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**PERSPECTIVES ON
CLIMATE CHANGE:
SCIENCE, ECONOMICS,
POLITICS, ETHICS**

EDITED BY

WALTER SINNOTT-ARMSTRONG

Department of Philosophy, Dartmouth College, Hanover, USA

RICHARD B. HOWARTH

*Environmental Studies Program, Dartmouth College, Hanover,
USA*



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ADAPTATION, MITIGATION, AND JUSTICE

Dale Jamieson

INTRODUCTION

In this chapter I claim that climate change poses important questions of global justice, both about mitigating the change that is now under way and about adapting to its consequences.¹ I argue for a mixed policy of mitigation and adaptation, and defend one particular approach to mitigation. I also claim that those of us who are rich by global standards and benefit from excess emissions have strenuous duties in our roles as citizens, consumers, producers, and so on to reduce our emissions and to finance adaptation.

THE UNAVOIDABILITY OF ADAPTATION

When I began my research on global climate change in the mid-1980s, it was commonly said that there were three possible responses: prevention, mitigation, and adaptation. Even then we were committed to a substantial climate change, although this was not widely known. This realization began to dawn on many people on June 23, 1988, a sweltering day in Washington, DC, in the middle of a severe national drought, when climate modeler James Hansen testified before a US Senate Committee that it was 99% probable that global warming had begun. Hansen's testimony was front-page news in the

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New York Times, and was extensively covered in other media as well. Whether or not Hanson was right, his testimony made clear that we were entering a new world, what Schneider (1989) called "the greenhouse century."

Once it became clear that prevention was no longer possible, mitigation quickly moved to center stage. One week after Hansen's testimony, an international conference in Toronto, convened by the World Meteorological Organization (WMO), called for a 20% reduction in greenhouse gas (GHG) emissions by 2005. In November, the World Congress on Climate and Development, meeting in Hamburg, called for a 30% reduction by 2000. Later that same year, acting on a proposal by the United States, the WMO and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in order to assess the relevant scientific information and to formulate response strategies.² In December 1989, the United Nations General Assembly adopted a resolution, proposed by Malta, that essentially authorized the negotiation of a climate change convention. The following year the IPCC published its first report and the International Negotiating Committee (INC) was established. In 1992 the Framework Convention on Climate Change (FCCC) was officially opened for signature at the Rio Earth Summit. It came into force on March 21, 1994, and by May 24, 2004, had been ratified by 189 countries.

The main objective of the FCCC is to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." This goal is consistent with accepting some degree of climate change so long as it is not "dangerous." In the negotiations leading up to the adoption of the FCCC, all the developed countries except the United States and the Soviet Union favored binding targets and timetables for emissions reductions as a way of reaching this goal. However, in the end the FCCC embodied voluntary commitments on the part of developed countries to return to 1990 levels of GHG emissions by 2000.

It soon became clear that while some European countries might succeed in keeping this commitment, the United States, Australia, New Zealand, Japan, Canada, and Norway would not. In 1995, at the first Conference of the Parties (COP 1), the "Berlin Mandate" was adopted. The parties pledged that by the end of 1997 an agreement would be reached establishing binding, "quantified, emission limitation reduction objectives" for the industrialized countries, and that no new obligations would be imposed on other countries during the compliance period. In December 1997, the parties agreed to the Kyoto Protocol, which in its broad outlines satisfied the Berlin Mandate. However, many of the most important details regarding the rules of implementation were left for future meetings.

Almost immediately the Kyoto Protocol came under fire from several different directions. It was simultaneously attacked as too weak, too strong, unworkable, and, at least in the United States, politically unacceptable. Meeting in The Hague in November 2000, a lame-duck American administration and its allies, Japan, Russia, Canada, Australia, and New Zealand (collectively known as "JUSCAN"), argued that countries should be able to satisfy up to 80% of their reductions by emissions trading and by establishing carbon sinks.³ The Europeans rejected this, and the meeting seemed headed for disaster. However, rather than admitting defeat, the conference was suspended until July 2001. In the interim, in March 2001, the new Bush administration caught the world by surprise by renouncing the Protocol. Ironically, this improved the negotiating position of America's JUSCAN partners. In order to come into force the Protocol had to be ratified by at least 55 countries, including Annex 1 countries responsible for 55% of Annex 1 country emissions in 1990.⁴ Since the U.S. share of such emissions is about 36%, it became imperative to keep the rest of JUSCAN in the Protocol. In addition, some hoped that by offering concessions, the United States could be persuaded to climb down from its extreme position and rejoin the negotiation. The result was that in July 2001, in Bonn, the European Union (EU) acceded to most of the demands that the Americans had made earlier in The Hague. The Protocol was further weakened in Marrakech in November 2001, when negotiators gave in to Russia's demand that its transferable credits for sinks be doubled. After two more years of study and negotiation, Russia finally ratified the Kyoto Protocol on November 18, 2004. On February 16, 2005, the Kyoto Protocol came into force, binding virtually every country in the world except the United States and Australia.

It is not completely clear what will be the effect of the Kyoto Protocol. While once it was envisioned that it would reduce developed country emissions by about 14% between 2000 and 2010, it now appears that in the wake of the Bonn and Marrakech agreements it could countenance as much as a 9% increase in emissions from these countries.⁵ Were that to occur, there would be little difference between the Kyoto path and a "business as usual" scenario, at least with respect to GHG emissions over the next decade.

Essentially what has occurred is that the vague loopholes that were embedded in the text of the Kyoto Protocol, rather than being eliminated, have been quantified and transformed into central features of an emissions control regime. In order to convey the flavor of these loopholes I will mention only the example of Russian "hot air." As a result of the post-communist economic collapse, Russian GHG emissions have sharply declined since

1990. What has happened, in effect, is that Russia is being allowed to sell the rights to emissions that would not have occurred, to countries that will in fact use them. Thus, more GHGs will be emitted than would have been the case under a regime that simply established mandatory emissions limits without such flexible mechanisms as emissions trading and credits for carbon sinks. Russia benefits economically, countries with high levels of GHG emissions are allowed to carry on business more or less as usual, and politicians can take credit for having addressed the problem. Meanwhile, global climate change continues largely unabated.

At the eighth Conference of the Parties (COP 8) meeting in Delhi in October 2002, the United States, once the foremost advocate of bringing developing countries into an emissions control regime, joined with the Organization of Petroleum Exporting Countries (OPEC), India, and China in blocking the attempts of the EU to establish a more inclusive regime after the Kyoto commitments expire in 2012.⁶ At COP 10, meeting in Buenos Aires in December 2004, the United States did everything it could to block even informal discussion of a post-2012 emissions regime. In retrospect, COP 8 may be seen as our entrance into an era in which the world has given up on significantly mitigating climate change, instead embracing a *de facto* policy of "adaptation only." Indeed, the most public pronouncement of COP 8, the Delhi Ministerial Declaration on Climate Change and Sustainable Development, emphasized adaptation almost to the exclusion of mitigation.

