Animals and Climate Change

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1. Introduction

The standard story about climate change is that humans are the main causes of climate change and will also be the main victims. But nonhuman animals are central to climate change too. In particular, animal agriculture is a major contributor to climate change, and climate change will be a major contributor to wild animal suffering. As a result, I believe, resistance to animal agriculture should be a major part of climate mitigation, and assistance for wild animals should be a major part of climate adaptation.

Both of these topics – animal agriculture as a cause of climate change, and wild animals as victims of climate change – are neglected, but the latter is especially neglected.[2] I think that there are at least two reasons for this. First, whereas we have self-interested reason to care about animal agriculture as a cause, we do not have self-interested reason to care about wild animals as victims (except insofar as we benefit from the existence of wild animals). Second, whereas it is relatively clear how we should address the problem of animal agriculture and climate change, it is not at all clear how we should address the problem of

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[2] See Hsiung and Sunstein 2007 and Palmer 2011 for representative exceptions.

wild animals and climate change. Indeed, the problem of wild animals and climate change sits at the intersection of some of the hardest problems that we face in science and philosophy, and it is therefore not only especially important but also especially daunting.

My aim in this chapter is to examine the connections between animals and climate change from a primarily philosophical perspective. I will proceed as follows. In §2, I will examine the impacts that animal agriculture will have on climate change, and I will argue that, in light of these impacts, we morally ought to resist animal agriculture as part of our mitigation efforts. In §3, I will examine the impacts that climate change will have on wild animal populations, and I will argue that, in light of these impacts, we morally ought to assist wild animals as part of our adaptation efforts. Then, in §4-5, I will discuss questions about wellbeing, creation ethics, population ethics, duties to future generations, and more that we need to ask before we can make these duties more concrete. I will not attempt to answer these questions here. Instead, my aim is to start to unpack the relevant issues and argue for two first steps that will make sense no matter how we answer many of them. First, we should research alternatives to animal agriculture and interventions in wild animal suffering. Second, we should extend moral and political standing to all animals.

Before I begin, a quick note about the scope of this topic. While my focus here will be on animal agriculture as a cause of climate change and on wild animals as victims, we can, and should, also talk about farmed animals as victims of climate change and about wild animals as causes. For an example of the former, in fall 2016 Hurricane Matthew resulted in flooding that killed millions of farmed animals in North Carolina alone (Philpott 2016). And for an example of the latter, aquatic animals such as whales function as carbon sinks if they die of natural causes (since they sink to the bottom of the ocean, bringing stored carbon with them) and as carbon sources if we kill them (since we bring them to the surface, releasing stored carbon into the atmosphere) (Pershing et al 2010). There is much more to say about

these topics (as well as about the relevance of other domesticated and liminal animals), but since the most important topics in this area are animal agriculture as a cause of climate change and wild animals as victims, these two will be my focus here.

2. Farmed animals, climate change, and a duty to resist

We know that the climate is changing, and that human activity is changing it. We will likely see a 2-4 degrees Celsius increase in global average temperatures above pre-industrial levels by the end of the century (IPCC 2014). There is also a small chance that a runaway effect will occur, causing as much as a 10 degree Celsius increase. Climate experts generally agree that a 5-10 degree increase would be catastrophic. But even if we limit the damage to 2-4 degrees, climate change will have a massive and pervasive impact on this planet. It will cause melting ice caps; rising sea levels; flooding coastal cities; an increase in the frequency and intensity of extreme weather events such as hurricanes and tsunamis; regional conflicts over land, water, energy, and food, and more (NASA 2016). As the Pentagon notes, it will also be a "threat multiplier" that exacerbates existing problems in unstable regions (Bergengruen 2017). This raises questions about what if anything we can and should do to mitigate human-caused climate change.

These questions are hard to answer because the activities that contribute most to climate change are activities that humans really enjoy: reproduction and consumption. Consider reproduction first. In 1900, we had a global human population of about 1.5 billion. By 1950, we had about 2.5 billion (Kremer 1993). Now we have more than 7 billion and counting, and population experts estimate that we will likely have 9 or 10 billion by 2050 and 10 or 11 billion by 2100 (Gerland et al 2014). Now consider consumption. Not only do we have more people, but these people are consuming more land, water, energy, and animals

than ever before. In particular, to feed even a fraction of the current human population, we are currently farming 20+ billion terrestrial animals at any given time, and using a substantial proportion of the land, water, and energy that we consume in order to sustain this population (FAO 2016; see also Tilman et al 2011). Moreover, this farmed animal population is increasing with each passing year, since developed countries are expanding into aquaculture and developing countries are seeing increased demand for animal products and adoption of industrial animal agricultural methods.

Needless to say, this global animal agricultural system causes unimaginable pain and suffering for nonhuman animals (Singer 2009). It also harms workers (Pachirat 2013) and leads to many public health and environmental risks, ranging from increased mental and physical health risks from animal waste seeping into the land and water near factory farms to increased risk of a global pandemic from antimicrobial use on factory farms (Pew Comission 2008). Thus, even if we set aside climate change, we have strong reason to advocate against animal agriculture. With that said, and most importantly for our purposes here, animal agriculture is also a leading contributor to human-caused climate change. Specifically, animal agriculture is responsible for an estimated 9 percent of human-caused carbon emissions, 37 percent of human-caused methane emissions, and 65 percent of human-caused nitrous oxide emissions (Steinfeld et al 2006). When you put these figures together, the upshot is that industrial animal agriculture is responsible for anywhere from 14.5-51% of global greenhouse gas emissions.

Why is this range so wide? The 14.5% estimate comes from a 2013 FAO report (Gerber et all 2013, updated from an 18% estimate in Steinfeld et al 2006) whereas the 51% estimate comes from a 2009 World Watch report (Goodland and Anhang 2009), which assesses the climate impacts of animal agriculture on a different timescale. In particular, the FAO report assesses the climate impacts of animal agriculture on a 100 year timescale (which

amplifies the impacts of other industries, since animal agriculture is responsible for a relatively small share of global carbon emissions and carbon stays in the atmosphere longer than methane and nitrous oxide). In contrast, the World Watch report assesses the climate impacts of animal agriculture on a 20 year timescale (which amplifies the impacts of animal agriculture, since animal agriculture is responsible for a relatively large share of global methane and nitrous oxide emissions and methane and nitrous oxide trap heat more effectively than carbon while in the atmosphere). Insofar as the FAO and World Watch reports are assessing the climate impacts of animal agriculture on different timescales, then, they might not be disagreeing so much as reporting similar information in different ways.

