2

ETHICAL CHALLENGES POSED BY CLIMATE CHANGE
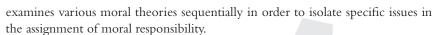
An Overview

Madison Powers

Overarching Issues

Climate change poses well-known threats to human life, health, and habitats. Over the long term, global atmospheric warming threatens the planetary systems that have made possible all life on Earth over the last 10,000 years of the Holocene era (Steffen et al. 2015; Powers 2018). Even in the near term, the projected adverse effects include species extinction; drought, desertification and disruption of the hydrologic cycle; sea level rise; extreme weather events and disrupted growing seasons; crop loss from flooding and fresh water runoff, especially where agriculture is dependent upon rainfall; and expansion and worsening of geographic zones at highest risk for infectious diseases (IPCC 2014). These adverse effects are already being felt by, and will be most consequential for, the nations that are the poorest, hottest, agriculturally most vulnerable to weather pattern disruption, economically most dependent on agriculture, most vulnerable to vector borne diseases that are expected to increase dramatically, and least able to adapt by virtue of their disadvantageous geography and lack of economic resources.

It is not surprising, then, that many of the pressing moral issues pertain to the assignment of responsibility for addressing the current and expected effects of anthropogenic climate change. The complex cluster of environmental, economic, and political problems emerging from the accumulation and concentration of greenhouse gases in the Earth's atmosphere challenges the capacity of traditional moral theories to provide practical guidance. Particular strands of a complex puzzle are often best illuminated within the context of specific theoretical approaches to moral problem solving, each of which brings some aspect of the problems to the forefront. The framework of subsequent sections of this chapter

examines various moral theories sequentially in order to isolate specific issues in the assignment of moral responsibility.

However, the processes leading to climate change raise more general moral questions. Key issues include identification of the appropriate target for harm prevention, the distinction between duties of mitigation and duties of adaptation, recognition that the duties will conflict or efforts to fulfill them will be self-defeating or working at cross-purposes, and decisions regarding the distribution of the costs and other economic burdens of fulfilling those duties.

The Target of Harm Prevention

The first issue is the appropriate target for coordinated international efforts to limit the likely harm to the planet overall and specific regions. It is often said that climate change poses a special, if not unique moral challenge because "dangerous anthropogenic climate change" only materializes once a threshold level of greenhouse gas concentration is reached (UNFCCC 1992). After years of discussion about the appropriate target for limiting the concentration of accumulated greenhouse gases, the political consensus emerging in 2015 from the 21st Conference of Parties in Paris, endorsed the goal of restricting atmospheric greenhouse gas concentration to 450 parts per million (ppm) (UNFCCC 2015). This figure corresponds roughly to 1 trillion metric tons of greenhouse gases in the atmosphere, the point at which the Earth's atmospheric temperature would be raised by 2 degrees Celsius above pre-industrial levels. In part, this choice of target reflects a judgment of acceptable risk, predicated on estimates of a threshold of significant danger of irreversible environmental impacts threatening the stability of the planet.

However, harms to human health and environment from climate change are occurring now. After considerable protest from representatives of low-lying and island nations, the text of the Agreement acknowledged that considerable harm will occur at a 1.5 degree increase in atmospheric temperature. Moreover, recent research suggests that at the current 400 ppm level of concentration considerable harm is resulting from sea level rise and weather pattern disruption, thereby increasing frequency and magnitude of storm damage and diminishing agricultural production (Schurer et al. 2017).
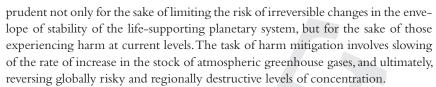
The upshot is that the debate over the targets of harm prevention reflects a deep normative disagreement over what constitutes acceptable harm. Representatives of regions of the world who are hurt first and worst by climate change want the world to commit to doing more, sooner, while other parties to the negotiations favor a less aggressive response, reflecting a reluctance to undertake expensive and socially disruptive behavioral change.

Duties of Mitigation and Adaptation

The second issue pertains to alternative perspectives on the kinds of moral responses that are most pressing. On the one hand, an emphasis on mitigation of harm is

prudent not only for the sake of limiting the risk of irreversible changes in the envelope of stability of the life-supporting planetary system, but for the sake of those experiencing harm at current levels. The task of harm mitigation involves slowing of the rate of increase in the stock of atmospheric greenhouse gases, and ultimately, reversing globally risky and regionally destructive levels of concentration.

Mitigation can be achieved primarily in either of two ways. The analogy to a bathtub is often used to make the point. We can close the valve at the tap or accelerate the flow through the drain. Concretely, the analogy highlights two distinct mitigation strategies. We can lower the atmospheric concentration below the current 400 ppm level either by reducing the rate of greenhouse gas emissions or enhancing mechanisms of greenhouse gas absorption in forests or oceans so that less ends up in the atmosphere where it causes harm.

Mitigation has long-term benefits for everyone, and it offers hope for near-term relief for countries already bearing some of the burdens of climate change. However, mitigation has an immediate adverse effect on affluent countries. Successful mitigation strategies will likely require a massive shift away from forms of production and consumption based on fossil fuels. Absent technological breakthroughs and widespread diffusion of cheaper and cleaner energy sources, the likely side effect is a reduction in standard of living.

Mitigation also is achievable through absorption – paradigmatically natural absorption through forest preservation – but at the moment, it comes with high costs and uncertain benefits for countries that are asked to forgo economic growth and expansion through natural resource development.

Mitigation also might be achieved by some form of geoengineering. The goal is the extraction of greenhouse gases from the atmosphere or redirection of energy into oceans or beyond the atmosphere. Critics view such strategies with skepticism, not only due to doubts regarding technological feasibility and scalability, but on the basis of moral concerns about the wisdom of conducting an unprecedented experiment with potentially catastrophic consequences. These worries are heightened by geoengineering's reliance on speculative theoretical assumptions and the lack of procedural safeguards and mechanisms for political accountability (Gardiner 2011, 339–396).

An alternative to costly and socially disruptive mitigation duties places greater emphasis on duties to facilitate adaptation to new heat and rainfall patterns, the increase in extreme weather events, and rising sea levels. Those hurt first and worst would have to alter existing agricultural practices, build more resilient buildings and infrastructure, or move away from coastlines and river beds. Because many countries lack the economic resources or technological capacities to undertake the necessary steps to adapt, the discharge of such duties inevitably must fall to richer countries or others with greater resources. The discharge of such duties might be undertaken through transfers of financial resources or reduced cost or no-cost technology transfers that enable those who are harmed to absorb or adapt to the environmental shocks. In short, neither mitigation nor adaptation is likely without considerable economic burdens for those best positioned to bear them.

Competing Strategies

Given that some harms are baked into the current levels of atmospheric green-house gases, the need for adaptation to changed environments is unavoidable. Absent a more robust commitment to more timely fulfilment of duties of mitigation, even more attention to adaptation strategies will be necessary to alleviate the predicted increase in human suffering. Adaptation strategies, however, often place decision makers in a bind. Three examples are illustrative.