As should be clear already, the climate change discussion has its own vocabulary, and it is important to understand exactly what is meant by such terms as "adaptation." One influential characterization is this: "...adaptation refers to adjustments in ecological-social-economic systems in response to actual or expected climate stimuli, their effects or impacts."⁷ Various typologies of adaptation have been developed,⁸ but for the present purposes it is sufficient to mark distinctions on two dimensions.

Some adaptations are conscious responses to climate change while others are not. For example, plans that are currently under way to evacuate low-lying Pacific islands are conscious adaptations, while adaptations by plants, animals and ecosystems, and also those by farmers who incrementally respond to what they see as climate variability and changes in growing season, are nonconscious adaptations. Intuitively, this distinction is between climate change policy adaptations and those responses that are autonomous or automatic. On another dimension, some adaptations are anticipatory while others are reactive. An example of an anticipatory adaptation is constructing seawalls in order to minimize the impact of an expected sea level rise. An

example of a reactive adaptation is the efforts of a coastal community, damaged by a hurricane, to rebuild to a more secure standard. This dimension marks the intuitive distinction between adaptations based on foresight and those that are responses to immediate events. Taking these dimensions together, we can say that climate change adaptations can be driven by policy or by autonomous responses, and they can be based on predictions or stimulated by events.

There are, of course, other dimensions on which one might distinguish adaptations, and the categories that I have characterized admit of degrees of membership. These complications need not concern us for the present purposes, however.⁹

From the beginning of the climate change controversy, some in the research community have been concerned about the place of adaptation on the policy agenda.¹⁰ There were several sources of this concern.

First, the community that studies climate and weather impacts is greatly influenced by the natural hazards community, which has long been committed to the idea that human societies are to a great extent maladapted to their environments. Researchers point to ongoing failures to adapt to such predictable features of a stable climate regime as droughts, storms, and hurricanes. For people who suffer from these events it matters little if they are part of normal variability, associated with various long-term natural cycles, or consequences of anthropogenic climate change. What people experience is weather, not the statistical abstractions constructed by climatologists. An increasing focus on adaptation would help vulnerable people whether or not climate change is occurring.

A second source of concern, often expressed by anthropologists and those influenced by the social movements of the 1960s, is rooted in opposition to scientific, top-down, managerial approaches to human problems. Here the concern is that focusing primarily on mitigation (i.e., reducing GHG emissions) transforms problems of human survival and livelihood into technical problems of "carbon management," best approached by scientists with their formal methods of prediction and their economic approaches to evaluating policy options. With this view, subsistence farmers in the developing world would do better by adjusting and adapting to changing environmental conditions based on their indigenous knowledge than waiting for the right sort of policy to emerge in New York, Geneva, or Washington and then filtering down through a panoply of national institutions, subject to who knows what kinds of distortions and revisions.

In the discussion surrounding the Kyoto Protocol some researchers seemed to suggest that adaptation was a neglected option as a response to

climate change.¹¹ Yet concern for adaptation is both implicit and explicit in the FCCC.¹² The sentence that follows the statement of the objective quoted earlier states that “such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to assure that food production is not threatened, and to enable economic development to proceed in a sustainable manner. Article 4, which specifies the commitments undertaken by the parties to the Convention, mentions adaptation on several occasions. The parties agree to implement national or regional adaptation measures, to cooperate in preparing for adaptation to the impacts of climate change, and to take adapting to climate change into account in their relevant social, economic, and environmental policies and actions. In 1994, the IPCC published technical guidelines to assist nations in performing “vulnerability and adaptation assessments,” and in 1995 at COP 1 in Berlin, explicit guidance was provided on adaptation planning and measures. The second IPCC report published in 1996 observed that many societies are poorly adapted to climate, and emphasized the importance of adopting “no-regrets” policies to better adapt to both the prevailing climate regime and what may come next.

More recently, in July 2003, the strategic plan of the United States Government’s Climate Change Science Program listed, as one of its goals, understanding “the sensitivity and adaptability of different natural and managed ecosystems and human systems to climate and related global changes.”¹³ No comparable goal regarding mitigation figured in the plan.

Once it became clear that prevention was not possible, adaptation had to be part of the portfolio of responses. The logic of the U.S. government’s *Climate Action Report 2002* is unassailable: “because of the momentum in the climate system and natural climate variability, adapting to a changing climate is inevitable.”¹⁴ The adaptations may be clumsy, inefficient, inequitable, or inadequate, but it has been clear for some time that human beings and the rest of the biosphere will have to adapt to climate change or they will perish. What is in question is not whether a strategy of adaptation should and will be followed, but whether in addition there will be any serious attempt to mitigate climate change.¹⁵

THE IMPORTANCE OF MITIGATION

My claim is that a policy of adaptation without mitigation, the one we may be slouching toward, runs serious practical and moral risks. The practical risk, which itself has moral dimensions, is that a GHG forcing may quite

suddenly drive the climate system into some unanticipated, radically different state to which it is virtually impossible to adapt. Such a catastrophic climate surprise could occur through climate change setting off a series of positive feedbacks, for example warmer temperatures leading to lower albedo (surface reflectancy), leading to warmer temperatures, leading to lower albedo, and so on – or through the flipping of a climate “switch.” The current climate regime depends on regular circulation systems in the oceans and atmosphere that at various times have turned on, shut down, or been radically different. At the end of the Younger Dryas, about 11,500 years ago, global temperatures rose up to 8°C in a decade and precipitation doubled in about three years.¹⁶ The GHG forcing that is now occurring increases the probability of such an abrupt change. As a recent report from the National Academy of Sciences (2002, p. 107) states,

In a chaotic system, such as the earth's climate, an abrupt change could always occur. However, existence of a forcing greatly increases the number of possible mechanisms. Furthermore, the more rapid the forcing, the more likely it is that the resulting change will be abrupt on the time scale of human economies or global ecosystems.

Indeed, there is some evidence that abrupt changes may already be occurring. The Arctic circulation appears to be slowing,¹⁷ and since the 1980s the Arctic Oscillation has been stuck in its positive phase, causing lower pressures to persist over the Arctic. This has led to warmer summers and stormier springs, resulting in the greatest contraction of Arctic sea ice since modern measurements began, and perhaps much longer if anecdotal and anthropological reports are to be believed.¹⁸ The recent Arctic Climate Impact Assessment sponsored by the Arctic Council, a high-level intergovernmental forum that includes the United States, found that the warming in the Arctic is much more extreme than that in the mid-latitudes, with some Arctic regions having warmed 10 times as much as the mid-latitude average.¹⁹ Perhaps most telling, in the summer of 2000 a Canadian ship succeeded in transiting the legendary, once impassable Northwest Passage, the elusive goal of mariners since the 16th century.

Even without abrupt climate change, an “adaptation only” policy runs serious moral risks. For such a policy is likely to be an application of the “polluted pay” principle, rather than the “polluter pays” principle. Some of the victims of climate change will be driven to extinction (e.g., some small island states and endangered species), and others will bear the costs of their own victimization (e.g., those who suffer from more frequent and extreme climate-related disasters).