With that said, there are other, more substantive differences between these reports as well. For example, the World Watch report estimates that the global population of farmed animals is higher than the FAO report does, and it also considers a wider range of food-related activities as part of animal agriculture than the FAO report does.[3] Which report is more accurate in these respects? I am not sure. Fortunately, I do not think that we need to answer this question in order to make substantive moral and political progress on this issue. In particular, even if we assume for the sake of argument that *both* of these reports are overestimating the real climate impacts of animal agriculture, and that the real climate impacts of animal agriculture are only, say, 10% of all human-caused greenhouse gas emissions (on a 100 year timescale), this is still a massive contribution, and it will only increase as the human population increases and a higher proportion of people in developing countries produce and consume industrial animal products. Thus, even though many questions remain about the relative climate impacts of animal agriculture, I think that we at least have enough information now in order to know that we need to take action on this issue.

[3] Thanks to Christopher Schlottmann for helpful conversation on this point.

What action should we take? I think we can say at least this much with confidence: Given that animal agriculture is a major contributor to human-caused climate change, we should resist animal agriculture as part of our mitigation efforts. In particular, we should resist animal agriculture individually through activism, advocacy, and philanthropy, and we should resist it collectively through public policy. Unfortunately, many environmentalists have been slow to accept these conclusions. Why is that? There are many sources of resistance, ranging from historical tensions between the animal and environmental movements to personal reluctance to accept that we might have a moral duty to give up food that we like. Some people also have reasonable concerns about resistance of animal agriculture, though these concerns do not, I think, provide us with sufficient reason not to engage in resistance. I will focus on two reasonable concerns here.

First, one might worry that individual activism, advocacy, and philanthropy around animal agriculture will alienate people from the environmental movement, thereby limiting the growth and overall impact of this movement. Why should we focus on a relatively controversial topic such as food (which would push more people away) when we could instead focus on relatively uncontroversial topics such as deforestation, desertification, and natural resource extraction (which would bring more people in)? I think that this concern is reasonable, especially since many people in social movements, including the animal and environmental movements, do sometimes engage in unnecessarily alienating activism and advocacy. However, I also think that this concern does not provide us with sufficient reason not to engage in individual activism, advocacy, and philanthropy around this issue, since (a) these efforts might not alienate people from the environmental movement, and (b) even if they do have this impact, they might still be warranted.

First, individual activism, advocacy, and philanthropy around this issue might not alienate people from the environmental movement. There are many ways of addressing

controversial issues without pushing people away. For example, to the degree that activists frame animal agriculture as a structural social, political, and economic problem that demands a structural social, political, and economic solution rather than as an individual behavioral problem that demands an individual behavioral solution, they can address this issue without shaming individual producers and consumers. Moreover, to the degree that activists advocate for individual behavioral change in moderate, conciliatory ways rather than in radical, confrontational ways (for example, to the degree that they invite people to reduce meat consumption rather than insist on veganism as a moral baseline), they can address this issue without shaming individual producers and consumers, even when they do take an individual approach. These structural and/or conciliatory approaches might not be a full solution, as I will emphasize in a moment. But they are part of the solution, and insofar as activists worry about alienating people, they can mitigate this risk by taking these approaches.

Second, even if individual activism, advocacy, and philanthropy around this issue do alienate people from the environmental movement, they might still be warranted. After all, a smaller and/or slower growing movement that focuses on the right issues in the right ways may well do more good overall than a larger and/or faster growing movement that focuses on the wrong issues in the wrong ways. This is part of why people in many social movements, including the animal and environmental movements, agree that social movements should address at least some controversial issues and make at least some controversial claims about those issues. Yes, this approach risks alienating people in the short term. But it also raises awareness about important issues and shifts the center of debate about them, thereby paving the way for long-term change in spite of these short-term risks. And in this case, we have an industry that produces at least 10% of all human-caused greenhouse gas emissions. We have reason to believe that this industry is neglected in both the animal and environmental movements (ACE 2016). And we have reason to believe that activism that addresses this

industry can mitigate greenhouse gas emissions about as cost-effectively as carbon offsets can (ACE 2012). In light these considerations, I find it plausible that we should resist animal agriculture as part of our mitigation efforts whether or not doing so will alienate people in the short term (which, again, is a risk that we can mitigate if we like).

Second, one might worry that policy change around this issue will restrict individual liberty, thereby violating individual rights. Why should we attempt to restrict the kinds of options that people have access to (which would restrict individual liberty) rather than attempt to persuade people to make good choices given existing options (which would not restrict individual liberty)? I think that this concern is reasonable too, especially since many movements, including the animal and environmental movements, do sometimes promote good causes in coercive and manipulative ways. However, as with the previous concern, I do not think that this concern provides us with sufficient reason not to pursue policy change, since (a) policy change might not restrict individual liberty, and (b) even if it does, this impact might be warranted.

First, policy change might not restrict individual liberty. There are many ways of addressing controversial issues through policy without restricting individual liberty. Many countries currently support animal agriculture more than they support alternatives through taxes, subsidies, and deregulation. For example, part of why animal products seem to be so accessible and affordable is that many states do very little by way of regulating how animal products are made, very little by way of enforcing the regulations that they do have, and very little by way of punishing food corporations in cases of enforcement. This allows food corporations to "externalize" public health and environmental costs of animal agriculture by relying on taxpayers to foot the bill. So, if states were to tax animal agriculture more (relative to alternatives), subsidize animal agriculture less (relative to alternatives), and regulate

animal agriculture more (relative to alternatives), they could motivate more people to support alternatives without restricting individual liberty in the relevant sense at all.