Use of existing technologies for adaptation often cuts against the goal of greenhouse gas emissions reduction. As countries get hotter, especially in middle-income countries like India, greater reliance on refrigeration and indoor air conditioning will mean more emissions for the sake of adjusting to heat-related threats to agricultural products in the countryside and human life in the cities (Isaac and van Vuuren 2009). Adaptation strategies therefore sometimes run counter to the goals of mitigation.

Moreover, adaptation strategies sometimes compete with one another. In India, for example, climate change is exacerbating loss of both available surface water (e.g., rivers and streams) and ground water (i.e., aquifer) reserves. The response to the failure of surface water sources to replenish is to drill deep bore wells in search of water reserves in the aquifers. However, over-pumping has led to considerable reduction in recharge rates of aquifers (*The Economist* 2009). Strategies for adaptation to current loss of accessible water thus undermine the availability of water reserves that will be needed to adapt to long-term adverse hydrologic changes associated, in part, with climate change.
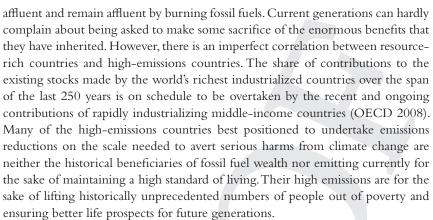
Finally, there will be instances in which adaptation duties cannot be feasibly and fully satisfied through resource and technology transfers from resource-rich to resource-poor nations. Some areas of the world will become radically inhospitable to human settlements, resulting in new waves of global migration. Estimates range from 200 million to 1 billion by 2050, with more recent predictions topping 1.4 billion by 2060 (Geisler and Currens 2017). Whatever the number turns out to be, in some cases, adaptation duties can only be satisfied by opening national borders for access to vital, life-sustaining resources, including water and habitable and arable land. The fulfilment of adaptation duties by the addition of new residents increases domestic energy demands, thereby adding to the challenge of meeting their own mitigation goals.

Bearing the Burdens of Mitigation and Adaptation

It is clear that effective and timely mitigation efforts and successful adaptation strategies will likely require citizens of affluent states to provide poor countries with the resources that they lack, or make sacrifices in their standard of living. In one sense, it seems fair to place the burden on rich countries that are home to some of the world's biggest emitters. Indeed, many affluent nations became

affluent and remain affluent by burning fossil fuels. Current generations can hardly complain about being asked to make some sacrifice of the enormous benefits that they have inherited. However, there is an imperfect correlation between resource-rich countries and high-emissions countries. The share of contributions to the existing stocks made by the world's richest industrialized countries over the span of the last 250 years is on schedule to be overtaken by the recent and ongoing contributions of rapidly industrializing middle-income countries (OECD 2008). Many of the high-emissions countries best positioned to undertake emissions reductions on the scale needed to avert serious harms from climate change are neither the historical beneficiaries of fossil fuel wealth nor emitting currently for the sake of maintaining a high standard of living. Their high emissions are for the sake of lifting historically unprecedented numbers of people out of poverty and ensuring better life prospects for future generations.

More generally, harms produced by climate change do not fit neatly into some of our standard ways of understanding moral responsibility. If the same consequences were the predictable side effects of a high-tech military conflict conducted in space by superpowers, most would agree that the warring parties have a stringent moral duty to refrain from such actions, however much it disadvantages them, and to compensate innocent parties because of the harm inflicted on innocent bystanders. If the same consequences were produced by an asteroid or tsunami, many would argue for the existence of stringent duties of beneficence to people who suffer losses from environmental disaster, based primarily on ability to bear the costs.

Nonetheless, those most affected are likely to experience the initial brunt of the harms of climate change very differently from a comparable loss due to an asteroid or tsunami. They are likely to feel a sense of injustice. They will know that the source of the harms is anthropogenic. While they are not in precisely the same moral posture as innocent bystanders, harmed by the actions of warring nations, most of the individuals hurt first and worst reside in countries that have contributed least to the problem. All the while, many others located elsewhere have benefitted disproportionately and continue to benefit from the very activities that result in the misfortune of modest contributors. The sense of injustice is likely to be magnified by the knowledge that what everyone does or fails to do damages the life prospects for the entire planet, that there is nothing that these countries can do on their own to prevent these outcomes, and that many of the hardest hit are least able to bear the burdens. They are effectively trapped in an unfolding spiral of harm that can only be averted by sacrifice by those who benefit most (Powers 2015).

Political rhetoric notwithstanding, the reality is that we are not "all in it together." Favorably circumstanced parties would have to agree to give up quite a lot of clear benefits now in order to avert a massive and imminent harm to other parties, with only the expectation of a less certain benefit in the distant future. Put another way, the motivational basis is lacking for a mutually beneficial agreement

based on a game-theoretic strategy of tit-for-tat reciprocity – a decision context in which the parties are symmetrically situated, where both parties believe they are giving and receiving comparable value in return.

Assignment of Moral Responsibility

The main normative challenge, then, is to identify a plausible rationale for the assignment of responsibility for mitigating harm and adaptation to the harms that mitigation efforts fail to stop. In moral theory generally, the path toward an answer typically begins with a presumption that causal contributors stand first in line for bearing responsibilities of both sorts. Similarly, within environmental ethics and discussions of the normative foundations of environmental tort law, the basic idea is often described as the Polluter Pays Principle (PPP). Such a principle is appealing for a simple reason. It answers to the intuitive idea that all and only the causal contributors to some problem should have primary duties to mitigate ongoing harm, prevent future harm, and remedy or compensate for the harms created by their actions (Adler 2007; Perry 1992; Caney 2010a).

Laddered Approaches

Ordinarily, we look first to agents that have some moral culpability, typically based on a wrongful intention or a failure to exercise a duty of due care or a duty to prevent harm to others.

While nation-states and other agents who stand in some special relationship of responsibility for the well-being of vulnerable parties might have back-up duties, the proximate causal agents are first in line. When individual agents are unable or not in a position of legitimate moral authority to take the necessary steps to prevent or remedy particularly grave or urgent harms, a long philosophical tradition recognizes a variety of arguments for a moral duty to establish institutions with the requisite organizational capacities and normative authority to tackle problems that assignment of responsibility to causally implicated individuals cannot resolve (Kant 1996; Pufendorf 1994; Rawls 1999, 99). The analysis of the proper locus of moral responsibility thus begins with the individual but ascends to another level, where assignment of responsibility is pushed upward to an institutional agent or other back-up agent.

The examination of some unusually complex questions of moral responsibility, including climate change, global poverty, and other harms produced within networks of interacting causal chains, involving multiple contributing agents, proceeds by way of this laddered approach. If the first step up the ladder proves inadequate to the resolution of a moral problem, then the focus of inquiry ascends to the next level, typically an institutional agent, such as a nation-state, primarily

because it is where the requisite institutional capacities and normative authority for coordinated action reside (Meckled-Garcia 2008).