Consider what happens when a climate-related disaster strikes a developing country. Often large amounts of aid are pledged and commitments are made to provide both humanitarian assistance and support for transforming the society in order to reduce its vulnerability to future disasters, but little meaningful change actually occurs. Consider an example.²⁰

In 1998 Hurricane Mitch struck Honduras, killing at least 6,500 people and causing \$2–4 billion in damage, an amount equivalent to 15%–30% of Gross Domestic Product (GDP). At the height of the emergency, donors pledged \$72 million to the World Food Program for immediate humanitarian assistance. More than a year later, less than one-third of the promised funds had been delivered. At a donors' conference convened in Stockholm in 1999, \$9 billion was pledged for the reconstruction and transformation of Central America. The conference report stated that "the tragedy of Hurricane Mitch provided a unique opportunity to rebuild not the same, but a better Central America."²¹ Many of the resources that were provided were reprogrammed funds or "in kind" contributions. Much of the promised aid was not delivered in any form. Still, a significant amount of aid did find its way into the country, especially compared to pre-Mitch levels of assistance.

The 3-year reconstruction period is now over, and we can ask what has been accomplished. There are success stories trumpeted by various governments and non-governmental organizations (NGOs), and it would be incorrect to say that no improvements have been made. Still, Honduras remains extremely poor and vulnerable to climate-related disasters. One observer writes that even

...after Mitch, we see many environmentally bad habits on replay. People are moving back into high-risk zones, farming practices degrade upper watersheds, illegal logging damages forests, trash dumping and sediment stop up storm drains (50 percent are out of order...), new buildings weaken river channels; lack of educational campaigns, poor emergency readiness, forest burning.²²

Tragically, we have lived through this story before. In 1974, Hurricane Fifi swept through Honduras, killing about 8,000 people and causing about \$1 billion in damages. Shortly after this event, studies showed that the destruction was exacerbated by various social, economic, and political conditions. These included deforestation, as well as the displacement of campesinos into isolated valleys and on to steep hillsides by foreign-owned banana plantations and large-scale beef ranches. After Hurricane Mitch, studies again implicated these same factors. The report of the 1999 donors' conference states that the tragedy "was magnified by man-made decisions

due to poverty that led to chaotic urbanization and soil degradation."²³ This cycle of vulnerability is made vivid by the following description:

On the North Coast, the Aguan River flooded big after Fifi. It is a closed basin and dumps huge amounts of water straight into the ocean. Not only did the same flooding occur with Mitch, but it carried the village of Santa Rosa de Aguan out to sea, drowning dozens. There was no effort in the headwaters to do something to avoid this repeat catastrophe.²⁴

What I am suggesting is that the moral risk of a policy of "adaptation only" is that it will hit the poor the hardest, yet it is they who have done the least to bring about climate change. They will suffer the worst impacts and they have the least resources for adaptation.

Some people would deny that the poor are most vulnerable, pointing to the long history of mutual accommodation between indigenous peoples and their environments. However, underdevelopment is not the same as lack of development. In some regions of the world people are less able to feed themselves and to manage their environments than they were in the distant past.²⁵ In some cases contact with the Northern-dominated global economy has brought the risks of capitalism without the benefits. Traditional ways of coping have been lost or driven out, while modern approaches are not available. From this perspective underdevelopment should be thought of as something that has been produced by the global economy rather than as some point of origination from which development proceeds. This, however, is not to endorse any "myth of merry Africa" in which all was paradisiacal before European contact. No doubt, in many regions "capitalist scarcity [has simply] replaced precapitalist famine."²⁶

Whatever is true about the details of these speculations, it is clear that poor countries will suffer most from climate change just as poor countries suffer most today from climate variability and extreme events. Honduras suffers more from hurricanes than Costa Rica, Ethiopia suffers more from drought than the United States, and probably no country is more affected by floods than Bangladesh. In 1998, 68% of Bangladesh's land mass was flooded, affecting about 30 million people, and this was only one of seven major floods that occurred over a 25-year period. Generally, 96% of disaster-related deaths in recent years have occurred in developing countries.²⁷

The vulnerability of poor countries to climate change has been widely recognized in international reports and declarations, including the most recent IPCC report.²⁸ The Johannesburg Declaration, issued on the 10th anniversary of the 1992 Rio Earth Summit, declared that "the adverse effects of climate change are already evident, natural disasters are more

frequent and more devastating and developing countries more vulnerable."²⁹ The Delhi Declaration, cited earlier, expressed concern at the vulnerability of developing countries, especially the Least Developed Countries (LDCs) and Small Island Developing States (SIDS), and identified Africa as the region suffering most from the synergistic effects of climate change and poverty.

One response to the fact that it is the poor countries which will suffer most from climate change would be to internationalize the costs of adaptation. This is favored by many of those in the research community who have championed adaptation and was also envisioned in Article 4.4 of the FCCC, which commits developed countries to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects."

Discussions about providing such assistance did not begin until COP 1 in Berlin in 1995, and only recently have begun to move to the center stage. The 2001 Marrakech Accords established three new funds to assist developing countries with adaptation. The Least Developed Countries Fund supports the development of adaptation action plans. The Special Climate Change Fund assists all developing countries (not only the LDCs) with adaptation projects and technology transfer. The Kyoto Protocol Adaptation Fund finances concrete adaptation projects and programs. The latter fund is resourced by an adaptation levy placed on transactions under the Clean Development Mechanism, the program under which greenhouse gas reductions are traded between companies in the developed and developing world. The other two funds are supported by voluntary contributions. Canada and Ireland have committed \$10 million to the Less Developed Country Fund, and various nations have pledged to contribute a total of \$450 million per year to the Special Climate Change Fund. These funds were supposed to begin operation in 2005, but they were stalled at the COP 10 meeting in December 2004, in part due to demands by Saudi Arabia that it receive compensation if the world turns away from the use of fossil fuels.

While I am in favor of establishing these funds, many practical problems must be overcome before significant resources are invested, and even on the most optimistic scenarios there are clear limitations on what these funds can accomplish.³⁰ Parry, et al. (2001) have shown that on "business as usual" emissions scenarios, hundreds of millions of additional people will be at risk from hunger, malaria, flooding, and water shortages. Economists standardly estimate the damages of climate change on such scenarios at 1.5–2% of GDP.³¹ This implies damages of between \$705 and \$940 billion per year in current dollars once the full impacts of climate change are felt. The damages

from sea level rise alone have been estimated at \$2 trillion over the next 50 years.³² Although more than half of global GDP is in the developed countries, the damages of climate change are likely to be significantly higher than 2% of GDP in the LDCs.

These numbers have an air of unreality about them, and the cost of adaptation would presumably be less than the damages that climate change would entail. Still, even if the Marrakech mechanisms were fully funded, it seems quite unlikely that they would begin to approach the level of resources required to fully finance adaptation to climate change in the poor countries. Moreover, even if these mechanisms would significantly defray the costs of adaptation for the poor, another injustice would be entailed. The United States is the largest emitter of GHGs; yet it is outside the Kyoto framework, thus not a contributor to the funds established by that agreement. It is difficult to see any system as just in which the world's largest emitter of GHGs does nothing to pay for the damages it causes.