Second, even if public policy does restrict individual liberty, that might be warranted. After all, many people believe that states are morally permitted, if not morally required, to restrict liberty in cases where exercising liberty foreseeably and avoidably causes harm. And of course, animal agriculture foreseeably and avoidably causes a lot of harm. Thus, we might think, states are morally permitted, if not morally required, to restrict individual liberty in order to prevent the harms that animal agriculture causes. However, we need to say more before we can draw this conclusion. For example, we have to ask: Do individuals cause harm when they eat animal products? Also, is the state morally permitted to restrict individual liberty only in order to prevent *individuals* from causing harm, or is it also morally permitted to restrict individual liberty in order to prevent *collectives* from causing harm? These questions matter because if we accept that *both* (a) individuals do not cause harm when they eat animal products *and* (b) the state is permitted to restrict individual liberty only in order to prevent individuals from causing harm, then we might deny that the state is permitted to restrict individual liberty in this case. However, if we accept (as I do) that *either* (a) individuals do cause harm when they eat animal products *or* (b) the state is permitted to restrict individual liberty in order to prevent collectives from causing harm, then we might accept that the state is permitted to restrict individual liberty in this case.

Of course, to say that we should resist animal agriculture as part of our mitigation efforts is not to say exactly how much or in what ways we should do that. The causes of climate change are many and varied, and our approaches to mitigation should be many and varied as well. But I do think that we should be spending much more time, energy, and money than we currently are on this issue. Otherwise, even if we (miraculously) bring about a decrease rather than increase in human population, and even if we (miraculously) bring

about a decrease rather than increase in consumption in general, we will neither be addressing the main population crisis nor be addressing the main consumption crisis.[4] To do that, we have to either abolish animal agriculture or regulate it so substantially that animal products become a rare luxury item from a global perspective, so that we can substantially reduce the animal welfare, public health, and environmental impacts of this industry.

3. Wild animals, climate change, and a duty to assist

We are now in the Anthropocene / Capitalocene, a geological era defined by the impacts of humanity / capitalism on the planet. The destruction of nonhuman spaces, construction of human cities, industrialization of human economies, and other such activities are already having a systematic impact on the planet. The prospect of climate change will only amplify these impacts. This raises, or at least amplifies, questions about duties of assistance for wild animals whose lives our activities will impact.

These questions are complicated, in part because climate change might have very different kinds of impacts for individuals, species, and ecosystems. At the level of species and ecosystems, it is relatively easy (while still objectively hard) to say what the overall impacts of climate change will be. In particular, climate change will bring about mass extinction, biodiversity loss, and ecosystem collapse, "with the worst-case scenarios leading to … the sixth mass extinction in the history of the earth" (Bellard et al 2012; see also Kolbert 2014).[5] Granted, it can be difficult to assess whether and to what degree certain kinds of change are good or bad for species or ecosystems. But we can grant for the sake of

[4] For more, see Garnett 2016, Ranganathan et al 2016, and Stehfest et al 2009.
[5] Though see Palmer 2011 for an argument that, even if we think that ecosystems have intrinsic moral value, it is hard to tell what counts as good or bad for them.

discussion that, if anything is bad for species or ecosystems, then the systematically destructive effects of human activity in general, and of human-caused climate change in particular, are bad for them.

In contrast, at the level of individual wild animals, it is much harder to say what the overall impacts of climate change will be. It might be tempting to think that if climate change is bad for species and ecosystems, then it will also be bad for individuals. But of course, this might not be true, since for every species that goes extinct, another might expand to take its place. Thus, if we want to assess how climate change will impact individual wild animals, we will have to ask questions such as: Which kinds of animals will likely do well in a world reshaped by climate change, and which kinds of animals will likely do badly? And how good or bad is life, on average or in total, for the kinds of animals who will likely do well and for the kinds of animals who will likely do badly?

Unfortunately, there are currently many uncertainties about which kinds of animals will likely do well and badly in a world reshaped by climate change. This issue will depend on the complex interplay of impacts on land, water, primary productivity, pathogens and parasites, and more (Tomasik 2008). With that said, consider for the sake of discussion two possible trends that we might see in a world reshaped by climate change. First, we might discover that climate change favors adaptive generalists, i.e. animals who can survive in a wide range of environmental conditions, over niche specialists, i.e. animals who can survive only in a narrow range of environmental conditions.[6] Second (this is more speculative), we might discover that climate change favors r-strategists, i.e. animals with shorter lifespans and higher reproduction rates, over K-strategists, i.e. animals with longer lifespans and lower reproduction rates (Tomasik 2008). Why might climate change have these impacts? The

[6] Thanks to Sue Donaldson for helpful discussion on this point.

answer is that climate change will radically and rapidly alter natural habitats, and so animals who are (a) able to survive in a wider range of environmental conditions and/or (b) have shorter lifespans and higher reproduction rates are more likely to survive to sexual maturity in these circumstances than animals who are not all else equal.[7] As Diaz et al put the point:

> On average, the organisms that are losing out [as a consequence of global change drivers such as climate change] have longer lifespans, bigger bodies, poorer dispersal capacities, more specialized resource use, lower reproductive rates, and other traits that make them more susceptible to human activities such as nutrient loading, harvesting, and biomass removal by burning, livestock grazing, ploughing, clear-felling, etc. (Diaz et al 2006, 1301).[8]

As I said, we will have to ask many other questions (including the many moral and political questions that we will consider below) before we can say what if anything follows from these possibilities. However, I think that we can say this much now: Insofar as human-caused climate change will harm wild animals, we should assist wild animals as part of our adaptation efforts, assuming we can do so effectively. In particular, and as before, we should assist wild animals individually through activism, advocacy, and philanthropy, and we should assist them collectively through public policy. Of course, the idea that we should help wild animals is controversial. However, I think that our complicity in climate-related wild animal suffering might change that for some people. In what follows I will focus on the utilitarian

[7] Of course, many r-strategists will also be niche specialists and many K-strategists will also be adaptive generalists, so these two considerations might push against each other to a degree. But they might not always do so, and in any case these possible impacts will be useful to consider for our purposes here.