Although the moral rationales for the laddered approach differ somewhat, the oldest and most familiar versions of the argument focus on duties to create states. However, the argument is readily expanded to accommodate the prospect that state institutions also might prove inadequate. We assign responsibility by ascending to the next level, for example, by creating new institutional arrangements beyond the nation-state (Wenar 2007; Ronzoni 2009; Scheffler 2010). The rationale undergirding the laddered approach has been used to argue for taking yet another step up the ladder, calling for a global constitutional convention to address competing intergenerational claims presented by climate change, on the assumption that internationally negotiated treaties, as currently envisioned, are inadequate to the task (Gardiner 2014). The central line of argument therefore mirrors more familiar versions of the laddered approach.

In each instance, the locus of responsibility shifts upward, often to new institutional agents that are better suited to the tasks of deliberation and coordination and equipped with the relevant expertise and authority to take the kinds of action otherwise likely to lack effectiveness or moral legitimacy.

Moral Pessimism

The search for a theoretical rationale for the assignment of responsibility for climate change harm proceeds against the backdrop of considerable doubt about the prospects for success at any step on the ladder. Some moral philosophers argue that climate change is a complex moral problem which our ordinary accounts of individual and institutional responsibility are ill-equipped to handle (Jamieson 2010, 2014; Sinnott-Armstrong 2010). Dale Jamieson, for example, asserts that our inherited conception of individual moral responsibility "presupposes that harms and their causes are individual, that they can be readily identified, and that they are local in time and space" (Jamieson 2010, 83). However, dangerous anthropogenic global warming is a function of the aggregate effects of uncoordinated actions undertaken by billions of individuals, firms, and governments, often for benign or salutary ends, over the course of centuries. The harm resulting from climate change therefore is the consequence of many small causal contributions made in the process of generating and using electricity, building cities, driving cars, cutting trees, and so on (Jamieson 2010; Sinnott-Armstrong 2010). No single contribution is the necessary or sufficient cause of the harm any identifiable individuals will experience. Moreover, because many of the emissions produced today will dissipate over 200–300 years we cannot assume that they will contribute to the problem in the distant future.

The conclusion of these pessimistic arguments is that whatever happens, however bad, might turn out to be a human tragedy, for which literally no one can be said to be culpable.

Three Generic Challenges

Those who think traditional moral theories face potentially insurmountable challenges for the assignment of moral responsibility for both individual and institutional agents, under any moral theory, often point to a cluster of problematic features of standard conceptions of moral responsibility. The problems are thought to occur at every step up the ladder, pushing us toward further ascent, only to face roughly the same challenges, as well as new ones at each new rung. Three of these generic arguments pose important challenges, but none seems decisive.

Determining When Harming is Wrong

The first of these challenges proceeds from the fact that there are many salutary uses of greenhouse gas emissions. Accordingly, it is implausible to think that greenhouse gas emission is in itself wrong. It is wrong, if at all, only contingently within a context in which the joint product of multiple agents, generally acting without coordination, produces a harm or unacceptable risk of harm (Sinnott-Armstrong 2010). However, the fact that a moral theory has to come to grips with the thorny problem of specifying the conditions under which some harm or imposition of an elevated risk of harm is wrong is neither an unusual problem nor necessarily insurmountable.

J.S. Mill, for example, famously argued that the mere fact that a business enterprise draws customers away from "disappointed competitors" does not entail a wrong or an injustice (Mill 1977, 293). Some setback to the interests of others is an inevitable feature of organized social life. Therefore, we have to rely upon other morally salient considerations, such as reasonable expectations or prior claims of right, to determine whether a harm should be considered a wrong. Even ill intention is not always decisive. I might open my pizza parlor across the street from a popular franchise of a national chain. I might intend to put it out of business by producing superior pizzas, and I might even intend to expand my business to multiple competing locations, and one by one, watch the dominos fall. Profits, jobs, and livelihoods will be lost.

The same point can be made about the imposition of risk in cases where actual harm might not occur. Economists point to the pervasive existence of negative externalities – costs and risks imposed on third parties by every kind of activity, including ones that have countervailing, socially beneficial purposes. We have no choice – legally or morally – but to decide which "harms to notice" (Baier 1985). We typically do so either by some process of balancing expected harms and benefits or by defining specific domains of permissible private action, in which the costs or risks imposed upon others are not treated as relevant grounds justifying interference with an activity.

In sum, all moral theories face the challenge of explaining which harms caused in the process of morally benign or socially beneficial activities count as wrongs.

The existence of socially beneficial emissions that contribute to the harms from dangerous anthropogenic climate change is a similar problem to those already faced by moral philosophers and legal theorists (Wenar 2007).

Fair Apportionment

The second generic challenge contends that the basis for apportionment of causal responsibility among so many causal contributors, over an extended and ongoing time frame, is so indefinite and speculative that it is neither feasible nor fair to single out some contributors (Caney, 2010b, 207; Posner and Sunstein 2008, 18). In particular, the worry is that the complete identification of the members of a set of putative wrongdoers is thwarted by the fact that some individuals are no longer living and some corporate entities are no longer doing business (Posner and Sunstein 2008, 18; Caney, 2010a, 130; Miller 2009, 126–27).

In essence, these critics are arguing that fairness requires holding responsible all or none. Some of these arguments in the context of moral theory turn on an analogy to legal theories of compensation for injury. For example, consider cases in which several manufacturing companies dump chemical effluent into a river over a period of several years, and it is clear that the parties do not act in a coordinated manner, or even act within the same time frame. In addition, over time some of the effluent degrades or is absorbed into the ground and dispersed and diluted in larger bodies of water. However, the cumulative consequence of a certain kind of conduct by many separate agents is a toxic soup that damages farmland downstream. Some companies are no longer in business, some companies profited greatly, and other companies barely made ends meet. Some companies dumped a lot of chemical effluent, and others much less.

However, in recent years the trend has been to dismiss the "all or none" objection. Many legal jurisdictions concede that it is unfair to assign liability without clear criteria for apportioning damages on the basis of contribution, but the conclusion is that it would be a graver form of unfairness to leave injured parties without recourse to remedy (Perry 1992). A more egregious form of unfairness would arise from letting everyone off the hook, simply because it is not possible to hold all contributors accountable or accountable in proportion to their contribution. More generally, this conclusion is not a departure from ways we already think of fairness norms. It is often recognized within moral theory that, when not all forms of unfairness can be avoided, competing claims of unfairness sometimes have to be ranked in comparative terms, rather than treated as preemptive considerations (Broome 1990).

The Question of Culpability

A third challenge points to a lack of a plausible account of moral culpability in the emitters' actions, especially for emissions in the distant past. Arguably, very few

causal contributors to climate change, at any stage of history, are culpable either because of malign intent or because their actions were inherently unjust in the way slavery can be said to be wrong in itself (Sinnott-Armstrong 2010; Miller 2009, 129). Even the weaker notion of negligence in tort law, from which we might construct a moral analogue, is thought by some to be too problematic for holding current generations responsible for past greenhouse gas emissions that remain in the atmosphere. As a condition for imposing liability, the argument is that it requires a showing of harm from some conduct that was in violation of existing norms of due care, which the parties being held responsible either knew or should have known they were violating at the time of emission (Posner and Sunstein 2008, 18–19).