Even more troubling than the fact that poor countries suffer more from climate-related impacts than rich countries is the fact that poor people suffer more from such impacts than rich people, wherever they live. The disproportionate impact on the poor was specifically cited in the donors' report on Hurricane Mitch, but this pattern of the poor suffering most from extreme climatic events has been documented as far back as the "little ice age" that occurred in Europe from 1300 to 1850.³³

A recent example is the Chicago heat wave of July 14–20, 1995. In a fascinating book, Klineberg (2002) documents in detail the victims of this event; they were disproportionately low-income, elderly, African-American males living in violence-prone parts of the city. A total of 739 people died in the heat wave, more than four times as many as in the Oklahoma City bombing that occurred three months earlier although it received much less media attention. This pattern of the poor suffering disproportionately from climate-related impacts, even in rich countries, occurred once again in the wake of Hurricane Katrina, which struck the Gulf Coast of the United States in September 2005. As I write these words the damages have not yet been assessed, but it is clear that they are quite catastrophic.

Poor people suffer more than do rich people from climate-related impacts, wherever they live, but poor people in poor countries suffer most of all. A recent report from a consortium of international organizations concluded that

climate change will compound existing poverty. Its adverse impacts will be most striking in the developing nations because of their geographical and climatic conditions, their high dependence on natural resources, and their limited capacity to adapt to a changing

climate. Within these countries, the poorest, who have the least resources and the least capacity to adapt, are the most vulnerable.³⁴

This conclusion should not be surprising since the poor suffer more from “normal” conditions, and often only need a good shove to plunge into catastrophe.

Climate change and variability have enormous and increasing impacts on developing countries, yet very little has been done to integrate these considerations with overall development objectives. At the United Nations Millennium Summit in September 2000, the world's governments committed themselves to eight Millennium Development Goals (MDGs), the achievement of which is supposed to result in a 50% reduction in global poverty by 2015. Despite the fact that one of these goals is “ensuring environmental sustainability,” the MDGs make no mention of climate change or climate-related disasters as threats to environmental sustainability or to the overall goal of poverty reduction. Yet the report from the African Development Bank et al. (2003) quoted earlier states that “climate change is a serious threat to poverty reduction and threatens to undo decades of development effort.” A similar conclusion was reached in a recent review of the United Nations International Decade for Natural Disaster Reduction, which stated that “millennium development targets cannot be reached unless the heavy human and economic toll of disasters is reduced.”³⁵ It is clear that climate change and variability should be thought of not only as environmental problems, but also as major influences on the development process itself.³⁶

These claims are borne out by a brief look at some examples. Climate change is expected to increase the incidence of malaria in some regions. While malaria is a human health problem, it is also an obstacle to development. Gallup and Sachs (2000) found that between 1965 and 1990, a high incidence of malaria was associated with low economic growth rates and that a 10% reduction in malaria was associated with a 0.3% increase in economic growth. Freeman, Martin, Mechler, Warner, and Hausmann (2002) showed that in Central America over the next decade, exposure to natural disasters could shrink a growth rate of 5–6% per year to one that is virtually flat. This would have the effect of consigning millions to poverty which they might otherwise escape.

It is the poor who suffer most from climate-related disasters, and in the end they are largely on their own. International assistance is typically inadequate, and many of the changes required to reduce vulnerability can be made only by affected communities themselves in conjunction with their governments. In turn local, regional, and national decision-makers are often

constrained by the economic and political realities of the global order. There is little reason to expect this pattern to shift as a changing climate increasingly makes itself felt in climate-related disasters.

Grand proposals have been made for addressing these problems. For example, Senator Al Gore (1992) proposed a "Global Marshall Plan" aimed at "heal[ing] the global environment." Even if there were popular support for such proposals, there would not be much reason to be optimistic. Rich countries, perhaps especially the United States, have the political equivalent of attention deficit disorder. A "Global Marshall Plan," or even a conscientious effort to finance adaptation to climate change on a global scale, would require a level of sustained commitment that most Western societies seem incapable of maintaining, especially now when the war on terrorism presents similar challenges and is perceived as much more urgent. Indeed, if we had the moral and political resources to internationalize adaptation and distribute the costs fairly, it seems likely that the attempt to control emissions would succeed and we could effectively mitigate the effects of climate change. A just approach to adaptation is not really an alternative to a just approach to mitigation, since it would mobilize the same resources of respect and reciprocity. Just as we must acknowledge the necessity of adaptation, so a just approach to climate change cannot escape the challenge of mitigation.³⁷

Mitigating climate change by reducing GHG emissions is important for a number of reasons. First, slowing down the rate of change allows humans and the rest of the biosphere time to adapt, and reduces the threat of catastrophic surprises.³⁸ Second, mitigation, if carried out properly, holds those who have done the most to produce climate change responsible, at least to some extent, for their actions. It is a form of moral education. As President Bush has said in other contexts, it is important for actions to have consequences. As I have said, mitigation as envisioned by the FCCC embodies aspects of the "polluter pays" principle. By bearing some costs to reduce GHG emissions, those who have been most instrumental in causing climate change bear some of the burdens. An exclusive focus on adaptation is an instance of the "polluted pays" principle. Those who suffer from climate change bear the costs of coping with it.³⁹

MITIGATION: A MODEST PROPOSAL

There are various mitigation schemes that could plausibly be seen as both just and economically efficient, including what I have elsewhere called a

“modest proposal.”⁴⁰ The proposal is modest in that it conjoins two ideas that are very much alive in the policy world, each of which has influential supporters. However, the conjunction of these ideas has not been forcefully advocated because those who support one conjunct typically oppose the other. Still, the elements of the proposal have been discussed by a number of authors in varying degrees of detail.⁴¹

The United States government, especially during the Clinton administration, made a very strong case for the idea that a GHG mitigation regime should be efficient, and that emissions trading is a powerful instrument for realizing efficiency.⁴² Developing countries, led by India, have convincingly argued that a GHG mitigation regime must be fair, and that fairness recognizes that the citizens of the world have equal rights to the atmosphere.⁴³ In my view both the United States and the developing countries have a point. The emphasis on efficiency promoted by the United States is potentially good for the world as a whole. The emphasis on equality promoted by the developing countries seems to me to be morally unassailable. The challenge is to construct a fair system of emissions trading.⁴⁴

The main problem with emissions trading as it is developing is that not enough thought is being given to what might be called the end game and the start game: the total global emissions that we should permit and how permissions to emit should be allocated. I propose that we give the Americans what they want: an unrestricted market in permits to emit GHGs, but that we distribute these permits according to some plausible principle of justice.

What would be such a principle? I can think of the following general possibilities.

1. Distribute permissions on a per capita basis.
2. Distribute permissions on the basis of productivity.
3. Distribute permissions on the basis of existing emissions.
4. Distribute permissions on the basis of some other principle.
5. Distribute permissions on the basis of some combination of these principles.

Principles 4 and 5 are principles of last resort,⁴⁵ and Principle 3 is implausible. The existing pattern of emissions primarily reflects temporal priority in the development process, rather than any moral entitlement. In general, it is hard to see why temporal priority in exploiting a commons should generate any presumptive claim to continue the exploitation. Suppose that I started grazing a large herd of cows on some land that we own together before you were able to afford any cows of your own. Now that you have a few cows you want to graze them on our land. But if you do,

some of my cows will have to be taken off the land and as a result I will be slightly less rich. Therefore, I demand compensation. Surely you would be right in saying that since we own the land in common you have a right to your fair share. The fact that you haven't been able to exercise that right does not mean that you forfeited it.