[8] One complication is that insect populations may be decreasing for other reasons (Vogel 2017). If they are, then even if climate change has a positive impact on insect populations, human activity may still have a negative impact on insect populations overall.

and rights theoretic cases for intervention in climate-related wild animal suffering, though I should say that I think similar considerations apply for other moral theories as well.[9]

With that in mind, consider utilitarianism first. Utilitarians think that we have a moral duty to maximize wellbeing in the world. Thus, for utilitarians the main questions will be: How important is climate-related wild animal suffering? How neglected is this problem? And how tractable is this problem? At present, the first two questions are easier to answer than the third. With respect to importance, utilitarians should say that wild animal suffering is a high priority cause area with or without climate change, since quadrillions if not quintillions of sentient lives are at stake. With respect to neglectedness, they should say that wild animal suffering is a high priority cause area with or without climate change, since hardly anybody is working on it at all right now (even in the animal and environmental movements). And with respect to tractability, they should say that this remains to be seen. We can currently help wild animals in small-scale ways, for example through small-scale feeding, vaccination, assisted migration, or population control programs. But we are not yet capable of helping wild animals in large-scale ways. Thus utilitarians should say that our focus in the short term should be on researching interventions in wild animal suffering (so that we know how to help them) and extending moral and political standing to wild animals (so that we have the power to act on this knowledge). And then, if and when we have a clear sense of the tractability of this problem, we can decide what if anything we should to do about it.

Are there limits to the ways in which we can be permitted or required to help wild animals according to utilitarianism? In principle, no. For example, if we determine that we can promote average or total wellbeing among wild animals by increasing or decreasing their

[9] For example, see Gruen 2014, Hursthouse 2011, and Palmer 2010 for alternative moral theories that imply that we have moral duties to wild animals (or at least that our treatment of wild animals is morally evaluable in some way, shape, or form).

populations, then a utilitarian might say that we have a moral duty to do exactly that. Similarly, if we determine that we can promote average or total wellbeing among wild animals by placing them in captivity (for example by turning all of nature into an animal sanctuary), then a utilitarian might say that we have a moral duty to do exactly that as well. (More on these possibilities below.) Of course, in practice, a lot depends on how confident we are about these judgments. Again, given how difficult these issues are and how poor our track record is on these issues, caution is warranted. Still, the mere fact that utilitarians are open to these options in principle (whether or not they are also open to these options in practice) is noteworthy.

Now consider rights theory. Rights theorists deny that we have a moral duty to maximize wellbeing. Instead, many rights theorists think that (a) we have a moral duty to respect autonomy, and that (b) whereas we have a perfect duty of non-maleficence (i.e. we always have a moral duty not to harm others), we have only, at best, an imperfect duty of beneficence (i.e. we only, at best, sometimes have a moral duty to help others).[10] As a result, the main questions for rights theorists will be: If we intervene in climate-related wild animal suffering, will we be interfering in wild animal autonomy, and will we be engaging in beneficence or non-maleficence? This is why, as I indicated above, many rights theorists deny that we have a moral duty to intervene in wild animal suffering in general, since, they think, non-beneficent non-interference is morally permissible whereas beneficent interference may or may not be morally permissible, depending on the details. However, they might accept that we have a moral duty to intervene in climate-related wild animal suffering in particular. Why? Because insofar as humans are already interfering with wild animal

[10] To be clear, I am focusing here on rights theories according to which wild animals have moral status. So I will be drawing less from rationalists like Immanuel Kant and more from sentientists, in a broad sense of the term, like Tom Regan 2004, Christine Korsgaard 2011, and Sue Donaldson and Will Kymlicka 2011.

populations through climate change and other such impacts, the choice is not between non-beneficent non-interference and beneficent interference. Instead, the choice is between relatively maleficent / non-beneficent interference (if we interfere only for self-interested reasons) and relatively beneficent / non-maleficent interference (if we interfere at least in part for other-interested reasons). And if this is right, then rights theorists may well say that we should choose the latter form of interference all things considered.

Are there limits to the ways in which we can be permitted or required to help wild animals according to rights theory? In principle as well as in practice, the answer is very likely yes. For example, even if we determine that we can promote average or total wellbeing among wild animals by increasing their populations, decreasing their populations, or placing them in captivity, a rights theorist might oppose these interventions if they believe that these interventions violate wild animal autonomy or harm some wild animals as a means to helping others. However, a lot will depend on the details. For example, rights theorists will have to ask which cases of wild animal suffering we should take responsibility for in a world reshaped by climate change, as well as what it means to respect wild animal autonomy and treat wild animals as ends in themselves in a world reshaped by climate change. Still, given our complicity in climate-related wild animal suffering, rights theorists should accept that we have a moral duty to assist wild animals in at least some cases, either as a matter of non-maleficence (insofar as assistance aims at mitigation) or as a matter of reparation (insofar as assistance aims at adaptation).

As I said above, I think that if these arguments are correct, then we morally ought to assist wild animals, assuming we can do so effectively, individually as well as collectively, through public policy. Of course, the idea that we should assist wild animals through public policy is controversial, because it raises challenging questions about the political standing of nonhuman animals. And the traditional view about this issue is that nonhuman animals

cannot have political standing, because only political agents can have political standing, and nonhuman animals are not political agents (for discussion, see Cochrane 2010). However, in recent years many theorists have started to challenge this analysis. Why? Because as Donaldson and Kymlicka (2011) note, many aspects of political standing do not, in fact, require the kind of political agency that nonhumans seem to lack. Granted, you might need the kind of political agency that nonhuman animals seem to lack in order to hold public office, vote in an election, participate in a jury, or be party to a contract. But you do not need this kind of political agency in order to enjoy at least some of the benefits of state action, such as the benefit of having your interests represented in the legislative process. Nor do you need it in order to assume at least some of the burdens of state action, since one can assume at least some burdens without conceiving of oneself as doing so. This development creates space for nonhumans to have at least partial political standing whether or not they have political agency in the relevant sense.

How if at all might this development create space for the state to have duties of assistance to wild animals in light of climate change? Donaldson and Kymlicka (2011) have developed what is currently the most prominent account of the political standing for nonhuman animals. With many caveats, they argue that we should extend our conception of citizenship (i.e. full membership in our political community) to domesticated animals, our conception of denizenship (i.e. partial membership in our political community and partial membership in their own political community) to liminal animals, and our conception of sovereignty (i.e. full membership in their own political community) to wild animals. On this view, we should think about our political duties to wild animals on the model of our political duties to other nations. So what political duties do we have to other nations? The standard view is that primarily, we should let other nations be. However, in cases of emergency, and especially in cases of emergency for which we are responsible, we should provide assistance.

