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Climate Change and Ethics

Citation for published version:

Hayward, T 2012, 'Climate Change and Ethics', *Nature Climate Change*, vol. 2, pp. 843-848.
<https://doi.org/10.1038/nclimate1615>

Digital Object Identifier (DOI):

[10.1038/nclimate1615](https://doi.org/10.1038/nclimate1615)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Nature Climate Change

Publisher Rights Statement:

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CLIMATE CHANGE AND ETHICS

What does it matter if the climate changes? This kind of question does not admit of a scientific answer. Natural science can tell us what some of its biophysical effects are likely to be; social scientists can estimate what consequences such effects could have for human lives and livelihoods. But how should we respond? The question is at root about how we think we should live – and different people have myriad different ideas about this. The distinctive task of ethics is to bring some clarity and order to these ideas.

Climate change is a matter of concern because, according to various prognoses offered by scientists, its effects are likely to be detrimental to human – and not only human – life on this planet: ‘human beings are transforming Earth in ways that are devastating for other forms of life, future human beings, and many of our human contemporaries.’¹ Given that premise, the central role of ethics is to organise thought about what humans ought to do in response to the threats they face, and to some extent are creating.

People engage practically in ethics whenever they make or assess particular proposals about what should be done; but a task focused on more by academic specialists is that of clarifying the structure of moral considerations that are brought to bear on a problem, along with elucidating the assumptions being borne upon. In practice and in theory, then, ethics reflects on the human goods that climate change can undermine, and examines questions such as what actions are right or wrong in relation to climate change, who has what duties, and how do these relate to others’ rights, e.g., to be protected against effects of climate change? The relevant range of problems has come into focus only relatively recently, with most literature appearing during the last 20 years or so, but with considerable acceleration since the time Gardiner’s seminal review appearing in 2004,² and as witnessed by two noteworthy collections of influential articles appearing in 2011.^{3 4}

In what follows, I show, first, how the greater part of debate about the ethics of climate change focuses on questions about who has what responsibility to bear the burdens of mitigating it or adapting to it. These questions are frequently in practice inflected in the language of rights, and the various connections between human rights and climate change are examined next. If some questions concern justice in the present, others regard our responsibilities to the future, as examined in the third section. The fourth main area of inquiry concerns the relation between individual and collective responsibilities.

Responsibilities

If humankind were a unitary agent, it could pursue clear objectives for reducing or capturing carbon emissions, where necessary also implementing measures for assisting those of the human body having to adapt to consequences of climate change. However, humankind is not a unitary agent. So a prominent debate in climate ethics concerns who has a responsibility to do what. The 'what' is usually discussed under two headings: mitigation and adaptation. Ethical evaluation can apply both to the decisions that cause climate change and to the effects it has. Some philosophers emphasize the distinction between the two kinds of responsibility,⁵ and there are those who focus attention primarily on mitigation⁶ or adaptation;⁷ but there are also reasons to think an integrated theory appropriate.⁸

Where debate has been more intense is on the question of the *who* – who has a responsibility to shoulder the burdens. Regarding the range of potential bearers of it – which could be individuals, corporations, states, for instance – to date, the allocation of responsibilities has focused in practice at the level of nation-states, and there has been international agreement to the principle of common but differentiated responsibilities among them.⁹ The general assumption has remained that, as Grubb noted in 1995, the main question is justice of allocation of emissions as between states.¹⁰ This assumption is not without its critics,¹¹ but the relevance of focusing on states is that they still have main political decision making powers in the world today.

Most attention has focused on the criteria for differentiation of responsibilities. Because responsibilities imply costs or burdens to be borne, and since people have a general preference to shift these whenever possible onto others, there is the most argument here. The issues involved have been brought into particular focus in connection with debate around international climate change agreements. The Kyoto Protocol adopted the so-called 'Grandfathering Principle': the developed – Annex-I – countries were required to reduce emissions by an average of 5 percent compared to 1990 levels. Hence those already heavily polluting in 1990 could continue emitting more GHGs than lower emitting countries. In post-Kyoto negotiations, which envisage developing countries also being included in the emissions reduction programme, the richer countries continue to press for application of the principle.¹² Philosophers assessing the principle's rationale, however, have generally regarded it as a pragmatic accommodation rather than a moral argument:¹³ if it is the only politically feasible way to get major polluters to accept emissions reductions, it is better than foregoing agreement altogether.¹⁴ Recent attempts to tease out what more, morally, might be said for it have not claimed to defeat the main ethical objections.¹⁵ These include concerns that the grandfathering of emissions rights will entrench existing inequalities by preventing those who are worse off from having the same opportunities and life chances had by affluent citizens of heavier polluting countries;¹⁶ and it would effectively prevent less economically developed countries from tackling energy poverty, thereby locking them into a state of underdevelopment.¹⁷

Differentiating common responsibilities: who should bear the costs of dealing with climate change?			
Principles	Differentiation criteria	Pros	Cons
Causal Responsibility Principle (Polluter Pays)	Those who have <i>caused</i> the build-up of CO2 in the atmosphere should bear the costs	it seems fair that those who cause a problem should deal with it;	those who emitted in the past may not have realized they were doing anything wrong, and now they are anyway dead, so while requiring <i>future</i> polluters to pay may be fair, we cannot impose costs on <i>past</i> polluters.
Beneficiary Pays Principle	Those who have <i>benefited</i> from excess emissions should pay	this principle maintains connection with causal responsibility by allowing that past polluters can be deemed to have bequeathed liabilities to those who have been advantaged today by past emissions	because it assumes that strict liability can apply retrospectively and can be inherited, present beneficiaries can complain it is unfair on them.
Ability to Pay Principle	Those who are <i>able to</i> should pay	recognizes that past emissions may not have yielded present benefits for a given country and places costs on those least harmed by having to bear them	disconnecting responsibility from causation can have perverse incentives if ecologically efficient are effectively required to subsidise polluters.