Principle 2 has a point. Surely we would not want to allocate emissions permissions toward unproductive uses. If the world can only stand so many GHG emissions, then we have an interest in seeing that they are allocated toward efficient uses.⁴⁶ But what this point bears on is how emissions should be allocated, not on how emissions permissions should initially be distributed. Markets will allocate permissions towards beneficial uses. But it is hard to see why those who are in a position to make the most productive use of GHGs should therefore have the right to emit them for free. This is certainly not a principle that we would accept in any domestic economy. Perhaps, if you owned my land, you would use it more productively than I do. For this reason you have an incentive to buy my land, but this does not warrant your getting it for free.

In my opinion the most plausible distributive principle is one that simply asserts that every person has a right to the same level of GHG emissions as every other person. It is hard to see why being American or Australian gives someone a right to more emissions, or why being Brazilian or Chinese gives someone less of a right. The problem with this proposal is that it provides an incentive for pro-natalist policies. A nation can generate more permissions to emit simply by generating more people. But this problem is easily addressed. For other purposes the FCCC has recognized the importance of establishing baseline years. There is no magic in 1990 as the reference year for emission reductions. But if 1990 is a good year for that purpose, let us just say that every nation should be granted equal per capita emissions permissions, indexed to its 1990 population. If you do not like 1990, however, then index to another year. It is important to my proposal that per capita emissions be indexed to some year, but exactly which year is open to negotiation.⁴⁷

Three problems (at least) remain. First, in indexing emissions to 1990 populations I am in effect giving the developed countries their historical emissions for free. But don't the same considerations that suggest that everyone who was alive in 1990 should have equal permissions, apply to everyone who has ever lived? There is some force to this objection. But knowledge of the consequences of GHG emissions does to some extent seem morally relevant. Suppose that when my mother grazed her cows on our common property, the world was very different. Neither of us thought of

what we were doing as eroding common property. Indeed, neither of us thought of the area on which the cows were grazing as property at all. I benefited from the activities of my mother, but neither your mother nor mine was aware of any harm being produced. If my mother had been cleverer perhaps she would have asked your mother for the exclusive right to graze cows on this piece of land. Perhaps your mother would have acceded because she had no cows and didn't think of land – much less this land – as property (much less as her property). Suppose that I say that since we now have different understandings, I'm going to set matters right, and that from this point on you have an equal right to graze cows on our land. I acknowledge that if I am to graze more cows than you I will have to buy the right.

I think many people would say that I have done enough by changing my behavior in the light of present knowledge. Perhaps others would say that there is still some sort of unacknowledged debt that I owe you because of the benefits I reaped from my mother's behavior.⁴⁸ But what I think is not plausible to say is that what my mother did in her ignorance is morally equivalent to my denying your right to use our land to the same extent that I do. For this reason I don't think that historical emissions should be treated in the same way as present and future emissions. The results of historical emissions are also so much a part of the fabric of the world that we now presuppose that it is difficult to turn the clock back. At a practical level, countries such as Canada, Australia, and the United States have had a difficult time determining what compensation they owe their indigenous peoples. Determining the effects of unequal appropriation of the atmosphere through history would be even more difficult.

The second problem is that some would insist that it matters where GHG emissions occur, not because of their impact on climate, but because of their effects on quality of life. A high quality of life, it is argued, is associated with high levels of GHG emissions. What this objection brings out is that a bad market in emissions permissions would be worse than no market at all. In a properly functioning market, nations would only sell their emissions permissions if the value of the offer was worth more to them than the permission to emit. But while no international market in emissions permissions could be expected to run perfectly, there is no reason to think that such a market cannot run well enough to improve the welfare of both buyers and sellers.

This leads to the problems of monitoring, enforcement, and compliance. These are difficult problems for any climate regime. Perhaps they are more difficult for the regime that I suggest than for others, but I think that it is

clear that any meaningful emissions control will require a vast improvement in these areas.⁴⁹

The scheme that I suggest has many advantages. It would stabilize emissions in a way that would be both efficient and fair. It would also entail a net transfer of resources from developed to developing countries, thus reducing global inequality.

AGENTS AND BENEFICIARIES

Thus far I have argued that it is important to mitigate climate change both in order to reduce the risks of a climate surprise and because a policy that involves mitigation is more likely to distribute the costs fairly than a policy of "adaptation only." I have also briefly sketched and defended one approach to mitigation that is both fair and efficient. However, it is one thing to say how the world ought to be and it is another to give an account of whose responsibility it is to bring that world about. When it comes to the specification of moral agents and beneficiaries at the global scale, there are three important models in play.⁵⁰

The first model is the familiar one of state sovereignty that goes back at least to the Treaty of Westphalia in 1648. This model sees states as morally decisive over their own people, and the international order as constructed from agreements or conquests among these sovereigns. In this view states are both the agents and beneficiaries of any duties that might exist to address climate change. While this view continues to have strong advocates, in a world in which people and states are tied together by a single environment, a globalized economy, and common threats, this model seems less plausible than it once did.⁵¹ Indeed, it is rejected both by those who seek to establish a global order based on human rights and environmental protection, and by those who want to establish the hegemony of a single power based on its unique commitment to some set of preferred values.⁵²

A second model, the sovereignty of peoples, has been developed by Rawls (1999), arguably the leading political theorist of the 20th century. Rawls characterizes a people as having the following three features: a reasonably just government that serves its interests in various ways, including protecting its territory; a common culture, usually in virtue of speaking the same language and sharing historical memories; and finally, having a moral conception of right and justice that is not unreasonable. A society of peoples is established when decent peoples agree to adopt the law of peoples, codified in eight principles that express a commitment to keep agreements and to

honor human rights, and to go to war only in self-defense and then to abide by the laws of war.

While Rawls is a liberal and his account of the law of peoples is sometimes called "a theory of liberal sovereignty," he specifically rejects the idea that a theory of distributive justice applies globally. The main reason for this is that the purpose of the negotiation that leads to the establishing of the law of peoples is to arrive at "fair terms of political cooperation with other peoples."⁵³ Representatives of peoples would accept duties to contribute to the welfare of other peoples, but they would only be instrumental to the larger purpose of assisting other peoples to play their proper role in the society of peoples. Either as peoples or individuals we do not, according to Rawls, have direct duties to the individuals who constitute other peoples.

Rawls's distinction between peoples and states is central to his view; yet it is difficult to maintain. "Peoples," insofar as this concept is well defined, seem suspiciously state-like. One way that peoples are supposed to be importantly different from states is that, unlike states as traditionally conceived, peoples can only wage defensive wars and must honor human rights. However, these features do not clearly distinguish states from peoples, since they can be seen as moral restrictions on the sovereignty of states rather than as indicating a change of subject from states to peoples. If peoples are not states, then it is unclear what they are or whether they behave coherently enough to star in a theory of international justice.