Thus, for example, Henry Shue argues that if developed nations are disproportionately responsible for climate change and if developing nations will be disproportionately impacted by climate change, then developed nations have a duty to help developing nations adapt to climate change (for example, see Shue 1999). If we apply this model to wild animals, then, we might reach a similar conclusion: Primarily, we should let them be. But if human communities are disproportionately responsible for climate change and if nonhuman communities will be disproportionately harmed by climate change, then human communities have a duty to help nonhuman communities adapt to climate change.

4. Animals, climate change, and a life worth living

Suppose, then, that we accept that we morally ought to resist animal agriculture as part of our mitigation efforts and assist wild animals as part of our adaptation efforts. We have many other questions that we need to ask as well before we can make our duties regarding animals and climate change more concrete. This is especially true for wild animals and climate change (which will be my focus here), since this topic requires us to think about many challenging questions holistically. In what follows I will consider how questions about wellbeing, creation ethics, population ethics, duties to future generations, and more all bear on this topic. As I said above, my aim is not to answer all these questions here but rather to explore them, show how they interact, and argue for two first steps that will make sense no matter how we answer many of them.

With that in mind, consider first several questions about wellbeing that we need to answer in order to make our duties regarding animals and climate change more concrete.

First, we need to ask: What does wellbeing depend on? This question breaks into several further questions; we will here consider two. The first is: Does the intrinsic value of a life depend only on subjective facts such as how much pleasure or pain it contains, or does it also depend on objective facts such as how many meaningful projects, relationships, and other such goods it contains? The second issue is: What marks the difference between a good life, i.e. a life worth living, and a bad life, i.e. a life not worth living? Should we set the baseline for a life worth living at zero, such that a life is worth living if it contains more good things than bad and not worth living if it contains more bad things than good (perhaps taking into account the order of good and bad things in life)? Alternatively, should we set the baseline higher than zero, such that a life can be not worth living even if it contains more good things than bad, or lower than zero, such that a life can be worth living even if it contains more bad things than good? (See Bradley 2015 for discussion.)

What should we think about these issues? With respect to what the intrinsic value of a life depends on, subjectivist views are appealing because they provide a simple, intuitively plausible explanation of why good things are good and bad things are bad. Meaningful projects, relationships, and so on are good to the degree that they promote pleasure and the absence of pain, period. In contrast, objectivist views are appealing because they capture the messiness, complexity, and variety that many people take the intrinsic value of a life to have (especially in a world where so many individuals lead such different lives). With respect to the second issue, this is a very challenging question. It feels tempting to set the baseline for a life worth living at zero, since it makes sense that a life with positive net value would be worth living and that a life with negative net value would be not worth living, all else equal. However, it also feels tempting to set the baseline higher than zero, since some people would rather not live at all than live a life that contains only a bit more good than bad. And it also feels tempting to set the baseline lower than zero, since other people would rather live a life

that contains a bit more bad than good than not live at all (and in both cases, who are we to dispute that?).

What depends on these issues? How we answer these questions will affect our thinking about which wild animals have lives worth living. For example, if wellbeing depends entirely on subjective facts, then we might feel relatively pessimistic about how many wild animals have lives worth living, since we might feel relatively pessimistic about how many wild animals have pleasant lives. In contrast, if wellbeing depends at least partly on objective facts (for example facts about whether or not a particular animal has a species-typical life), then we might feel relatively optimistic about how many wild animals have lives worth living, since we might feel relatively optimistic about how many wild animals satisfy the relevant criteria. As for the baseline of a life worth living: To the degree that we set a high baseline, relatively few wild animals will count as having lives worth living, and therefore relatively few wild animals will have the kinds of lives that we think we should bring about (assuming that we think we have stronger reason to bring about lives worth living than lives not worth living). Whereas, to the degree that we set a low baseline, relatively many wild animals will count as having lives worth living, and therefore relatively many wild animals will have the kinds of lives that we think we should bring about (again, assuming we think we have stronger reason to bring about lives worth living than lives not worth living).

The second question that we need to ask is: Which wild animals have the capacity for wellbeing? In other words, which animals have lives that are evaluable as worth living or not worth living? Of course, this depends on which theory of wellbeing we accept. But suppose for the sake of discussion that we accept that wellbeing depends on sentience, i.e. pleasure and pain experience. In this case, our question becomes: Which wild animals are sentient, i.e. have the capacity for pleasure and pain experience?

What should we think about this issue? Unfortunately, this question is difficult if not impossible to answer in any precise way. As long as we reject radical skepticism about other minds in general, we can be relatively confident that other vertebrates are sentient, since other vertebrates are behaviorally, psychologically, and evolutionarily continuous with humans in respects that appear relevant to sentience (DeGrazia 2002). However, we can be less confident about invertebrates, especially insects. After all, invertebrates such as insects are similar to us in many ways that appear relevant to sentience as well as different from us in many ways that appear relevant to sentience (see Mendl and Paul 2016 for discussion of the current science on this topic in the case of bumblebees). Ultimately, we might never know what if anything it is like to be an insect, and therefore we might always be at least somewhat uncertain about this issue (though of course, we might always be at least somewhat uncertain about other human and nonhuman animals as well; see Hyslop 2014 for discussion).

What depends on this issue? A lot. For example, scientists estimate that there are about 10 quintillion insects in the world at any given time (Encyclopedia Smithsonian 2016). It follows that if there is even a 1/1000 chance that the average insect has even 1/1000 the amount of wellbeing that the average primate does at any given time (which, in my view, is a conservative pair of assumptions), then the total amount of expected insect wellbeing in the world at any given moment is equal to that of 10 trillion primates. Thus, the question whether and to what degree we regard insects as having wellbeing may affect our moral calculations considerably. For example, if we accept utilitarianism, then we may or may not think that the impacts of climate change on insect populations are morally decisive, because of how much total wellbeing insects have overall. Similarly, if we accept rights theory, then we may or may not think that the impacts of climate change on insect populations are morally decisive as well, depending on how we flesh out the details of the theory (because of how many insects we could be harming unnecessarily as means to our ends).