A stronger ethical argument can be made for the principle, found intuitively persuasive by many, that those who have been causally responsible for overburdening the atmosphere have moral responsibility for dealing with the consequences. Nevertheless, there are considerations of both justice and practicability that tell against the principle that moral responsibility should track causal responsibility. One regards the difference between applying it to present or future actions as opposed to applying it retrospectively. Retrospective application of the principle can be challenged on the general grounds that this is presumptively illegitimate for *any* principle.¹⁸ More particularly, the Polluter Pays Principle – which is a specific application of causal responsibility (and sometimes misleadingly conflated with it) – is normally not deployed as a principle of historical accountability but as a practical device for ‘internalising’ the externalised environmental ‘costs’ of economic activities.¹⁹ So understood, it is a *future*-orientated principle that allows rational decision-making about the acceptability of costs in advance of incurring them. The imputation of obligations and costs *retrospectively*, which is anyway questionable ethically and legally, is the more so if the emitters of previous generations were ignorant of the detrimental consequences of their actions.²⁰ Furthermore, there is the evident practicality that principles of liability cannot apply to members of deceased generations themselves. Thus some people argue that the causal responsibility principle can be amended so that if we inherit *assets* from our grandfathers, then we should also be prepared to accept any liabilities that are attendant on those assets.

Simon Caney suggests that to adopt this stance is not to amend but to abandon the causal responsibility principle;²¹ it is certainly to take a distinct position.

This line of reasoning supports a second principle discussed in the climate justice literature, the 'Beneficiary Pays Principle': those who enjoy benefits generated by past activities which also cause harms to others have responsibility to shoulder a burden of alleviating those harms.²² On an approach sometimes referred to as 'the Brazilian Proposal' in Kyoto discussions, we should take account of countries' historical emissions because countries that have polluted heavily have benefited considerably therefrom in terms of increased wealth and more developed infrastructure.²³ Such countries have an 'ecological debt' to repay.²⁴

One objection, noted by Caney, is that it is 'unfair to hold current members of more affluent nations responsible for over-use of the atmospheric commons by their predecessors when there is little that they could have done to alter the energy choices of their ancestors.'²⁵ Others, however, point to the many advantages those living in developed countries enjoy over their counterparts in developing countries today as a result of their nations' historical emissions.²⁶ Neumayer suggests that 'the current developed countries readily accept the benefits from past emissions in the form of their high standard of living and should therefore not be exempted from being held accountable for the detrimental side-effects with which their living standards were achieved.'²⁷

Another objection, though, is that some of the benefits of past emissions are not confined to the emitting countries. Grubb et al, for example, argue that past emissions made possible the development of public goods such as modern medicine or better technologies that have also raised living standards in developing countries.²⁸ But Shue's rejoinder is that whatever benefits less developed countries have received, these have mostly been charged for, the recipients being 'left with an enormous burden of debt, much of it incurred precisely in the effort to purchase the good things produced by industrialization.'²⁹ Finally, another possibility is that past emissions may not have yielded appreciable benefits to the present generation at all, but here Smith's suggestion of applying thresholds of ability to pay³⁰ seems a sensible solution.

In fact, one further principle frequently invoked in the climate justice literature is that those with the ability to pay should shoulder the burden. This has pragmatic advantages over the previous two in that it does not require investigations of causality, or other problematic historical considerations. It is not usually commended as a sole or primary principle for allocating responsibilities, however, since that could support injustice or perverse incentives in cases where an ability to pay has been achieved through particular efficiency or ecological frugality. But it is arguably appropriate to apply where the other principles fail or cannot apply.³¹

In any debate about distributing responsibilities, to define them is also to delimit them, and the flipside of the question concerns the rights that people have. For instance,

determining a responsibility not to emit more than a certain amount of CO₂ is, in effect, to license emissions up to that amount, and it is this amount that negotiators want to know about in practice.

Debates about rights

The language of rights has figured prominently in climate ethics debates. In particular, there is debate about whether climate change can be regarded as a human rights issue, and if so how.³² Two prominent lines of argument can be distinguished: one treats the use of the planet's carbon absorption capacity as a necessary good that humans have a right to share; the other focuses on how harms to the planet's capacities can undermine goods that humans have a right to protection of.