For the sake of argument, suppose that we lack proper basis for holding emitters accountable for emissions prior to some recent date, when it became reasonable to conclude that emitters knew or should have known about the consequences of greenhouse gas accumulation. At some point, it is reasonable to assume that greenhouse gas emissions, for some purposes, on some scale, and in light of available feasible alternatives to achieve salutary purposes, constitutes a sufficiently anti-social activity, for which exculpatory considerations begin to fade from moral relevance.

All three generic arguments in support of the conclusion that existing moral theories suffer from intractable problems of assigning responsibility for greenhouse gas emissions fail. Determining when harming or imposing risk of harm constitutes a wrong is not a problem different in kind from ones routinely faced by moral theories. Any unfairness in holding some but not all causal contributors responsible for an aggregate harm might be outweighed or overridden by the importance of avoiding an even graver form of unfairness. Culpability need not be predicated upon malicious intent, and we have ample theoretical resources from which to develop alternative grounds for culpability. Such a judgment would have to be based on a complex evaluation of scale of emissions, purposes of emissions, and feasible alternatives for emitters who we can safely assume to be aware or who should be aware of the consequences of their actions.

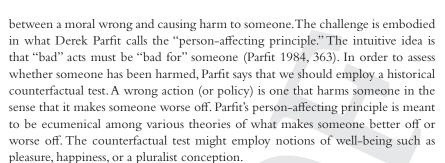## Harming, Wronging, and Doing Wrong

Lingering in the background are deeper challenges that moral theories face in dealing with climate change issues, based on the differences in the way each type of theory conceptualizes the nexus between harming someone, wronging someone, and doing wrong.

Harming and Moral Wrong

One reason for doubt about the prospects of existing moral theories to deal with issues of climate change responsibility focuses on the absence of a tight linkage

between a moral wrong and causing harm to someone. The challenge is embodied in what Derek Parfit calls the "person-affecting principle." The intuitive idea is that "bad" acts must be "bad for" someone (Parfit 1984, 363). In order to assess whether someone has been harmed, Parfit says that we should employ a historical counterfactual test. A wrong action (or policy) is one that harms someone in the sense that it makes someone worse off. Parfit's person-affecting principle is meant to be ecumenical among various theories of what makes someone better off or worse off. The counterfactual test might employ notions of well-being such as pleasure, happiness, or a pluralist conception.

If we concur with Parfit's claim that a tight link between harming and moral wrong has a strong intuitive grounding, we encounter two major obstacles in making sense of the wrongness of certain kinds of activities.

The first problem arises in cases of the sort Sinnott-Armstrong highlights. He considers the emissions from a recreational Sunday drive in an automobile. "No storms or droughts or heat waves can be traced to my individual act of driving" (Sinnott-Armstrong 2010, 336). Even if we are drawn to the thought that there is something morally problematic about fun but frivolous joy rides in gas guzzling automobiles in the current environmental context, it is not clear that any identifiable person is made worse off by that action, and thus unclear what grounds we have for moral criticism.

The second problem is that even if for the sake of argument, my activities, perhaps together with thousands or millions of other Sunday drivers, do reduce the quality of life for generations in the distant future, we still lack a basis for concluding that anyone was made worse off in the way that the counterfactual test of the person-affecting principle presupposes. Parfit and others refer to this worry as the non-identity problem.

Consider what we can say about the massive greenhouse gas emissions of all of the leisurely driving in 2020 and the quality of life of persons born several generations later. At the time of the action, there is literally *no one* whose quality of life is made lower by those emissions. Even if the quality of life of future generations is quite low, and that outcome is a direct causal consequence of our actions today, there are no persons who can say that they have been harmed by our actions or energy use policies. This is because everything we do today determines the identity and number – and even whether – people are born in the distant future. If we accept the person-affecting principle, we cannot say that anyone has been wronged, simply because there is no one who has been made worse off.

There seem to be two main options for getting around the counterintuitive implications. We might retain the core of the person-affecting principle by jettisoning the historical counterfactual test of harming. Instead of saying that persons are harmed when made worse off than they would have been but for a causally intervening act, the relevant notion of harm might be replaced, or more plausibly, supplemented by an alternative conception. We might say that persons are harmed by being made worse off than they are entitled to be, for example,

as assessed by reference to a minimum quality of life standard set by a theory of human rights (Pogge 2007). We are thereby able to hold on to the tight link between harming and moral wrong, but we can do so only by revising the notion of what counts as a harming. The problem with this strategy is that it is unclear what the revised notion of harm adds to the understanding of wronging. Pogge's point can be made more straightforwardly. All he has to claim is that wronging can be a matter of violating some independent moral standard.

The thought that wronging need not involve harming leads to a second option for getting around the strictures of the person-affecting principle. Moral wrong might be defined disjunctively. We might think of moral wrongs as either involving harm in the way the person-affecting principle supposes, or involving some other kind of wrong-making feature of the relationship between wrongdoers and those who are wronged. Because we already have on hand some familiar moral theories that reject the exclusivity of the harm-based account of moral wrong embodied in the person-affecting principle, it is worth exploring how some of them might theorize the relation between activities that contribute to dangerous climate change and wronging others.

Wronging Someone without Harming

The tradition of moral theorizing rooted in Kant's moral theory offers a number of options for how we might unpack his conception of wronging persons. For example, we wrong others by failing to treat them with the respect due to a dignified being, treating them as mere means, or failing to recognize them as self-directing agents.

One concrete suggestion along these lines is found in Scanlon's contractualist theory (Scanlon 1998). His claim is that we should understand moral wrong as a matter of violating a norm that no one could reasonably reject as the basis for interpersonal relations. If this is a plausible way of understanding what makes wrong acts wrong, there is no need for the idea of harming of a person in order to understand the wrongness of an action. Critics nonetheless will complain that more needs to be said in order to elucidate what constitutes reasonable rejectability in general, and what sort of actions that contribute to adverse environmental impact fit the bill. However, if we can fill out the story in a satisfactory way, then we can speak meaningfully of wronging others, including future generations, without having to pass the counterfactual test of identifying anyone in particular who has been made worse off in the way Parfit's person-affecting principle supposes (Kumar 2003).

Another alternative to the reduction of all wronging to harming others involves the invasion of the sovereign domain of decision making or violating their reasonable expectations of exclusive control (Ripstein 2006). In a similar vein, the cumulative actions of high-emissions individuals and countries could be seen as involving a unilateral imposition of risk to the most vital interests of the global

poor who will be hurt first and worst. A morally salient fact is their position of utter powerlessness to secure their own future, and to some extent, we can understand their situation as one in which they are in the grip of others in ways that resemble paradigmatic forms of unjust domination (Laborde 2010).