The third question that we need to ask is: Which animals have lives worth living? Of course, this depends on what theory of wellbeing we accept too. But suppose for the sake of discussion that we accept that wellbeing depends on sentience and that the baseline for a life worth living is zero, i.e. that a life is worth living if it contains more pleasure than pain and not worth living if it contains more pain than pleasure. In this case, our question becomes: Which animals have net pleasurable lives, and which animals have net painful lives?

What should we think about this issue? Unfortunately, this question is difficult if not impossible to answer in any precise way as well. Many people think that most wild animals have net pleasurable lives because, when they think about wild animals, they think about charismatic megafauna such as elephants, lions, or tigers roaming the countryside (and they tend to assume that natural processes are good). However, some people such as Oscar Horta (2010) and Brian Tomasik (2015) think that most animals have net painful lives. Why? Because they think that, when we consider the full story about what life in nature is like (and correct for our tendency to assume that natural processes are good), we see that most wild animals experience lives full of pain as a result of hunger, thirst, disease, weather, predation, and more. Horta and Tomasik think that this is especially true of r-strategists (especially insects), since r-strategists (especially insects) aim for quantity over quality in reproduction, which means that a relatively high proportion of these individuals experience a painful death as soon as they become capable of experiencing anything at all (assuming that they do experience anything at all of course).

What depends on this issue? Again, a lot. Consider for the sake of simplicity two possible scenarios (though please keep in mind that the actual state of affairs is likely to be much more complicated). First, suppose that no wild animals have lives worth living, and that K-strategists have worse lives *on average* (because they have longer lives and more intensely negative experiences) and that r-strategists have worse lives *in total* (because there

are so many more of them). In that case, if human-caused climate change increases the ratio of r- to K-strategists, then it will make quality of life for wild animals better on average but worse in total, all else equal. Conversely, suppose that all wild animals have lives worth living, and that K-strategists have better lives on average (because they have longer lives and more intensely positive experiences) and r-strategists have better lives in total (because there are so many more of them). In that case, if human-caused climate change increases the ratio of r- to K-strategists, then it will make quality of life for wild animals worse on average but better in total, all else equal. Thus, these questions could determine whether we think the impact of climate change on wild animals is net positive or negative, which, in turn, could affect what we think we owe certain wild animal populations in light of climate change.[11]

As we have seen, these questions about wellbeing are both deeply important and deeply challenging, given that we may never know what if anything it is like to be members of other species. This raises more general methodological questions about how to treat other animals in cases of uncertainty about whether they have lives worth living. One possibility, which I discuss in more detail elsewhere (Sebo 2017), is that we can use principles of risk and uncertainty to assess how to treat other animals in these cases. In this case we would have two main options to consider. First, we can use a precautionary principle that tells us not to risk bringing about an unacceptable level of harm. Second, we can use an expected harm principle that tells us to (a) multiply the probability that our action will cause harm by the level of harm it would cause if it did and (b) treat the product of this equation as the amount of harm that our action will actually cause, for purposes of deciding what to do.

[11] These questions could also end up determining whether animal agriculture has a net positive or negative impact on farmed animals, which will be relevant for some moral theories. It is interesting to ask what theory of wellbeing, if any, implies the common view that wild animals have good lives overall but that farmed animals do not. It is also interesting to ask how if at all we should change our thinking about animal ethics if we are not able to vindicate either or both parts of this common view.

What would these principles imply about the questions that we have been considering here? In cases of uncertainty about whether or not animals have the capacity for wellbeing in general, both of these principles would tell us to treat them as though they do, at least to a degree. In particular, the precautionary principle would tell us to treat other animals as though they have the capacity for wellbeing, and the expected value principle would tell us to multiply our credence that they have this capacity by the amount of wellbeing they would have if they did, and to treat the product of that equation as the amount of wellbeing that they actually have for purposes of deciding what to do. However, in cases of uncertainty about whether or not animals have lives worth living, it is less clear what these principles would tell us to do, since there are real risks either way. For example, if we decide to say that animals have lives worth living in cases of uncertainty, then we risk false positives, i.e. we risk accidentally bringing about more animals with lives not worth living (insofar as we think we should bring about animals with lives worth living). Whereas if we decide to say that animals have lives not worth living in cases of uncertainty, then we risk false negatives, i.e. we risk accidentally bringing about fewer animals with lives worth living (insofar as we think we should not bring about animals with lives not worth living). Thus a lot will depend on which of these risks we think is greater, as well as on what we think about the relative value of bringing about lives worth living and not bringing about lives not worth living. We will consider this issue below.

5. Animals, climate change, and a life worth creating

Next, consider several questions about creation ethics, population ethics, and duties to future generations that we need to ask in order to make our duties regarding animals and climate change more concrete.

First, do we have an equally strong duty to bring about lives worth living and not bring about lives not worth living, or do we have a stronger duty to not bring about lives not worth living than we have to bring about lives worth living? This question concerns creation ethics, and it actually divides into multiple questions. One question is about the lives that we *cause* to exist. Do we have an equally strong duty to cause lives worth living to exist and not cause lives not worth living to exist, or do we have a stronger duty to not cause lives not worth living to exist than we have to cause lives worth living to exist? Another question is about the lives that we *allow* to exist. Do we have an equally strong duty to allow lives worth living to exist and not allow lives not worth living to exist, or do we have a stronger duty to not allow lives not worth living to exist than we have to allow lives worth living to exist? (We can set aside the possibility that we have a stronger duty to cause / allow lives worth living to exist than we have to not cause / allow lives not worth living to exist, since very few if any people accept this view as far as I can tell.)