The idea that there is a human right to a certain amount of greenhouse gas emissions has emerged with the idea that an appropriate benchmark for international agreements should be an equal per capita entitlement. Some have argued that there is an entitlement to equal or minimum emissions,³³ and the idea of a human right to 'subsistence emissions' has been influential in debates about the ethics of climate change since it was first proposed by Henry Shue, albeit then in the different context of ozone emissions.³⁴ Other philosophers, however, have entered skeptical considerations. As David Miller says: 'People have human rights to whatever is necessary to meet their basic needs as human beings, but they cannot claim a right to whatever means they themselves prefer to use to meet those needs.'³⁵ And as I have elsewhere argued, carbon emissions should not be the object of a human right because a decent human life does not inherently depend on them: subsistence needs can be (and for much of human history have been) met without fossil-fuelled economic development.³⁶ A right to minimum emissions risks exacerbating rather than resolving the problem of excessive emissions. What the rich owe to the poor should be seen not as 'more emissions' but as an equitable share of the benefits they have derived from their own excess use of the atmosphere – and, indeed, other environmental services and natural resources, or 'ecological space'.³⁷

A different way in which human rights are brought into climate ethics debates is through a focus on how the harms brought about through climate change can have an adverse impact on the interests that human rights are intended to protect. Derek Bell makes the striking claim that 'anthropogenic climate change violates human rights';³⁸ Caney offers the more circumspect argument that there is a human right 'not to be exposed to dangerous climate change'.³⁹ However, these arguments are not always as clear as they might be on the relationship between interests and rights: not all philosophers agree that rights necessarily protect people's interests;⁴⁰ and, even allowing that they can do so, the mere existence of an interest is not itself sufficient for there to be a right. For the positing of a right to be meaningful, it must imply that there is some duty on someone to bring about the outcome specified as the content of the right.⁴¹ Certainly, to speak of a right being violated

implies a strong claim that someone is doing something direct and pernicious. Yet the reality is that responsibility is more diffused and complex.⁴²

Nevertheless, this general issue also affects rights other than those relating to climate change, and still the human rights discourse has real traction. Recent years have seen developments towards international recognition of environmental human rights;⁴³ with procedural rights having the firmest footing,⁴⁴ but with growing acknowledgement too of an underlying substantive right to an adequate environment.⁴⁵ Vanderheiden has suggested that as a corollary such a right includes a claim to climatic stability;⁽⁶⁾ Hiskes argues that environmental human rights can serve as the basis for intergenerational environmental justice.⁴⁶ Yet while the impetus to use human rights discourse and instruments has a clear motivation, there remain issues and uncertainties around using human rights for environmental ends or the pursuit of environmental justice.⁴⁷ Those difficulties are all the more marked when we think about climate change having future effects.

Ethics for the Future

Although we now take a view of climate change as having effects already in the present, the future horizon remains a major focus of concern, with questions about justice between generations and our obligations to future generations looming large.⁴⁸

Concerns about climate change are premised on the idea that there is something wrong in allowing the environment to deteriorate for future generations of humans. Yet when we think more closely what this might mean we encounter certain conundrums. One much discussed in the climate change literature is the notorious 'non-identity problem' formulated by Derek Parfit.⁴⁹ The puzzle is that if an act is wrong, this is because it harms future persons or makes things worse for them than otherwise they'd have been; but a person's identity depends on the time at which he or she is conceived; and different patterns of behaviour in this generation will result in different individuals being born into future generations; therefore we cannot be said to have harmed, or made worse off, any future person through climate change damage by a policy without which they would not have existed at all.⁵⁰ While some philosophers attempt to find ways of dealing with this conundrum,⁵¹ others doubt that it really captures what we need to be concerned about, particularly if a less individualistic framing of the problem is adopted.⁵² Yet the broader point remains that some indeterminacy is always likely to affect our thinking about the ethical claims on us of future generations. For instance, if we think about assigning rights to future generations, and non-individualistically, we face the difficulty that it is not straightforward to speak of groups having rights even in the present, and it is problematic to speak of rights of beings who do not even exist yet. Nor are such difficulties surmounted by speaking instead of our duties regarding them, since the same sorts of questions arise.

Nevertheless, we are accustomed to the idea that although much about the future is uncertain, we still have to make decisions now. There is a very basic, and quite simple

principle articulated by proponents of a stewardship approach to environmental ethics that we should treat the world as if held by us in trust, which means leaving it in no worse condition for future generations than we find it.⁵³ This principle is reflected in the concept, influential since the Brundtland Report 25 years ago, of sustainable development: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'⁵⁴ This concept has met little resistance, even if questions like why take 'now' as the baseline for future generations when past generations did not always inherit as much as we did have been voiced.⁵⁵ But it is notoriously susceptible of different interpretations.⁵⁶ One major area of debate in environmental values has always focused on the question of how much of nature's 'capital' can be substituted by manufactured goods or other kinds of technological capacity, with the concept of 'strong' sustainability allowing much less substitution than 'weak' sustainability.⁵⁷ Depending on the interpretation adopted, the difference in the degree of constraint implied for economic 'business-as-usual' is very considerable. The weaker the constraints are taken to be, the more latitude there is for thinking that humankind will be able to develop its way out of environmental problems, through the application of innovation and technology. The latitude of this conception is consistent with economists' assumptions about the possibility of economic growth continuing indefinitely into the future.