Among other tasks, such approaches would have to say more about the matters that fall within someone's sovereign domain of decision making with regard to climate impacts, and how the aggregated negative externalities of the discrete actions of so many other agents constitute unjust forms of control. Moreover, powerlessness is a condition in which one's fate is out of one's control, but being powerless is not equivalent to the unjust relations picked out by theories of domination. Such theories focus on the wrongness of an agent's having arbitrary and unilateral power over a subordinate party. Application of standard theories of domination would have to accommodate the fact that the powerlessness felt by relatively modest contributors to the cumulative stock of greenhouse gases is not solely due to the power wrongly exercised by other agents. Even comparatively modest emitters are implicated in their own inability to forestall harm to themselves and to everyone else. There is, in short, no sharp divide between victims and wrongdoers that allows us to track the distinction between dominant and subordinate parties.

Perhaps a third line of Kantian-inspired argument might bypass the challenge posed by the lack of a standard for wrongful greenhouse gas production and the fact that even the actions of the least environmentally destructive individuals and communities contribute to the condition of helplessness for themselves and others. Various substantive notions of failures of moral reciprocity suggest a more concrete way of elucidating the general Kantian idea of a failure to respect the agency of others and treat them in ways appropriate to their standing as moral equals. Ranier Forst, for example, observes that a minimum commitment to reciprocity at the heart of an ideal of moral equality requires "that none of the parties concerned may claim certain rights and privileges it denies to others" (Forst 2001, 177). In the context of climate change, ideals of reciprocity might recognize the existence of some permissible level of contribution to the stock of greenhouse gases, such that the low-end users among the global poor are not properly counted as participating in a moral wrong. High-end users above that level, by contrast, would be wrongdoers were they to insist on their own prerogative to emit for the sake of a higher standard of living, and if pursuit of that higher standard deprives the poor of the most basic requirements of life that the affluent would similarly claim for themselves. If a strategy of this sort proves successful, then we have both insight into who is wronged and the standard by which wrongness might be assessed.

Doing Wrong without Harming or Wronging Someone

Thus far, reciprocity theories, as well as reasonable rejectability theories, and domination or invasion of moral sovereignty theories provide only placeholder

accounts for how climate change duties might be grounded. A critic might well demand more in the way of practical guidance. Still lacking are substantive answers to questions about the quantity of emissions and their purposes that allow us to judge that someone is wronged.

However, Parfit argues that the theoretical path forward lies elsewhere (Parfit 1984, 384). He says we need an impersonal way to explain what makes a wrong act wrong. An impersonal theory is one that views wrong acts as wrong for reasons other than someone's having been made worse off or wronged. If successful, such a strategy would articulate a standard of conduct, below which we can be said to do wrong. If successful, the point made against Pogge earlier is that we need not worry about whether there is any specific person who is wronged. We would simply have a theory of what constitutes wrongdoing without having to assume the need to identify who is harmed or wronged. The lack of a link between doing wrong and an identifiable wronged person – a harm to their well-being interests, a violation of sovereign rights, being disrespected or disadvantaged, being subject to unjust dominion, a failure of reciprocity, or whatever – does not matter because the test of right and wrong is a matter of compliance with or violation of a general norm.

To be sure, it matters to each person who can say that because of some action or policy she has been wronged. She has a special standing to complain, but the wrong she experiences is not a function of the fact that she in particular has been wronged. Tim Hayward presses what I take to be a similar point. He asks what moral difference it makes that the duty breached is a duty directed "to me." It is the departure from a standard of due care that is the defining feature of the wrong, not the identity of the persons wronged (Hayward 2013). No fact peculiar to specific identifiable right-holders – contemporaneous "statistical others" or future generations – provides grounds for such rights. The grounds are "general facts about what is good for humans" and the kinds of conduct that exhibit a strong tendency to undermine their most vital interests (Hayward 2013, 280). Rahul Kumar makes a similar point. All that is necessary to know is what it is that persons in specific situations are entitled to expect of other persons in showing respect for the moral status of persons (Kumar 2003, 111).

Participation in Collective Harming

An alternative approach attributes moral responsibility to individuals on the basis of their participation in a collective activity rather than any feature that explains the wrongness of particular actions. The standard model of complicity in collective injustice supposes more than a mere joint product; it requires a joint project. Paradigmatically, that involves two things: participants work together, each doing some part, knowing that others are doing their part toward the achievement of a shared end, and the shared end itself is morally condemnable.

Christopher Kutz suggests that both assumptions should be relaxed (Kutz 2000). For example, civilian railway conductors who coordinated the train schedules

delivering people to Nazi death camps should not be let off the hook either by claiming that their participation made no difference to the outcome or that they only intended to collect a paycheck, and did not share the Nazi's corrupt intention.

Assuming both revisions are plausible, the ascription of moral responsibility for participation in collective wrongdoing in standard cases like the railway conductor case is brought closer to cases that Kutz calls unstructured collective harms. His example of an unstructured collective harm involves numerous car drivers whose actions have a cumulative harmful effect – the environmental harm of damage to the Earth's protective ozone layer. Kutz's revisionist construal of collective wrong-doing thus resembles instances in which individuals participate in social processes that produce climate change. Participants in the joint production of these environmental harms are in a similar moral position as the railway conductor. They share no culpable intention and make little or no causal difference to the outcome. On Kutz's account, we should not hold the drivers blameless for their participation in the creation of a collective harm, for much the same reason we should not hold similarly situated Nazi-era railway workers blameless.

The problem with Kutz's argument is that cases of unstructured collective environmental harms are importantly different from the case of the railway conductor under the Nazi regime. We still need an explanation of what makes participation culpable, and in standard cases, participants are implicated by their complicity with the actions of one or more agents who bear clear marks of moral wrongdoing. Presumably, there are no agential analogues to the Nazis in either the climate change or ozone depletion cases. The existence of at least one morally corrupt agent in the network of contributing agents is what casts a moral shadow over the character of those who unintentionally but knowingly aid the evil project of others. Kutz, however, argues that the locus of what is wrong-making in this scenario is morally deficient character, not a morally culpable discrete action, shared intention, joint project, or causal difference. However, for that strategy to work, we have to identify what remains an elusive basis for our negative assessment of character, given that our character is not impugned by our contributions to the evil projects of others.

Green Virtues

Others who doubt the prospects for identifying what makes actions contributing to the harms caused by climate change wrong also suggest shifting to consider-ations of character under a virtue ethics approach. Ronald Sandler, for example, argues that instead of looking at individual actions and their harmful consequences we should be looking at character traits that point to the "green" virtues. Sandler observes that a "character trait is a virtue to the extent that its possession is gener-ally conducive to promoting the good; and a character trait is a vice to the extent that it is generally detrimental to promoting the good" (Sandler 2010, 176). The underlying rationale for identifying virtue is similar to Julia Driver's theory, which

defines virtue as a character trait that "systematically produces or gives rise to the good" (Driver 2001, 108).