What should we do about this issue? That depends in part on what moral theory we accept. For example, since (many) utilitarians think that (a) benefits and harms are equally morally important and (b) actions and omissions are equally morally important, they should say that we have an equally strong duty to cause and allow lives worth living and to not cause or allow lives not worth living (at least in theory).[12] In contrast, since (many) rights theorists think that (a) harms are more important than benefits and (b) actions are more important than omissions, they should say that we have a stronger duty to not create lives not worth living than we have to create or allow lives worth living and not allow lives not worth living (in theory as well as in practice). However, there are exceptions to these generalizations. For example, negative utilitarians think that (a) harms are more important than benefits and (b)

[12] Though see Benatar 2006 for an argument that whereas creating lives not worth living counts as a harm, creating lives worth living does not count as a benefit.

actions and omissions are equally important. Thus, they should say that we have a stronger duty to not create or allow lives not worth living than we have to create and allow lives worth living. At the limit, this kind of view seems to support mass extinction for all sentient life.[13]

How much depends on this issue? A lot. For example, if we think that benefits and harms are equally important, then we might think that we should be neutral about whether to treat wild animals as having lives worth living in cases of uncertainty all else equal (because false positives and false negatives are equally risky all else equal). Whereas if we think that harms are more important than benefits, then we might think that we should treat wild animals as not having lives worth living in cases of uncertainty all else equal (because false positives are riskier than false negatives all else equal). Similarly, if we think that actions and omissions are equally important, then we might think that we have moral duties to future wild animals whether or not they will exist as a result of our actions. Whereas if we think that actions are more important than omissions, then we might think that we have moral duties to future wild animals only if they exist as a result of our actions (in which case we will have to decide whether the Anthropocene / Capitalocene / climate change make it the case that future wild animals exist as a result of our actions). Of course, there are further questions that we have to ask here too. For example, a rights theorist will want to know whether certain population control measures would interfere with wild animal autonomy or harm certain wild animals as a means to helping others. Still, what we think about creation ethics will have a major effect on what we take our moral duties to future wild animals to be.

The second question is: Do we have an equally strong duty to create all lives worth living, or do we have a stronger duty to create better lives worth living than worse lives worth living? This question raises what Derek Parfit calls the non-identity problem (Parfit 1984,

[13] See Ord 2013 for critical discussion of negative utilitarianism.

351-377). Roughly speaking, the non-identity problem works as follows. Many of our choices will affect not only the quality but also the identities of future lives. Thus, for example, suppose that we have two policy options: A and B. If we select option A, that will bring about one population of individuals (population A) who have lives very much worth living. Whereas if we select option B, that will bring about another population of individuals (population B) who have lives at least somewhat worth living. Intuitively, if we bring about population B instead of population A, we cause harm, and therefore we act wrongly, all else equal. But whom are we harming? Not population B, since this is the only future in which they can exist at all. So, our challenge is to either show how option B causes harm and is therefore wrong all else equal, or accept that it does not cause harm and is therefore not wrong all else equal.

What should we think about this issue? Some philosophers think that we do not, in fact, cause harm in this kind of situation. As long as everyone in the future has lives worth living, it is not worse to bring about individuals with worse lives than individuals with better lives. Other philosophers think that we do, in fact, cause harm in this kind of situation. On impersonal views (the kinds of views that utilitarians tend to accept), the solution is that option A will result in higher levels of wellbeing than option B, independently of who experiences that wellbeing. On person-affecting views (the kinds of views that rights theorists tend to accept), the solution is that certain individuals in population A function as counterparts to certain individuals in population B, and so we can compare lives worth living across possible futures for purposes of assessing harms and benefits (see, for example, Višak 2016).

How much depends on this issue? That depends on how we answer some of the other questions that we have asked here. For example, to the degree that climate change will produce more wild animals with lives not worth living, we can say that climate change will

harm wild animals *whether or not* we think the non-identity problem has a solution. In contrast, to the degree that climate change will not produce more wild animals with lives not worth living, we can say that climate change will harm wild animals *only if* we think that the non-identity problem has a solution. Of course, we will not be able to resolve these issues here. But note that, if we want to claim that climate change will harm future humans by causing them more pain and suffering even if they still have lives worth living, then we will have to find a solution to the non-identity problem, in which case this solution will likely apply in the nonhuman case as well.

The final question that we will consider here (though there are many others as well) is: Does average or total wellbeing matter more? This question raises what Derek Parfit calls the repugnant conclusion (Parfit 1984, 381-90). Roughly speaking, the problem here is that we run into seemingly implausible results no matter what we say. On one hand, if we say that total wellbeing matters more than average wellbeing, then we seem to be committed to the idea that a world with, say, 10 quintillion "happy insects" (each of whom, we can stipulate, has a life containing one unit of wellbeing) is better than a world with, say, 10 billion happy, flourishing humans (each of whom, we can stipulate, has a life containing one million units of wellbeing). Why? Because the insect world would contain 10 quintillion (1e+19) units of wellbeing overall, whereas the human would contain only 10 quadrillion (1e+16) units of wellbeing overall. On the other hand, if we say that average wellbeing matters more than total wellbeing, then we seem to be committed to the idea that a world with, say, 10 billion happy, flourishing humans is better than a world with 10 billion happy, flourishing humans *and* 10 quintillion happy insects. Why? Because the average quality of life in the human-only world would be higher than the average quality of life in the human and nonhuman world. Intuitively, many people want to reject both of these conclusions. This raises the question: Which, if either, should we accept, and why?

What should we think about this issue? For some philosophers, the solution is to simply accept one of these conclusions, no matter how implausible it may appear to be. For example, total utilitarians (the more common type) think that we should accept that total wellbeing matters more than average wellbeing (and therefore that a world with 10 quintillion happy insects is better than a world with 10 billion happy humans all else equal), and average utilitarians (the less common type) think that we should accept that average wellbeing matters more than total wellbeing (and therefore that a world with 10 billion happy humans alone is better than a world with 10 billion happy humans and 10 quintillion happy insects all else equal). For other philosophers, the solution is to reject the reasoning that leads to both conclusions, sometimes in ways that concern other issues that we have discussed here. For example, if we raise the baseline for a life worth living high enough, then we can say that the insects in question are "sad" rather than "happy," and that their lives are adding negative rather than positive value to the world. Of course, in this case we might still face a version of this problem with other kinds of animal. For example, even if we are no longer committed to the idea that a world with 10 quintillion *insects* is better than a world with 10 billion humans, we might still be committed to the idea that a world with, say, 10 quadrillion *squirrels* is better than a world with 10 billion humans. But maybe this bullet is easier to bite.