Much of the debate about what to do regarding climate change relates to economic considerations, but its terms are not ethically neutral. Often it is framed in terms of a perceived trade-off between economic benefits and environmental costs. But a case can also be made for the positive economic value of tackling climate change. This follows in a tradition of environmental economics that seeks to attach value or price to unpriced or undervalued environmental 'services'.⁵⁸ The influential report prepared by the British economist Nicholas Stern is a noteworthy case. Specifically regarding the future dimension, Stern gave serious attention to the ethical issues involved in the choice of the discount rate – that is to say, the rate at which the value of assets and welfare, as well as costs and economic damages, including as a result of climate change, is assumed to diminish over time, from the standpoint of the present. Stern arrived at a significantly lower rate of discount in determining the current 'correct' price for carbon emissions than the influential position of William Nordhaus: the overall social discount rate employed by Stern was only 1.4% compared to Nordhaus's 5.5%.⁵⁹ This led Stern to support immediate emissions reductions consistent with a USD300 per tonne tax on carbon emissions. By contrast Nordhaus supports a carbon tax of only around USD30 per tonne, rising to USD85 per tonne by 2050. This difference is almost entirely the result of the different assumptions made when calculating the social discount rate.⁶⁰ The high rate implies a very low level of concern for our descendants.⁶¹ So the economics of climate change cannot be separated out from the ethics: it implicitly relies on ethical judgments regarding the nature of our obligations regarding future generations.⁶²

Stern himself has been criticized from both sides about the assumptions he allows. Not only the more conservative mainstream economists but also more radical thinkers⁶³ have

identified a politically-loaded vision of a tamed capitalism – not unrestrained, but not seriously challenged – persisting indefinitely into the future. A similar vision seems to be assumed also by liberal political theorists who suggest that an appropriate approach to our future orientated obligations is to adopt John Rawls's idea of a 'just savings principle',⁶⁴ although it is questionable what exactly we can be saving for the future if we are already overusing the planet's resources and environmental capacities.⁶⁵

Taking decisions regarding the future

How to act against climate change cannot be decided on the basis of 'hard numbers' because there are no 'hard numbers' when it comes to climate change. To outsiders, the cost-benefit analyses (CBA) of economists may suggest otherwise. But those who understand what the studies do, also know two things. First, many effects of climate change simply cannot be adequately monetarily valued. Second, what can be valued needs to be transformed from values in the distant future to present values and any CBA recommendation is therefore crucially dependent on the discount rate used, and there is no such thing as the "right" discount rate, for the rate chosen is in turn inextricably linked to normative value judgements. It follows that, one way or the other, the decision-making toward climate change is heavily influenced by ethical choices.

[Adapted from Neumayer⁶⁶]

The nature and shape of the ethical problem facing us becomes quite different if, instead of anticipating a context of gradual environmental deterioration and incremental hardships as a likely result, we anticipate dramatic and catastrophic changes.⁶⁷ With the prospect of runaway climate change precipitated by passing various "tipping points" of abrupt change, questions arise, in particular, of whether and when a precautionary approach ought to be adopted by policy-makers. The Precautionary Principle has neither a commonly accepted definition nor a set of criteria to guide its implementation,⁶⁸ but attempts to elicit a core idea for it have been made in debates about precaution relation to climate change.⁶⁹ The general idea is that if there is a potential for harm from an activity, and uncertainty about the magnitude of impacts or causality, then anticipatory action should be taken to avoid the harm. But the Precautionary Principle admits of stronger and weaker interpretations, and if a strong interpretation is too demanding in most policy areas, Catriona McKinnon argues, it could nevertheless be defensible with respect to climate change: if the consequences of failing to take precautionary action could be such extreme scarcity of resources as to render the pursuit of justice itself impossible, then we cannot choose not to be precautionary.⁷⁰ The question then is what kinds of precaution are at issue.

The argument that climate change might undermine the very circumstances that make justice possible relates to the literature on environmental security.⁷¹ The range of views on the implications of environmental insecurities for ethical life is extremely wide, but one general

insight to have emerged is that, whatever the future may hold in store, the insecurities that already afflict people today are amplified by environmental changes.⁷² For many people in many parts of the world, the circumstances that make justice possible have already been undermined through processes of ecological marginalization that are permitted and even encouraged by the institutions supporting globalization today.

It seems not unreasonable to suggest that a pre-requisite of justice for the future is a real commitment to justice now. The implication is that if we are not to discount the future, nor to disregard the plight of the worst off today, then the better off have to make greater commitments to both equality and reduction of environmental demands. From this perspective, climate ethics is seen as part and parcel of global justice more widely construed.⁷³ Those who already suffer most from socio-economic disadvantage globally are generally most at risk of having their suffering compounded by the effects of climate change. The international institutional order arguably provides structural support for this 'radical inequality'.⁷⁴ These are institutions in which we – individuals in affluent societies – are all implicated, according to some influential theorists of justice, notably Thomas Pogge. But Pogge has been challenged on how individuals can be held responsible.⁷⁵ This question of connection between individuals and wider associations and institutions is the final main topic area.