Rawls speaks as if peoples are well-defined, self-contained, and as if they map on to territories and the Law of the Excluded Middle applies to membership in them. None of this is true. We need only to contemplate the claims of Palestinians, Kurds, or Orthodox Jews, or consider various national laws that attempt to legislate a people's identity in order to see that the very attempt to define a people is a problematical and highly political act. The fact that peoples are not self-contained and do not map on to specific territories is evidenced by several recent wars, notably in the Balkans. That the Law of the Excluded Middle does not apply to membership in a people can be seen by Mexican-Americans, Irish-Americans, or any number of other claimed, hyphenated identities. Indeed, individuals may shift their identities, depending on their purposes.⁵⁴ These considerations suggest that either Rawls's law of peoples is at heart a "morality of states," which he denies, or it is founded on a vague and unstable concept.

One particularly objectionable feature of Rawls's views is that because he thinks of peoples as normally occupying territories, he invests national boundaries with a moral significance that they do not have.⁵⁵ It is unjust, if anything is, that a person's life prospects should turn on which side of a

river she is born, or where exactly an imaginary line was drawn decades ago by a colonial power. But for Rawls, there is nothing morally objectionable about the arbitrariness of borders or the differential life-prospects that they may engender. When a pregnant woman in Baja California (Mexico) illegally crosses the border to San Diego, California (United States) so that her child will be born an American citizen with all the advantages that brings, there is for Rawls nothing troubling about the circumstances that motivate her action. Peoples have the right to control the borders of their own territories, but how can we fault a woman for doing what she thinks is best for her child?⁵⁶

Problems such as these lead people to embrace a third view, "cosmopolitanism," which holds that it is individual people who are the primary agents and beneficiaries of duties.⁵⁷ In this view duties, including duties of distributive justice, project across national boundaries, connecting individuals with each other, regardless of citizenship and residency.

While there are real differences between Rawls and his cosmopolitan critics, I believe that they can be brought closer together than one might think. Perhaps we can begin to see this when we realize that Rawls and his critics are to some extent motivated by different concerns. Cosmopolitans are concerned with what we might call moral or social "ontology." They insist that it is individual people who are the fundamental grounds of moral concern, not collectives or abstractions such as peoples or nations. Rawls is concerned with the question of how peoples with different views of the good can cooperate fairly with each other, and move together toward a peaceful future in which human rights prevail.⁵⁸ From the perspective of a person in a developing country who is being provided with a micro-loan (for example), it makes little difference whether she is being aided because she is the direct beneficiary of a moral obligation, or because the people of which she is a part is being aided so that it can become part of the society of peoples.⁵⁹

Rather than adjudicating between these views, I want to offer another perspective. We do not have to choose between being individuals who have duties to other individuals, or being members of a people which owes duties to other peoples. Both are true, and more besides. We are parents, students, members of NGOs, Irish-Americans, Muslims, citizens of towns and states, stockholders, consumers, patrons of the arts, sports fans, home-owners, commuters, and so on. We occupy multiple roles that have different responsibilities and causal powers attached to them. It is from these roles and powers that duties flow.

For example, I may have duties to reduce my consumption of energy, encourage my acquaintances to do the same, join organizations and support

candidates that support climate stabilization policies, disinvest in Exxon, support NGOs and projects in developing countries that assist people in adapting to climate change, and contribute to organizations that protect nonhuman nature. Exactly what duties I have depends on many factors including my ability to make a difference, how these duties compete with other moral demands, and so on. In the picture that I am urging, our duties form a dense web that crosses both institutional and political boundaries. We do not have to choose between accounts that privilege particular levels of analysis.⁶⁰

A full account would have to explain exactly how the clear, urgent duties relating to adaptation and mitigation that I have described map on to us as individuals in the various roles that we occupy. Indeed, it is here where much of the slippage occurs between the abstract recognition of what ought to be done and what I am motivated to do. In fact, a kind of "shadow" collective action problem can break out within each of us. I may agree that as a consumer I am responsible for intolerable amounts of GHGs, yet it may be very difficult to disaggregate this responsibility to me in my various roles as father, teacher, little league baseball coach, and so on. Many questions remain, but my central claim is clear: We have strenuous duties to address the problem of climate change, and they attach to us in our various roles and relationships.

OBJECTIONS

The simplest objection to what I have said would involve denying that there are any such things as duties that transcend national boundaries.⁶¹ Whatever plausibility such a claim might have would rest on supposing that it is neutral in applying to all countries and their citizens equally. For example, this claim would imply both that Americans have no duties to Sierra Leoneans and that Sierra Leoneans have no duties to Americans. However, while this claim may be formally neutral it certainly is not substantively neutral.⁶² Americans, acting both as individuals and through their institutions, can greatly influence the welfare of the citizens of Sierra Leone, but Sierra Leoneans are virtually powerless to influence the welfare of Americans. Thus, the apparently reciprocal nature of the duties involved can easily be seen as a mere charade.⁶³

However, it is easy to see why in the past some may have thought that duties do not transcend national boundaries. Famines and other disasters have occurred throughout history, but in many cases it was not known

outside the affected regions that people were dying. Even when it was known and people were willing to provide assistance, little could be done to help those in need. When people are not culpably ignorant and they are not in a position to be efficacious, there is little point in ascribing duties to them. But today things are very different with respect to information and causal efficacy. We live in an age in which national boundaries are porous with respect to almost everything of importance: people, power, money, and information, to mention a few. These help to make obligations possible. If people, power, money, and information are so transnational in their movements, it is hard to believe that duties and obligations are confined by borders.⁶⁴ The view that duties do not transcend national boundaries (unlike lawyers, guns, and money – not to mention drugs and immigrants) is really equivalent to denying people in the developing world a place at the table. It is the global equivalent of the domestic denial of rights to women and minority populations.

While most philosophers and theorists these days would not challenge the very existence of transnational duties, some would hold that there are very few such duties and that they are comparatively weak. Such a view is sometimes expressed by granting the existence of transnational duties but denying that they are duties of justice. There are two distinct grounds for such a view.

The first ground, which is broadly based in the tradition of the 17th century philosopher Thomas Hobbes, is based on denying that there is any such thing as “natural justice.” On this view justice is entirely a matter of convention: Justice consists in conforming to enforceable agreements; injustice consists in violating them. Since there is little by way of enforceable, international agreements, there are few transnational duties.