Dale Jamieson recommends this approach to those who are inclined toward utilitarian moral theories. Instead of looking at the consequences of discrete actions, or even the aggregated consequences of multiple actions, we can assess the character traits of people whose actions over a lifetime reveal dispositions that we have reason to condemn, and accordingly, grounds for assigning them some greater share of responsibility relative to those whose dispositions tend to be environmentally less destructive (Jamieson 2007). The obvious merit of the virtue approach is that it does not depend on the existence of a joint project, a wrongful intention, a shared end, or a causally efficacious action resulting in a harm to an identifiable victim. Vice is simply a character flaw because of its systematic tendency to produce grave harm.
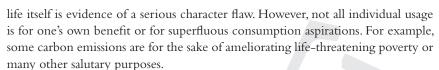
Green virtues, however, are not easy to identify, even with the aid of an appeal to broadly consequentialist underpinnings. Virtue is usually construed as a dispositional mean between two vices. Courage, for example, is the mean between cowardice and recklessness. Benevolence is a mean between the overly generous dispositions of a spendthrift and the miserly dispositions of persons lacking in compassion for others. But how do we mark the "green mean"? Intuitively, we might be inclined to identify some clear patterns of excess, at least relative to some well-defined purpose. We might think that setting the thermostat at maximum performance levels when no one is at home is evidence of culpable environmental indifference. Beyond these rather simple, context- and purpose-dependent activities, it is by no means clear what would count, say, as general virtues with respect to the production of greenhouse gases.

Perhaps in the light of the urgency of climate change threats to the planet, the virtuous person would aim for no net greenhouse gas production. We might reconstruct John Broome's suggestion that we each have duties to zero out our carbon footprint because anything else amounts to an injustice (Broome 2012). Not only are there empirical disagreements about whether specific carbon offset programs do what they promise, but existing energy technology makes such offsets feasible for no more than a small sliver of the Earth's population. As a result, we would run into the traditional worry about the plausibility of virtues that depend too much on luck or good fortune. Currently, it simply is not possible for everyone, or perhaps even very many, to be virtuous in this manner.

Alternatively, some notion of virtuous emitters might be gleaned from a reflection on Henry Shue's distinction between subsistence and luxury emissions (Shue 2010). Shue's aim is to answer the question of how much emissions exceed an individual's entitlement to a declining common pool resource. He argues that, given that we are well beyond 60% of the 1 trillion metric tons of accumulated atmospheric greenhouse gas concentration consistent with a livable, 2-degree target, current emission patterns of the global affluent are not justifiable (Shue 2011). We might reconstruct Shue's argument to say that using more than needed to sustain

life itself is evidence of a serious character flaw. However, not all individual usage is for one's own benefit or for superfluous consumption aspirations. For example, some carbon emissions are for the sake of ameliorating life-threatening poverty or many other salutary purposes.

Driver suggests we should be searching for a "character trait [that] is a virtue to the extent that its possession is generally conducive to promoting the good." In that case it is not clear that the focus on green virtues, in isolation from consideration of the totality of benefits and harms from all of our consumption and production activities, will offer helpful practical guidance, either for how individuals should live or for identifying culpable participation in an unstructured collective harm.

Therefore, we need a more detailed explanation of what distinguishes virtuous and condemnable participation in a vast and complex causal network of agents who differ in intention, social utility of their activities, and so on. For a notion of virtue to fill that gap, some independent standard of excess and unjustified greenhouse gas contribution is needed in order to assess character.

Nation-States and International Institutions

There is an important sense in which the collectively produced impacts of climate change are more structured than the foregoing discussions suggest. Individual and corporate greenhouse gas footprints are what they are only because of the state's fingerprints in establishing the legal and regulatory background. Moreover, states are uniquely positioned to alter the conduct of many separate agents. For these reasons, states are prime candidates to bear the next-level responsibility. States become prominent moral agents in circumstances in which valuable ends are not likely to be realized and important moral norms are not likely to be satisfied within a system of social interaction where matters of coordination, distribution of benefits and burdens, and enforcement are beyond the reach of individual agents.

There are, of course, lively disagreements about whether collective action problems are amenable to resolution without state institutional structures or agents vested with coercive power. Moreover, some critics of the prominent role given to states in negotiating and implementing treaties and bearing the costs of addressing the consequences of climate change prefer the backward-looking model of liability under the PPP. Their claim is that all ascriptions of moral responsibility should attach to individuals and corporate entities simply because they are the direct causal agents of environmental problems, rather than governmental entities that are said to have only indirect relationship to the harms (Posner and Sunstein 2008, 20).

However, the uncertainties of effectiveness of non-coercive voluntary solutions, along with the limitations of the liability model, reveal the need for exploration of the clear advantages that states have over individuals as frontline bearers of responsibility for addressing climate change. Under the current global order states possess

a unique combination of institutional capacities and political legitimacy for undertaking coercive and definitive resolution of competing claims (Meckled-Garcia 2008). They set the rules for resource ownership, extraction, use, and permissible negative externalities. States shape corporate investment and research and development priorities through tax policy. States shape personal consumption decisions through tax policy and social welfare policies that affect consumer spending. They alter consumption patterns by shaping the distribution of income and wealth and through targeted subsidies for heating oil, solar panels, or employee benefits such as free automobile parking at work. States also create statutorily defined economic incentives and subsidies for production, issue taxpayer-backed bonds that finance industrial construction, and regulate production through a myriad of licensing and accreditation procedures.

In addition, states can counteract the unwanted distributive effects of diffusion of costly new technologies through programs that compensate and retrain displaced employees of fossil fuel-based industries, and help those whose habitat has been adversely affected to adapt to or move to other areas. States thus have at their disposal a wide variety of policy levers that, at least in principle, enable them to bear responsibilities that no other agent can discharge, and they are in position to assign particular responsibilities and burdens to some segments of society with an eye to the demands of fairness and distributive justice.

Further Implications of Morally Unique State Agency

The unique institutional capacities and politically legitimate use of coercive regulatory and coordination power within a state that makes them especially important agents in the division of domestic moral responsibility also explains the moral limits of their role globally. No single nation can avoid climate change on its own, and even a radical reduction of greenhouse gas production by a handful of the planet's largest producers will not be enough to forestall dangerous climate change and prevent serious harm to all of the nations of the world. The upshot is that the outward-facing responsibility of any state is severely circumscribed. The problem of climate change, as well as its solution, is inherently international. Only the creation of transnational institutions, having analogous capacities and politically legitimate authority for coordination, distribution, and enforcement, is likely to be adequate to the task at hand.

That said, states have a unique role in the creation of such institutions. Only states are positioned to create global institutions. The point is not merely the pragmatic observation that within the current global order only an agreement among nation-states can produce binding treaties and new authoritative institutions. The more basic point is a normative one. It is the normative uniqueness of state agency, in both its institutional capacities and political legitimacy of its coercive authority, that enables it to perform according to the terms of any international agreement. No other agent can deliver.

Moreover, the normative uniqueness of states in creating and implementing the terms of a global agreement comes with unique moral constraints on the way such an agreement may be reached. Recall Forst's point about the minimal demands of reciprocity as a constitutive feature of just relations among moral equals. It requires "that none of the parties concerned may claim certain rights and privileges it denies to others." Richard Miller makes a substantially similar point with regard to what citizens of one country, committed to an ideal of reciprocity at the core of universal moral equality, may authorize their own governments to do on their behalf. It requires "backing their own [government's] proposals with morally relevant reasons and giving weight, in proportion to seriousness, to relevantly similar reasons offered by others [governments]" (Miller 2010, 72).