How much depends on this issue? Again, it depends on how we answer some of the other questions that we have considered here. For example, if we think that climate change will increase or decrease both average and total wellbeing in the world, then we will not encounter this problem. Whereas if we think that climate change will increase average wellbeing but decrease total wellbeing in the world (or vice versa), then we will encounter this problem, and it will matter whether or not we have a solution. Thus, for example, suppose that all wild animals have lives worth living, that r-strategists have better lives in total and K-strategists have better lives on average, and that climate change will increase the

ratio of r- to K-strategists in the world. In this case, climate change will increase total wellbeing and decrease average wellbeing in the world all else equal. Now suppose, in contrast, that all wild animals have lives not worth living, that r-strategists have worse lives in total and K-strategists have worse lives on average, and that climate change will increase the ratio of r- to K-strategists in the world. In this case, climate change will decrease total wellbeing and increase average wellbeing in the world all else equal.

There are many other questions that we need to consider in this area as well, for example about whether or not we have equally strong duties to nearby and distant future individuals (see the Mintz-Woo chapter in this volume for discussion), and about whether or not we are epistemically and practically capable of predicting what future individuals will need and providing it for them (see Beckerman 1999). Without going into too much detail about these questions here, we can note two related points of contact with the questions that we have considered here. First, if we accept an impartial moral theory, we will accept that we have strong and direct duties to distant future animals (at least in theory), whereas if we accept a partial moral theory, we may or may not, depending on the details. Second, insofar as we make progress researching large-scale interventions in wild animal suffering, we might accept that we have strong and direct duties to distant future animals in practice as well (i.e. we might accept that we morally ought to engage in bio-engineering or geo-engineering programs designed to promote the interests of distant future human and nonhuman animals). Whereas insofar as we do not make progress researching these interventions, we might accept that we have only weak and/or indirect duties to distant future animals in practice (i.e., we might think that we morally ought to attempt to bring about a more just future society in which people can treat human and nonhuman animals well, rather than attempting to treat them well directly). Some of these views will be more revisionary than others. With that said, I think that any reasonable view about our duties to future animals will be at least somewhat

revisionary, since there are potentially so many more future animals than present animals that we would have to set an implausibly steep discount rate, in theory or in practice, in order to vindicate anything like our current thinking about this topic.

6. Conclusion

My aim in this chapter has been to survey some, but not remotely all, of the connections between animals and climate change, as well as some, but not remotely all, of the scientific and philosophical questions that we must ask in light of these impacts. I have not, of course, attempted to answer all of these questions here, though I did come closer to doing that in the case of farmed animals than in the case of wild animals.

In the case of farmed animals: Since animal agriculture is a leading cause of climate change, we should resist animal agriculture in our efforts to mitigate climate change. The question is whether and how we can do that in an ethical and effective way. I have indicated why I think we can move in this direction individually as well as collectively without doing more harm than good or violating individual rights, but much more needs to be said before we can fully evaluate this approach to environmental advocacy.

In the case of wild animals: If climate change will be a major contributor to wild animal suffering in the future, then we should assist wild animals in our efforts to adapt to climate change. How should we do so in particular? We will need to make more progress on the many issues that we have considered here before we can say for sure. However, I think that we can make two general, provisional observations for now.

First, we cannot wait for consensus about the many issues that we have considered here in order to take action. We may never achieve consensus about these issues, yet the fact remains that climate change will have an increasingly massive and pervasive impact on all

sentient life on this planet with each passing decade. We need to confront that reality now and see what, if anything, we can do now that will make sense no matter how we answer many of the questions that we have asked here. Otherwise we will be no better with respect to animals and climate change in particular than the many politicians who say, "We need another decade of research before we can take action" are with respect to climate change in general.

Second, as we have seen, there are at least two general courses of action that we can take now that will make sense no matter how we answer many of the questions that we have asked here. First, we can make *epistemic progress* by researching what we should aim for and how we should aim for it. Should we resist or embrace the impact that climate change will have on wild animal populations, and, either way, how can we help surviving animals to flourish as much as possible? And, second, we can make *practical progress* by advocating for moral and political standing for wild animals, so that we will have the social and political capital necessary for taking the interests of wild animals into account as we recreate human societies in the face of climate change. If we take these steps now, then we will be more likely to know what to do and be able to do it when the time comes – no matter what that happens to be (see Horta 2010 for similar recommendations).

Granted, idea that we might have a moral or political duty to resist animal agriculture or assist wild animals raises further questions about how restrictive and demanding such policies would be. This is especially true of the latter idea. Insofar as we extend moral and political standing to nonhuman animals, the class of moral and political agents, i.e. those of us who have moral and political duties, will be much smaller than the class of moral and political patients, i.e. those of us who have moral and political rights. So, we will have to decide how willing we are to accept a conception of private and public morality according to which the vast majority of the burdens to change in terms of mitigation (?) will flow to

humans and the vast majority of the benefits will flow to nonhumans (specifically wild nonhumans), in practice. Indeed, we might even wonder whether such a situation is compatible with what Hume (1998), and then Rawls (1999), called "the circumstances of justice," i.e. the circumstances in which justice is possible and necessary to try to achieve (see Plunkett 2016 for more on this issue).

These concerns are reasonable. However, I think that it would be premature to dismiss the idea that we morally ought to resist animal agriculture and/or assist wild animals on the basis of these concerns at this point. After all, even if we think that there are limits to how restrictive or demanding morality can be, we might also think that substantial self-sacrifice is called for in a situation in which potentially quintillions of lives are at stake as a result of our activity. Also, even if it would be excessively restrictive or demanding for us to fully address these issues now, it might not be quite as restrictive or demanding for us to do so in the future, especially once we have new alternatives to animal agriculture, new interventions in wild animal suffering, and new social, political, and economic systems for implementing them. Thus, for example, if we focus on researching interventions in wild animal suffering and extending moral and political standing to wild animals right now, we might find that we can help them in part simply by considering and representing their interests as we work to recreate our own communities to cope with climate change later on.

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