The second ground for such a view is based on a Communitarian account of justice. While this view may grant that enforceable agreements across communities can generate duties of justice, it holds that such duties typically arise within, rather than among, communities, and do not require explicit agreements. Since the world is characterized by a plurality of communities rather than by a single global community, the necessary condition for a dense network of transnational duties of justice is not satisfied. Thus, Communitarians come to the same conclusion as Hobbesians: there is little ground for supposing that there is a panoply of transnational duties of justice.⁶⁵

I will not mount a systematic refutation of these views here but instead restrict myself to a single observation about the view that while transnational duties may exist, they are not duties of justice. As I have indicated,

there are different grounds for such a denial. Such a denial may rest on the view that some transnational duties are distinct from duties of justice because they do not originate in agreement, are not owed to specific beneficiaries, or are less urgent than duties of justice. What I want to insist on is that there are urgent duties to respond to climate change, that those of us who are part of the global middle class contribute significantly to causing the problem, and that we can identify generally those who will suffer from our actions.⁶⁶ If this much is granted, then I am not sure that anything of significance turns on either asserting or denying that the duties in question are duties of justice.⁶⁷

The second objection has been raised most consistently and forcefully by Schelling (1992, 1997, 2000), who argues in the following way. Suppose that it is true that we have duties to improve the welfare of those who are worse (or worst) off. There are other, more efficient and efficacious, ways of doing this than by reducing our GHG emissions. For example, we could invest in clean water systems, vaccinations, literacy programs, and so on. Or we could simply give money to those who are worse off. Schelling concludes that

it would be hard to make the case that the countries we now perceive as vulnerable would be better off 50 or 75 years from now if 10 or 20 trillions of dollars had been invested in carbon abatement rather than economic development.⁶⁸

While this objection has some force, plausible responses can be given.

First, for any actual transfer from the rich to the poor, there is likely to be another possible transfer that is more beneficial. However, this does not imply that every such transfer we make is wrong, irrational, or ill-advised. This is because the alternative policies we choose between are not all those that are logically or physically possible, but those that have some reasonable chance of actually being implemented. Some of our duties with respect to climate change have a reasonable chance of being implemented because they involve controlling our own behavior or taking action in a democratic society. Even if the results of our discharging these duties were not optimal relative to the set of logically or physically possible actions that we might perform, their consequences would be very good indeed and this is sufficient for making it at least morally permissible to carry them out.⁶⁹

Furthermore, the duty to mitigate climate change does not depend on some general duty to benefit the worse (or worst) off. Such a principle might generate this duty, but so would more modest principles that require us to refrain from imposing serious risks on others. Indeed, the modesty of the principles required to ground such duties is part of what makes action on

climate change both possible and urgent, despite the obstacles hindering such action.⁷⁰

Finally, transferring resources to the worse (worst) off rather than mitigating our carbon emissions would do nothing to reduce the risk of catastrophic climate change. Nor would it provide comfort to those morally considerable aspects of nature that are vulnerable to climate change. There is no guarantee that transforming the poor into the rich would in itself protect environmental values, such as respect for what is wild and natural, that are at the heart of many people's concern about climate change.

For these reasons, despite the power of Schelling's objection, the idea that we have a duty to mitigate climate change is not defeated.

THE PROBLEM OF MOTIVATION

Even if what I have said is correct, a problem may linger. Morality is fundamentally directed toward action. Many would say that it seems clear that we are not motivated to address this problem. What is the point of seeing climate change as posing moral questions if we are not motivated to act? To this I have four related responses.

First, outside the United States, especially in Europe and the developing world, the problem of climate change is widely seen as a moral issue. Much of the anger at the American withdrawal from the Kyoto Protocol can only be understood by appreciating this fact. Seeing climate change as posing moral questions is part of appreciating others' points of view. Of course, having appreciated how climate change can be viewed in this way, we are free to reject this perspective. However, I believe that once we appreciate climate change as a moral problem, this view is virtually irresistible.⁷¹

Moreover, rejecting the moral framing of the climate change problem and instead approaching it from the perspective of self-interest does not lead to solutions. Although I think we could get further on this ground than we have gotten thus far, ultimately acting on the basis of narrow self-interest locks us into collective action problems that lead to worse outcomes overall. This is borne out by the current state of climate change negotiations and also helps explain why we as individuals often feel so powerless in the face of this problem.⁷²

Third, a moral response to climate change is difficult to escape. For the challenge of climate change is not only global and abstract, but also local and intimate. Once obligations are seen in the way described in the previous section – as forming a dense web of connections that link us in our myriad

roles and identities to people all over the world – then it becomes clear that virtually everything we do is morally valenced. When we bike instead of drive or donate money to Oxfam, we issue moral responses to the problem of climate change. Denying responsibility, dissembling, and ignoring the problem are themselves moral responses.

Finally, I think that it is a plain fact that climate change poses moral questions. While I do not want to argue in detail here about the concept of morality or defend the idea that there is a simple and direct relation between grasping the way the world is and being motivated to act, surely there is some connection between seeing an act as morally right and performing it. That something is the morally right thing to do is a powerful consideration in its favor. It may not always carry the day, but it cannot easily be ignored.

Taken together, these considerations go some way toward demonstrating the utility of viewing climate change as a moral problem.

CONCLUDING REMARKS

There are some reasons to be hopeful that the global community is beginning to wake up to the problem of climate change. The Kyoto Protocol came into effect in 2005, and the European Union is eager to take more aggressive action after 2012, when the first Kyoto commitment period expires. American corporations that do business outside the United States will be governed by the Kyoto system, and many are increasingly receptive to the idea of a single global system for managing GHG emissions. Even the northeastern states and California, largely ruled by Republican governors, are moving toward adopting their own GHG emissions policies. Meanwhile, the Inuit peoples are preparing a case to present to the Inter-American Commission on Human Rights, charging that the United States is threatening their existence through its contributions to global warming.

Despite these signs of hope, climate change is a scientifically complex issue that is difficult to address effectively and, in the United States at least, politicians can safely ignore this issue without fear of punishment. It is in part another victim of the war on terrorism. While climate change may be far from the public mind, GHGs continue to build up in the atmosphere, and the risks of climate change continue to magnify. When it comes to responding to fundamental changes in the systems that control life on Earth, denial, distortion, and spin are not viable long-term strategies.⁷³ Eventually, concern about climate change will emerge as an important public issue, and a movement toward creating a law of the atmosphere will gain momentum.

In the meantime it is important to recognize that those who suffer from extreme climatic events are often the victims of greed, indifference, and mendacity. It is human beings and their societies that are largely responsible for the climate change now under way, not nature or fortune. People and nations who willfully evade taking responsibility for the consequences of their actions may one day be called to account.

NOTES

1. In discussions of climate change “mitigation” refers to policies or actions directed toward reducing greenhouse gas emissions; “adaptation” refers to how plants, animals, and humans respond to climate change (excluding, of course, their mitigation responses). The meaning of these terms is further elaborated later.

2. For an account of the formation of the IPCC, see Agrawala (1998).

3. Emissions trading is a scheme in which an entity (such as a nation) whose emissions of some substance are limited by a binding agreement can purchase the right to emit more of the substance in question from an entity that will limit its emissions by the same amount in exchange for the payment (emissions trading is discussed in detail below). Carbon sinks are biological or geological reservoirs (such as forests) in which carbon is sequestered; the idea being that nations can “offset” their emissions by sequestering carbon that would otherwise be in the atmosphere.

4. Annex I countries are the industrialized countries of North America and Europe, Japan, Australia, and New Zealand (a full list can be found on the web at <http://unfccc.int/resource/docs/convkp/conveng.pdf>); together they were responsible for more than two-thirds of global GHG emissions in 1990.