Concretely, because of the morally unique position of governments to negotiate an agreement and their morally unique capacity and authority to implement its terms, reciprocity sets limits on the sacrifices they may demand of the representatives of other nations. They may not press for terms that require sacrifice of the most basic well-being and agency interests of non-nationals unless they are prepared to accept comparable sacrifices among their own citizens. A commitment to a principle of interstate reciprocity does not mean that nation-states cannot drive a hard bargain, or that the pursuit of national self-interest is illegitimate. Nor does it require anything as demanding as tit-for-tat reciprocity. At the very least, however, it means that nations may not prioritize domestic prosperity or a fossil fuel-based, high standard of living for their own citizens at the expense of the most basic, non-negotiable human interests of those hurt first and worst.

Future Generations and Institutional Limitations

Some argue that even the creation of international institutions through a process of interstate agreement remains inadequate to address intergenerational problems of climate change. Another step up the ladder is required. Current generations of interstate bargainers are not reliable stewards of the interests of future generations because of the absence of intergenerational reciprocity. Future generations can do nothing to affect the well-being of current generations, but what current generations do will have enormous impact on future generations. Future generations have nothing to offer the current generation in exchange for their (un-assurable) cooperation. Future generations cannot bargain, and they are powerless to command sacrifice from past generations for the sake of their own well-being. As Stephen Gardiner observes, the intergenerational aspect of the problem makes climate change more resistant to solution. "The usual appeals to broad self-interests rely on there being repeated interactions between the parties where mutually beneficial behavior is possible. But between present and future generations there is neither repeated interaction … nor mutual benefit" (Gardiner 2011, 37).

The intergenerational aspect of the climate change problem is significant. For one thing, as much as 80–90% of the harmful effects of climate change are expected to occur after 2200 (IPCC 2014). Not only are we not "all in it together" internationally: the worst effects will land on some parts of the world even as some parts of the world experience some medium-term benefit from postponing having to reckon with lifestyle changes. It's also the case that generations do not have symmetrical risk-benefit profiles. Current generations have enormous incentive to continue emitting greenhouse gases for their own benefit, and indeed, strong incentives to emit even more in order to raise the standard of living for themselves and several (interacting) generations to come. A significant portion of the world experiences energy poverty, or insufficient energy resources to secure adequate levels of food, water, transportation and medical care. Indeed, the moral focus on the current needs of the poor is built into the original provisions of the United Nations Framework Convention on Climate Change, recognizing the right of development and the differential sacrifices that industrially developed countries should make (UNFCCC 1992).

The implication of enhanced priority for the benefit of the global poor is that those who are charged today with the task of bargaining over the terms of a climate change treaty on behalf of the citizens of their own nations are unlikely to be suitable fiduciaries of the interests of future generations of citizens. There is a built-in conflict of interest, and a high likelihood of bias toward the present, even on the plausible assumption that most people believe that they have responsibilities to those generations not yet born. For these reasons, Gardiner proposes ascent to another level beyond the international institutional level negotiated by self-interested nation-states. Only something like a global constitutional convention can hope to approximate a framework for impartial balancing of interests across generations (Gardiner 2014).

Moreover, arguments for discounting the interests of future generations are offered by economists who assume that future generations will be much better off. William Nordhaus has estimated that those living in 2200 will be 12.3 times richer than those currently living (Nordhous 2006). On the basis of estimates of this sort, it is often claimed that it would be wrong to favor the well-being of future generations over that of current generations who are judged to be comparatively – even dramatically – worse off.

A Substantive Question about What's Owed

Complicating the intergenerational question still further is the inherent difficulty of figuring out what reciprocal fairness across generations would entail. There are lots of unsatisfactory suggestions in play. One thought is that we should aim for overall resource consumption levels that represent a comparable standard of living across the generations. That sort of solution seems intractable. We neither know the size of future generational cohorts nor the specific resource requirements

that would result in comparable levels of well-being. We have many reasons to suppose that the planet's population will grow massively. Trying to ensure a comparable standard of living for successive, larger generational cohorts would be too demanding for current generations. Perhaps generations far into the future will have few options but to burn fossil fuels in order to preserve current standards of living. Perhaps they will not. There is considerable uncertainty about what will be required to meet future need, even if we assume that intergenerational fairness demands something like a guarantee of a comparable standard of living.

However, there are some things that we can say with a high degree of confidence. Future humans will have the same basic biological needs. They will require access to food, energy, and water, and for the satisfaction of these biological needs they will need functioning Earth systems. As Henry Shue puts it, if there is one plausible human right it is the right "to inherit from past generations an environment that is neither radically inhospitable nor radically unpredictable" (Shue 2011, 293). Some Earth scientists similarly conclude that what is at stake in climate change is different in kind from all of the rest of what matters in the standard debates about the trade-offs between the environment and other values. They argue that the stable functioning of Earth systems − including the atmosphere, oceans, forests, waterways, biodiversity, and biogeochemical cycles − is a prerequisite above all else (Steffen et al. 2015).

Never before have we had reason to think so modestly about the future, because never before has so much that is so basic been put at such grave risk by the very activities that have contributed so much to human well-being.

Bibliography

Adler, M.D. 2007. "Corrective Justice and Liability for Global Warming." *University of Pennsylvania Law Review* 155 (6): 1859–67.

Baier, Annette. 1985. "Poisoning the Wells." Reprinted in *Postures of the Mind: Essays on Mind and Morals*, 263–291. Minneapolis, MN: University of Minnesota Press.

Broome, John. 1990. "Fairness." *Proceedings of the Aristotelian Society* 91: 87–101.

Broome, John. 2012. *Climate Matters: Ethics in a Warming World*. New York: W. W. Norton and Company.

Caney, Simon. 2010a. "Cosmopolitan Justice, Responsibility, and Global Climate Change." *Climate Ethics: Essential Readings*, edited by S. M. Gardiner, S. Caney, D. Jamieson and H. Shue, 122–145. Oxford and New York: Oxford University Press.

Caney, Simon. 2010b. "Climate Change and the Duties of the Advantaged." *Critical Review of International Social and Political Philosophy* 13 (1): 203–228.

Driver, Julia. 2001. *Uneasy Virtue*. New York: Cambridge University Press.

The Economist. 2009. "India's water crisis: When the rains fail." https://www.economist.com/node/14401149

Forst, Ranier. 2001. "Towards a Critical Theory of Transnational Justice." in *Global Justice*, edited by Thomas Pogge, 169–187. Oxford: Blackwell Books.

Gardiner, Stephen. 2011. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. New York: Oxford University Press.
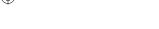
Gardiner, Stephen. 2014. "A Call for a Global Constitutional Convention Focused on Future Generations." *Ethics and International Affairs* 28 (3): 299–315.