Individual obligation and collective action

Much of the literature on climate ethics addresses what governments or policy makers should do. But what about what each of us ought to do ourselves? Some, like Walter Sinnott-Armstrong, maintain that the problem is primarily political, and should be dealt with at that level.⁷⁶ Jamieson, by contrast, argues that although the nation state is a level of social organization relevant to addressing climate change because it is causally efficacious, it is not the primary bearer of ethical responsibilities.⁷⁷ He advocates inculcating green virtues at the individual level. Others, like Gardiner⁷⁸ and Cripps,⁷⁹ emphasise that the key question is how to understand the relationship between individual and collective responsibilities. This is not straightforward, since what one ought to do can sometimes depend on what others do, and different individuals can have different views on what should be done, as well as different degrees of commitment to actually doing it. Moreover, to address a problem like climate change requires collective action, and how is this to be achieved when individuals and groups are motivated by conflicting interests? Furthermore, even if an individual wants to do the right thing, how may their ethical obligations be affected by failure of others to comply with theirs? This is the classic kind of collective action problem has a particular salience in climate debates. If some people fail to do their bit, can others be reasonably expected to pick up a share of the load that has been left by the defaulters? To expect the morally conscientious to take up the slack could be not only unfairly demanding on them, it could create a perverse incentive for others to do even less.⁸⁰ Hence it could be counterproductive, or even wrong,

for one to do what one believes we all ought to do. As Cripps observes, it remains a major philosophical challenge to outline individual climate duties, or to devise suitable rules to apply in all circumstances.

One can therefore appreciate why Jamieson believes we need to inculcate a new, greener, *ethos*. I have argued something similar in relation to the idea of 'ecological citizenship', where an ethos of resourceful restraint is contrasted with the expansionist ideals immanent in liberal political visions.⁸¹ A focus on the virtues – as a complement to ethics of duty, rights or utility, and proposals such as carbon allowances,⁸² or allowances even against a wider range of ecological services⁸³ – would seem to be a necessary factor in thinking about what individuals should do.⁸⁴ It is possible to generate a vision of living a life that is rich in ends and simple in means,⁸⁵ where the focus is on being rather than having,⁸⁶ where one treads more lightly on the planet and shows kindness to one's fellows, humans and non-. If everyone did this, the problem of climate change might be diffused entirely.

Obstacles to the fulfilment of this green vision, however, are several. One is that not everyone will find it attractive. Another is that even those who find it attractive are locked into more consumerist lifestyles. Indeed, it is not only a question of what agents want or do: there are institutional structures that maintain the incentives and motives for continuing, as far as possible, the current development trajectory. And, not least, different individuals in the world today find themselves in some vastly different situations: for some, it is not a case of reining in their demands on the planet, but achieving an adequate foothold at all. A meaningful green vision would have to be one that included engagement with the structures of global inequality.⁸⁷

Climate change presents collective action problems, then, not only for individuals, but also for the collectivities that are nation-states. Moreover, there are other kinds of collectivities – notably those of transnational enterprise and finance – that are not presently under the control of states. Given the vital difference it makes to a person's life whether they command some capital, or are employed by capital, or are entirely marginalized by the global flows of capital, one would expect a relevant ethics today to attend also to the relationships between these classes of individuals as classes.

Conclusion

Ethics encompasses evaluative thought that extends from noble visions and high ideals to the more immediate and constrained assessment of options that face people in the here and now. There are those who advocate forsaking ideal theory altogether in favour of more pragmatic policy-making, and 'realistic' politics;⁸⁸ but this risks neglecting how real people – and, indeed, history – are moved by ideals. Visions of a world liberated from indiscriminate consumerism among the affluent and destitution among the poor are not at the cutting edge of research, but they can help give it orientation.⁸⁹

So it is of course important to engage with policy ideas that are driven by prevailing economic interests, including proposals intended to mitigate climate change by developing rather than inhibiting economic activity. Some have a directly physical dimension: for instance, geoengineering, ‘the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change’,⁹⁰ is receiving increased attention from scientists and policy makers, and it raises major ethical questions that need to be kept track of.⁹¹ Others have more indirect impacts, as, for instance, the issues surrounding carbon trading.⁹² In such debates it is important to keep alive an active questioning of the ethical assumptions made when costings of environmental harms are conducted, or when debating energy policy and the cost of various alternative renewable energy sources.

Security issues, too, are likely to loom larger as the effects of climate change become more serious, and I would expect academic collaboration between ethics and environmental security to intensify, particularly with regard to issues arising when circumstances of justice break down in a region. Questions emerging include whether there should be a distinct category of rights for ‘environmental refugees’ or for other endangered communities.⁹³ More generally, with the status in international law of environmental rights gradually developing, questions remain live about whether – and how – we might think of protection against climate change as a human right.

A question that has not been prominent in climate ethics discussions is what about nonhumans? However, as the issues here are somewhat unclear,⁹⁴ I suspect that concern will remain limited to considerations of other species’ role in maintaining our ecological life support systems.

