging and intense the effects of climate change are, the more effects of this kind will come about, at least in the context of animals whose breeding is not tightly controlled by human beings, and is strongly influenced by temperature, the seasons, and climate-affected changes in ecosystems. Now, if what's thought to be morally important is *total* positive (or negative) animal experience over time, understood “impersonally” (in the sense of not belonging to any *particular* individual), this productive effect of climate change may not be ethically important. But if we're concerned about climate change harming particular individuals, or infringing rights, then this productive effect does seem very important.

Let's compare individual animals in two different situations. First, let's take a mature adult Alaskan polar bear. One effect of climate change is to shift patterns of sea ice; ice thaws earlier and forms later. These changes in sea ice make life more difficult for the polar bear, so that its survival becomes precarious. Its life is going less well than it would otherwise have done; ultimately its life might be shorter.<sup>37</sup> We can claim, therefore, that this polar bear is being harmed by climate change in ways that matter morally. Without climate change, this bear's life would have gone better; now it is going comparatively badly, and human activities are causally responsible.

But now, let's imagine a different situation. A decade from now, changes in climate as a consequence of human activities have led to the expansion of nine-banded armadillo populations northwards in the USA. (I'll just assume that armadillos are sentient, and that climate changes would have this effect.) Two armadillos move into new territory, meet, mate, and

<sup>36</sup> As discussed by Derek Parfit, *Reasons and Persons* (Oxford: Clarendon Press, 1984).

<sup>37</sup> Some of what I say here is influenced by John Broome, *Counting the Cost of Global Warming* (Cambridge: White Horse Press, 1992), though Broome only discusses human cases.

produce offspring. But while the warming climate has opened up new habitat possibilities for the young armadillos, it is also more liable to produce extreme weather events, such as droughts and floods. Armadillos are particularly vulnerable to drought; and a drought begins to develop. The young armadillos struggle to survive; they have to travel long distances to find sufficient water; they have more difficulty locating sources of food.

Although different factors are at work here – loss of sea ice versus drought – we might think that our choices have made these young armadillos, like the polar bear, worse off than they would have been had we adopted different policies. But there's a telling difference. The polar bear was already in existence before the sea ice began to change and to make its life go badly. But climate change is a necessary condition of the *very existence* of these particular armadillos. Without the change in climate, some other armadillos, or indeed some other animals altogether, would have existed. It's not that anthropogenic climate change has *worsened* their lives (as we can say about the polar bear), but rather that, without climate change, these particular armadillos would never have existed.

This argument is significant inasmuch as it suggests that we should be wary about making claims that climate change will harm animals – and perhaps nonconscious organisms – that have not yet come into being. For at least some of these animals (and for an increasing number of animals over time) climate change will be a necessary factor in their existing at all. So, while we might reasonably be concerned that existing animals (such as individual polar bears) are *currently* being harmed by climate change, if we look into the further future, it's going to be increasingly difficult to think of climate change as a factor that's harming, or infringing the rights of, particular individuals.

However, this doesn't mean that we should not be (as it were) *impersonally* concerned at the prospect of a future world with more animal suffering in it, rather than less, on account of the changes in the world that climate change might bring.<sup>38</sup> Consequentialists could still see this as a troubling prospect. But there's deep uncertainty here. We can't tell whether climate change will cause more suffering to non-humans than it will relieve. We don't know whether more animals capable of suffering will ever live. Nor do we know whether, on account of climate change, more or fewer cognitively sophisticated animals will ever live. If climate change were both to cause a proliferation in the numbers of cognitively simpler armadillos while

<sup>38</sup> There are a number of other possible responses to non-identity problems that it would be interesting to develop in this case; unfortunately, I don't have space to pursue these here.

simultaneously bringing about a decline in the numbers of cognitively sophisticated elephants or chimpanzees, this would be particularly pernicious in some ethical views. But we lack any evidence about the plausible effects of climate change that could help us to make judgments of this kind; nor is it at all obvious how such evidence could be obtained. Certainly, no one is conducting research directly into such questions, nor are they likely to do so.

## 7 IN CONCLUSION

I began by noting that very little has been published so far concerning the effects of climate change on the nonhuman world. While this silence is not unexpected in political and philosophical circles where only present and future humans have moral status, it's very surprising in the context of environmental ethics. However, looked at more closely, this silence seems less surprising. For the ethical implications of climate change in the context of the nonhuman world are extremely unclear. One reason for this lack of clarity is the high degree of uncertainty about how the climate will actually change, and what effect that will have on species, ecosystems, and living organisms. Second, while climate change will have significant negative impacts, it will also drive speciation, change some ecosystems without destroying them, produce organisms that would not otherwise have existed, and promote the flourishing of at least some species, ecosystems, and individual organisms. In part, ethical judgments here will depend on whether one takes the view that one can weigh the benefits of climate change against the harms it causes, or not. A consequentialist must here struggle with the questions of deep uncertainty climate change raises, where we don't have a good sense of what outcomes are even plausible, let alone predictable or to be expected. A non-consequentialist, though, will have to think through the non-identity problems that climate change raises, at least in the context of living organisms. All I've been able to outline here are some very preliminary steps in thinking about such problems. What's needed is a much more careful and detailed account both of the likely effects of climate change on the nonhuman world, and whether – and why – these effects might be of ethical importance.