Geisler, Charles and Ben Currens. 2017. "Impediments to inland resettlement under conditions of accelerated sea level rise." *Land Use Policy* 66: 322–330. https://doi.org/10.1016/j.landusepol.2017.03.029

Hayward, Tim. 2013. "On Prepositional Duties." *Ethics* 123 (2): 264–291.

IPCC. 2014. "Summary for Policymakers." *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.). Cambridge: Cambridge University Press, 2014, www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf

Isaac, Morna, and Detlef P. van Vuuren. 2009. "Modeling global residential sector energy demand for heating and air conditioning in the context of climate change." *Energy Policy* 37: 507–521.

Jamieson, Dale. 2007. "When Utilitarians Should be Virtue Theorists." *Utilitas* 19 (2): 160–183.

Jamieson, Dale. 2010. "Ethics, Public Policy, and Global Warming." *Climate Ethics: Essential Readings,* edited by S. M. Gardiner, S. Caney, D. Jamieson and H. Shue, 77–86. Oxford: Oxford University Press.

Jamieson, Dale. 2014. *Reason in a Dark Time*. New York: Oxford University Press.

Kant, Immanuel. 1996. *The Metaphysics of Morals*, edited and translated by M. Gregor. New York: Cambridge University Press.

Kumar, Rahul. 2003. "Who Can Be Wronged?" *Philosophy & Public Affairs* 31 (2): 99–118.

Kutz, Christopher. 2000. *Complicity: Ethics and Law for a Collective Age*. Cambridge: Cambridge University Press.

Laborde, Cecile. 2010. "Republican Global Distributive Justice: A Sketch." *European Journal of Political Theory* 9 (1): 48–69.

Meckled-Garcia, Saladin. 2008. "On the Very idea of Cosmopolitan Justice: Constructivism and International Agency." *Journal of Political Philosophy* 16 (3): 245–271.

Mill, J.S. 1977. *On Liberty*. In *The Collected Works of John Stuart Mill* Vol. XVIII, edited by John M. Robson, 213–310. Toronto: University of Toronto Press.

Miller, David. 2009. "Global Justice and Climate Change: How Should Responsibilities Be Distributed?" *The Tanner Lectures on Human Values* 28, edited by G. B. Peterson, 119–156. Salt Lake City, UT: The University of Utah Press.

Miller, Richard. 2010. *Globalizing Justice: The Ethics of Poverty and Power*. Oxford: Oxford University Press.

Nordhaus, William. 2006. "The Stern Review on the Economics of Climate Change." Available at www.econ.yale.edu/~nordhaus/homepage/homepage/stern_050307.pdf.

Organization for Economic Cooperation and Development (OECD). 2008. *OECD Environmental Outlook to 2030*, Paris: OECD Publishing.

Parfit, Derek. 1984. *Reasons and Persons*. Oxford: Oxford University Press.

Perry, Stephen. 1992. "The Moral Foundations of Tort Law." *Iowa Law Review* 77: 449–514.

Pogge, Thomas. 2007. "Severe Poverty as a Human Rights Violation." in *Freedom from Poverty as a Human Right*, edited by Thomas Pogge, 11–53. Oxford: Oxford University Press.

Posner, Eric and Cass Sunstein. 2008. "Global Warming and Social Justice: What Do We Owe the World for Climate Change?" *Regulation* 31 (1): 14–20.

Powers, Madison. 2015. "Moral Responsibility for Climate Change." in *Routledge Companion to Bioethics*, edited by John Arras, Elizabeth Fenton, and Rebecca Kukla, 133–146. New York: Routledge.

Powers, Madison. 2018. "Sustainability and Resilience." *Encyclopedia of the Anthropocene, vol. 4,* edited by Dominick DellaSala and Michael Goldstein, 29–37. Oxford: Elsevier. http://dx.doi.org/10.1016/B978-0-12-409548-9.10491–9.

Pufendorf, Samuel. 1994. *"On the Law of Nature and of Nations."* in *The Political Writings of Samuel Pufendorf*, edited by Craig L. Carr, and translated by Michael J. Seidler. New York: Oxford University Press.

Rawls, John. 1999. *A Theory of Justice. Revised Edition.* Cambridge: Harvard University Press.

Ripstein, Arthur. 2006. "Beyond the Harm Principle." *Philosophy and Public Affairs* 34 (3): 215–245.

Ronzoni, Miriam. 2009. "The Global Order: A Case of Background Injustice? A Practice-Dependent Account." *Philosophy & Public Affairs* 37 (3): 229–256.

Sandler, Ronald. 2010. "Ethical Theory and the Problem of Inconsequentialism: Why Environmental Ethicists Should be Virtue-Oriented Ethicists," *Journal of Agricultural and Environmental Ethics* 23 (1): 167–183.

Scanlon, Thomas. 1998. *What We Owe to Each Other.* Cambridge: Harvard University Press.

Scheffler, Samuel. 2010. "Cosmopolitanism, justice, and institutions." Reprinted in *Equality and Tradition: Questions of Value in Moral and Political Theory*, 160–172. New York: Oxford University Press.

Schurer, Andrew P., Michael E. Mann, Ed Hawkins, Simon F. B. Tett, and Gabriele C. Hegerl. 2017. "Importance of the pre-industrial baseline for likelihood of exceeding Paris goals." *Letters: Nature Climate Change* 7: 563–567. www.nature.com/natureclimatechange

Shue, Henry. 2010. "Subsistence Emissions and Luxury Emissions." in *Climate Ethics: Essential Readings*, edited by S. M. Gardiner, S. Caney, D. Jamieson, and H. Shue, 200–214. Oxford and New York: Oxford University Press.

Shue, Henry. 2011. "Human Rights, Climate Change, and the Trillionth Ton." in *The Ethics of Global Climate Change,* edited by Denis Arnold, 292–314. Cambridge: Cambridge University Press.

Sinnott-Armstrong, Walter. 2010. "It's Not My Fault: Global Warming and Individual Moral Obligations." in *Climate Ethics: Essential Readings*, edited by S. M. Gardiner, S. Caney, D. Jamieson, and H. Shue, 332–346. Oxford and New York: Oxford University Press.

Steffen, Will, Katherine Richardson, Johan Rockström, Sarah E. Cornell, Ingo Fetzer, Elena M. Bennett, Reinette Biggs, Stephen R. Carpenter, Wim de Vries, Cynthia A. de Wit, Carl Folke, Dieter Gerten, Jens Heinke, Georgina M. Mace, Linn M. Persson, Veerabhadran Ramanathan, Belinda Reyers, and Sverker Sörlin. 2015. "Planetary boundaries: Guiding human development on a changing planet." *Science* 347 (6223). http://dx.doi.org/10.1126/science.1259855

United Nations Framework Convention on Climate Change (UNFCCC). 1992. http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

United Nations Framework Convention on Climate Change (UNFCCC). 2015. *Adoption of the Paris Agreement.* http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf

Wenar, Leif. 2007. "Responsibility and Severe Poverty." in *Freedom from Poverty as a Human Right: Who Owes What to the Very Poor?,* edited by Thomas Pogge, 255–274. Oxford: Oxford University Press.