Finally, there are two overarching factors that will continue to require ethical attention. The contribution to the problem of the planet’s expanding human population has to a great extent been shied away from in academic debates of recent years, but there are signs of a renewed attempt to grapple with it.⁹⁵ The other factor is the similarly inescapable fact that the underlying problem of climate change – the cause of continued excess emissions and the competitive struggles impeding their abatement – is the development trajectory we are on, globally. The ‘treadmill of accumulation’ John Bellamy Foster calls it.⁹⁶ The most immediate and pervasive challenge is to find ways that the well-off can learn to live well but with less pressure on the ecological services that support our hitherto commodious climate, while at the same time ensuring that the poorer are not precluded from decent life chances.

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- ¹ Jamieson, D. When Utilitarians Should Be Virtue Ethicists. *Utilitas* 19, 160-183 (2007).
- ² Gardiner, S. Ethics and Global Climate Change. *Ethics* 114, 555-600 (2004).
- ³ Arnold, D.G. (ed) *The Ethics of Global Climate Change* (Cambridge University Press, 2011).
- ⁴ Gardiner, S., Caney, S., Jamieson, D. & Shue, H. (eds) *Climate Ethics: Essential Readings* (Oxford University Press, 2010).
- ⁵ Caney, S. 'Climate Change, Energy Rights and Equality' in *The Ethics of Global Climate Change* (ed. Arnold. D) (Cambridge University Press, 2011).
- ⁶ Vanderheiden, S. *Atmospheric Justice* (Oxford University Press, 2008).
- ⁷ Paavola, J & Adger, N. Fair Adaptation to Climate Change. *Ecological Economics* 56, 594-609 (2006).
- ⁸ Vanderheiden, S. Globalizing Responsibility for Climate Change," *Ethics and International Affairs* 25, 65-84 (2011).
- ⁹ Stone, C.D. Common but Differentiated Responsibilities in International Law. *The American Journal of International Law* 98, 276-301 (2004).
- ¹⁰ Grubb, M. Seeking Fair Weather: ethics and the international debate on climate change. *International Affairs* 71, 463-496 (1995).
- ¹¹ Harris, P.G. & Symons, J. Justice in adaptation to climate change: cosmopolitan implications for international institutions. *Environmental Politics* 19, 617-636 (2010).
- ¹² Moss, J. et al. *Energy Equity and Environmental Security* (UNESCO, 2012).
- ¹³ Caney, S. Justice and the Distribution of Greenhouse Gas Emissions. *Journal of Global Ethics* 5, 125-146 (2009).
- ¹⁴ Gosseries, A. Historical Emissions and Free-Riding. *Ethical Perspectives* 11, 36-60 (2004).
- ¹⁵ Bovens, L. A Lockean Defense of Grandfathering Emission Rights in *The Ethics of Global Climate Change* (ed. Arnold. D) (Cambridge University Press, 2011).
- ¹⁶ Baer, P., Athanasiou, T., Kartha, S. & Kemp-Benedict, E. Greenhouse Development Rights: A Framework for Climate Protection that is "More Fair" than Equal per Capita Emissions Rights. In Gardiner, S. M., Caney, S., Jamieson, D., and Shue, H. (eds.), *Climate Ethics: Essential Readings* (Oxford University Press, 2010).
- ¹⁷ Roberts, J.T & Parks, B.C. Fuelling Injustice: Globalization, Ecologically Unequal Exchange and Climate Change. *Globalizations* 4, 193-210 (2007).
- ¹⁸ Hart, H.L.A. Positivism and the Separation of Law and Morals. *Harvard Law Review* 71, 593-629 (1958).
- ¹⁹ Stevens, C. Interpreting the Polluter Pays Principle in the Trade and Environment Context. *Cornell International Law Journal* 27, 577-590 (1994).
- ²⁰ Weisbach, D. Negligence, Strict Liability, and Responsibility for Climate Change. *Iowa Law Review* 97, 521-565 (2012).
- ²¹ Caney, S. Cosmopolitan Justice, Responsibility, and Global Climate Change. *Leiden Journal of International Law* 18, 1-29 (2005).
- ²² Shukla, P.R. Justice, Equity and Efficiency in Climate Change: A Developing Country Perspective. In *Fairness Concerns in Climate Change* (ed. F. Toth), (Earthscan, 1999).
- ²³ Bode, S. Equal emissions per capita over time – a proposal to combine *responsibility* and *equity of rights* for post-2012 GHG emission entitlement allocation. *Environmental Policy and Governance* 14, 300-316 (2004).
- ²⁴ Simms, A. *Ecological Debt: the health of the planet & the wealth of nations* (Pluto Press, 2005).

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- ²⁵ Caney, S. Environmental Degradation, Reparations, and the Moral Significance of History. *Journal of Social Philosophy* 37, 464–482 (2006).
- ²⁶ Halme, P. Carbon Debt and the (In-)Significance of History. *Trames* 11, 346-365 (2007).
- ²⁷ Neumayer, E. In defence of historical accountability for greenhouse gas emissions. *Ecological Economics* 33, 185–192 (2000).
- ²⁸ Grubb, M., Sebenius, I., Magalhaes, A., and Subak, S. Sharing the Burden. In Mintzer, I. M. (ed.), *Confronting climate change: risks, implications, and responses* (Cambridge University Press, 1992).
- ²⁹ Shue, H. Global environment and international inequity. *International Affairs* 75, 531–545 (1999).
- ³⁰ Smith, K.R. The Natural Debt: North and South. In *Climate change: developing southern hemisphere perspectives* (ed. T.W. Giambelluca, A. Henderson-Sellers) (Wiley, 1996).
- ³¹ Caney, S. Justice and the Distribution of Greenhouse Gas Emissions, *Journal of Global Ethics* 5, 125-146 (2009).
- ³² Humphreys, S. (ed) *Human Rights and Climate Change* (Cambridge University Press, 2009).
- ³³ Singer, P. *One World* (Yale University Press, 2004).
- ³⁴ Shue, H. Subsistence emissions and luxury emissions. *Law and Policy*, 15, 39-59 (1993).
- ³⁵ Miller D, *Global justice and climate change: how should responsibilities be distributed? The Tanner Lectures on Human Values*. (Tsinghua University: Beijing; 2008)
- ³⁶ Hayward, T. Human Rights Versus Emissions Rights: climate justice and the equitable distribution of Ecological Space. *Ethics and International Affairs* 21, 431-450 (2007).
- ³⁷ Sachs, W., Santarius, T. & Camiller, P. *Fair Future: resource conflicts, security and global justice: a report of the Wuppertal Institute for Climate, Environment and Energy* (Zed Books, 2007).
- ³⁸ Bell D. Does anthropogenic climate change violate human rights? *Crit Rev Int Social Polit Phil* 14, 99-124 (2011).
- ³⁹ Caney, S. Human Rights, Climate Change and Discounting. In *Climate Change, Ethics, and Human Security* (ed. K O'Brien and A.L. St. Clair) (Cambridge University Press, 2009)
- ⁴⁰ Kramer, M, Simmonds, N. & Steiner, H. *A Debate Over Rights: Philosophical Enquiries* (Oxford University Press, 1998).
- ⁴¹ O'Neill, O. *Bounds of Justice* (Cambridge University Press, 2000).
- ⁴² Attfield, R. Mediated Responsibilities, Global Warming, and the Scope of Ethics. *Journal of Social Philosophy* 40, 225-236 (2009).
- ⁴³ Boyd, D.R. *The Environmental Rights Revolution* (UBC Press, 2012).
- ⁴⁴ Boyle, A. Human Rights or Environmental Rights? A Reassessment. *Fordham Environmental Law Review* XVIII, 471-511 (2007).
- ⁴⁵ Hayward, T. *Constitutional Environmental Rights* (Oxford University Press, 2005).
- ⁴⁶ Hiskes, R.P. *The Human Right to a Green Future: environmental rights and intergenerational justice* (Cambridge University Press, 2009).
- ⁴⁷ Woods, K. *Human Rights and Environmental Sustainability* (Edward Elgar, 2010).
- ⁴⁸ Beckerman, W. & Hepburn, C. Ethics of the Discount Rate in the Stern Review on the Economics of Climate Change. *World Economics* 8, 187-210 (2007).
- ⁴⁹ Parfit, D. *Reasons and Persons* (Oxford University Press, 1986).
- ⁵⁰ Cripps, E. Where We Are Now: Climate Ethics and Future Challenges. *Climate Law* 2, 117-133 (2011).

-
- ⁵¹ Moellendorf, D. Justice and the Intergenerational Assignment of the Costs of Climate Change. *Journal of Social Philosophy* 40, 204-224 (2009).
- ⁵² Page, E. A. *Climate change, justice and future generations*. (Edward Elgar, 2006).
- ⁵³ Northcott, M. *The Environment and Christian Ethics* (Cambridge University Press, 1996).
- ⁵⁴ World Commission on Environment and Development (WCED), *Our Common Future* (Oxford University Press, 1987).
- ⁵⁵ Beckerman, W. Sustainable Development and Our Obligations to Future Generations. In A. Dobson (ed) *Fairness and Futurity* (Oxford University Press, 1998).
- ⁵⁶ Redclift, M, 'Sustainable development (1987–2005): an oxymoron comes of age', *Sustainable Development* 13 (2005): 212-227.
- ⁵⁷ Neumayer, E. *Weak versus strong sustainability: exploring the limits of two opposing paradigms* (Edward Elgar, 2004)
- ⁵⁸ Costanza, R. et al. The value of the world's ecosystem services and natural capital. *Nature* 387, 253-260 (1997).
- ⁵⁹ Nordhaus, W.D. A Review of the Stern Review on the Economics of Climate Change. *Journal of Economic Literature* XLV, 686–702 (2007).
- ⁶⁰ Broome, J. The Ethics of Climate Change, *Scientific American* 298 (June 2008) 96-102.
- ⁶¹ Quiggin, J. 2008. Stern and his critics on discounting and climate change: an editorial essay. *Climatic Change*, 89, 195-205 (2008).
- ⁶² Caney, S. Climate Change and the Future: Time, Wealth and Risk. *Journal of Social Philosophy* 40, 163-186 (2009).
- ⁶³ Bellamy Foster, J., Brett Clark, B. & York, R. *The Ecological Rift* (Monthly Review Press, 2010)
- ⁶⁴ Langhelle, O. Sustainable Development and Social Justice: Expanding the Rawlsian Framework of Global Justice. *Environmental Values* 9, 295-323 (2000).
- ⁶⁵ Hayward, T. International Political Theory and the Global Environment: Some Critical Questions for Liberal Cosmopolitans. *Journal of Social Philosophy* 40, 276-295 (2009).
- ⁶⁶ Neumayer, E. A missed opportunity: the Stern review on climate change fails to tackle the issue of non-substitutable loss of natural capital. *Global environmental change*, 17 (3/4) (2007).
- ⁶⁷ Gardiner, S.M. *A Perfect Moral Storm: the ethical tragedy of climate change* (Oxford University Press, 2011).
- ⁶⁸ Fitzmaurice, M. *Contemporary issues in international environmental law* (Edward Elgar, 2009).
- ⁶⁹ Gardiner, S.M. A Core Precautionary Principle. *Journal of Political Philosophy* 14, 33-60 (2006).
- ⁷⁰ McKinnon, C. Runaway Climate Change: A Justice-Based Case for Precautions. *Journal of Social Philosophy* 40, 187-203 (2009).
- ⁷¹ Matthew, R.A. et al. *Global Environmental Change and Human Security* (MIT Press, 2009).
- ⁷² O'Brien, K. et al (2010), *Climate Change, Ethics and Human Security* (Cambridge University Press, 2010).
- ⁷³ Roberts, J.T. & Parks, B.C. *A climate of injustice: global inequality, North-South politics, and climate policy* (MIT Press, 2007).
- ⁷⁴ Pogge, T. *World Poverty and Human Rights* (Polity Press, 2008).
- ⁷⁵ Hayward, T. On the Nature of Our Debt to the Global Poor. *Journal of Social Philosophy* 19, 1-19 (2008).

-
- ⁷⁶ Sinnott-Armstrong, W. It's Not My Fault: global warming and individual moral obligations. *Perspectives on Climate Change: Science, Economics, Politics, Ethics Advances in the Economics of Environmental Research* 5, 293–315 (2005).
- ⁷⁷ Jamieson, D. Climate Change, Responsibility, and Justice. *Science and Engineering Ethics* 16, 431–445 (2010).
- ⁷⁸ Gardiner, S.M. Is no one responsible for global environmental tragedy? Climate change as a challenge to our ethical concepts. In *The Ethics of Global Climate Change* (ed. Arnold. D) (Cambridge University Press, 2011).
- ⁷⁹ Cripps, E. Climate Change, Collective Harm and Legitimate Coercion", *Critical Review of International Social and Political Philosophy* 14, 171-193 (2011)
- ⁸⁰ Miller, D. Taking Up the Slack? responsibility and justice in situations of partial compliance. In C. Knight and Z. Stemplowska (eds.) *Responsibility and Distributive Justice* (Oxford University Press, 2011).
- ⁸¹ Hayward, T. Ecological citizenship: Justice, rights and the virtue of resourcefulness. *Environmental Politics* 15, 435-446 (2006).
- ⁸² Hyams, K. A Just Response to Climate Change: Personal Carbon Allowances and the Normal-Functioning Approach. *Journal of Social Philosophy* 40, 237-256 (2009).
- ⁸³ Corbera, E., Brown, K. & Adger, N.W. The Equity and Legitimacy of Markets for Ecosystem Services Development and Change 38, 587-613 (2007).
- ⁸⁴ Barry, J. Resistance is Fertile: From Environmental to Sustainability Citizenship. In *Environmental Citizenship* (eds. Andrew Dobson and Derek Bell) (MIT Press, 2005).
- ⁸⁵ Devall, B. *Simple in Means, Rich in Ends*. (Peregrine Smith, 1988)
- ⁸⁶ Fromm, E. *To Have or To Be?* (Continuum, 2005)
- ⁸⁷ Dobson, A. Thick Cosmopolitanism. *Political Studies* 54, 165-184 (2006).
- ⁸⁸ Posner, E.A. & Weisbach, D. *Climate Change Justice* (Princeton University Press, 2010).
- ⁸⁹ Dean Moore, K & Nelson, M.P. (eds) *Moral Ground: ethical action for a planet in peril* (Trinity University Press 2010).
- ⁹⁰ Royal Society. *Geoengineering the Climate: science, governance and uncertainty* (The Royal Society, 2009)
- ⁹¹ Gardiner, S.M. Some Early Ethics of Geoengineering the Climate: A Commentary on the Values of the Royal Society Report. *Environmental Values* 20, 163-188 (2011).
- ⁹² Caney, S. and Hepburn, C. Emissions Trading: Unethical, Ineffective and Unjust?' *Royal Institute of Philosophy Supplement* 69, 201-234 (2011).
- ⁹³ Biermann, F. & Boas, I. Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees. *Global Environmental Politics* February 10, 60–88 (2010).
- ⁹⁴ Palmer, C. Does Nature Matter? The place of the nonhuman in the ethics of climate change. In *The Ethics of Global Climate Change* (ed. Arnold. D) (Cambridge University Press, 2011).
- ⁹⁵ Cafaro, P. Climate Ethics and Population Policy. *WIREs Clim Change* 3 (2012), 45–61. doi: 10.1002/wcc.153
- ⁹⁶ Bellamy Foster, J. *The Ecological Revolution: making peace with the planet* (Monthly Review Press, 2009).