5. Babiker, Jacoby, Reilly, and Reiner (2002).

6. For a list of OPEC member states see www.opec.org.

7. Smit, Burton, Klein, and Wandel (2000, p. 225). It should be noted that the term “adaptation” is typically used positively in opposition to the negative term, “maladaptation.”

8. See, for example, Abramovitz et al. (2002), Smithers and Smit (1997), Kates (2001), Kelly and Adger (2000), Reilly and Schimmelpfennig (2000), and Smit, Burton, Klein, and Wandel (2000).

9. Still, it is worth observing that adaptations can stand in feedback relations to the climate change to which they are a response. For example, one possible adaptation to a warmer world is more extensive use of air conditioning, which itself contributes to greater warming. Thus, we must be careful that in trying to live with climate change, we do not make it worse. I owe this point to Steve Gardiner.

10. For example, see Jamieson (1990, 1991).

11. For example, Rayner and Malone (1997), Pielke, Jr. (1998), Parry, Arnell, Hulme, Nicholls, and Livermore (1998), and Pielke, Jr. and Sarewitz (2000).

12. Because he has a definition of the term different from the one employed in the FCCC, Pielke, Jr. (2005) claims that adaptation is a neglected option, despite the occurrence of the word in the treaty and in many subsequent official documents. This way of putting the point seems to transform an important substantive critique into

what appears to be a linguistic dispute. The core of Pielke's, Jr. challenge is that focusing on adaptation to climate variability and extreme events, whatever their causes, would be much more effective than focusing on climate change, with the emphasis on scientific knowledge and mitigation strategies that this approach brings along, and the attendant policy gridlock that follows. While I am sympathetic to this view, it raises important questions about how to determine relevant alternatives when faced with policy questions. Why not, for example, abandon questions of weather and climate altogether and focus instead on global poverty? I have more to say about this in my response to Schelling below.

13. <http://www.climate-science.gov/Library/stratplan2003/vision/default.htm> (accessed August 8th, 2003).

14. <http://www.epa.gov/oppeoel/globalwarming/publications/car/ch6.pdf> (accessed June 22nd, 2002).

15. The idea that climate change poses a dichotomous choice between adaptation and mitigation may stem from Matthews (1987), who drew a sharp distinction between those she called "adaptationists" and "preventionists;" but already by 1991 Crosson and Rosenberg (1991) were treating this as a mistaken dichotomy that had been bypassed by the policy discussion.

16. National Academy of Sciences (2002, p. 27).

17. Häkkinen and Rhines (2004).

18. Thompson and Wallace (2001).

19. Available at <http://amap.no/workdocs/index.cfm?dirsub=%2FACIA%2Foverview> (accessed December 17, 2004).

20. The following discussion is based on Glantz and Jamieson (2000).

21. Summary report of proceedings: Inter-American Development Bank Consultative Group meeting for the reconstruction and transformation of Central America (May 1999), Stockholm, Sweden (http://www.iadb.org/regions/re2/consultative_group/summary.htm, accessed November 7, 2000).

22. *Honduras This Week* (May 29, 2000) (<http://www.marrder.com/htw/special/environment/70.htm>, accessed April 23, 2003).

23. Summary report of proceedings: Inter-American Development Bank Consultative Group meeting for the reconstruction and transformation of Central America (May 1999), Stockholm, Sweden (http://www.iadb.org/regions/re2/consultative_group/summary.htm, accessed November 7, 2000).

24. *Honduras This Week* (May 29, 2000) (<http://www.marrder.com/htw/special/environment/70.htm>, accessed April 23, 2003).

25. Davis (2001).

26. Iliffe (1987, p. 3).

27. See African Development Bank et al. (2003) and the sources cited therein for documentation of the claims made in this paragraph.

28. IPCC (2001).

29. Available on the web at http://www.johannesburgsummit.org/html/documents/summit_docs/1009wssd_pol_declaration.doc (accessed August 12, 2003).

30. One problem is that these funds are intended to finance adaptation to climate change, not adaptation to natural climate variability. This requires a successful applicant to identify the incremental risk posed by climate change and show that the benefit that the proposed project would provide would address only this increment.

This burden is not only almost impossible to discharge in many cases, but it is an absurd requirement for reasons explained below.

31. IPCC (2001).
32. Ayres and Walters (1991), as cited in Spash (2002, p. 164).
33. Fagan (2001).
34. African Development Bank et al. (2003, p. 1).
35. <http://www.id21.org/society/S10aisdr1gl.html> (accessed August 12, 2003).
36. See also Jamieson (2005a).
37. For reasons discussed in the next section and suggested in note 30, it is also easier to specify and quantify duties related to mitigation than those related to adaptation. Carbon dioxide emissions are directly measurable; success in adapting to climate change is not.
38. However, we should bear in mind that, though they are importantly related, reducing emissions is not exactly the same as slowing down the rate of climate change (Pielke, Jr., Klein, & Sarewitz, 2000).
39. For more on justice in adaptation see Adger, Huq, Mace, and Paavola (2005).
40. Jamieson (2001).
41. For example, Athanasiou and Baer (2002), Brown (2002), Cazorla and Toman (2001), Clausen and McNeilly (1998), Grubb (1995), Meyer (2000), Sachs et al. (2002), Shue (1995), Singer (2002), and the papers collected in Toth (1999). Of course, these ideas also have their detractors. For a critique of emissions trading see various papers by Larry Lohmann at www.thecornerhouse.org.uk. For an excellent survey of the issues see Gardiner (2004).
42. For a thorough defense of emissions trading in a GHG control regime see Stewart and Wiener (2003); for a contrary view, see Schelling (2002).
43. For a defense of this view see Agarwal and Narain (1991).
44. The following nine paragraphs are revised from Jamieson (2001).
45. Principle 4 is a principle of last resort because my list includes all the principles that I can think of that are attractive, and Principle 5 because it does not have the theoretical economy of the other principles on the list.
46. While this principle is one that is often associated with the American position and there are different ways of understanding the data, it is clear that the United States is an inefficient producer of GDP relative to most European countries and Japan. Thus, this principle might imply that some American emission permissions should be transferred to France (for example).
47. For a defense of 2050 as the index year, see Singer (2002); generally, for a discussion, see Gardiner (2004).
48. For example, Gardiner (2004) and Shue (1992).
49. See Stewart and Wiener (2003) for further discussion of these issues.
50. Cf. Held (2002).
51. For an argument that some transnational corporations are more powerful than many states, and hence *de facto* more sovereign, see Korten (1995) and Hutton (2002).
52. For the first view see Singer (2002); for the second see Boot (2002).
53. Rawls (1999, p. 69).
54. For more on these points see O'Neill (1994).
55. Pogge (1994) vigorously argues this point; I have learned much from his critical discussion of Rawls.

56. For further objections along these lines see Beitz (2000), Buchanan (2000), and Kuper (2000).

57. There are more expansive ways of characterizing cosmopolitanism (e.g., Jones, 1999, p. 15), and less expansive ways (e.g., dropping the requirement that individual people are the primary agents); this will do for the present purposes.

58. Here I have benefited from discussions with Leif Wenar, and from reading Wenar (2002).

59. For further discussion, see Crisp and Jamieson (2000).

60. Related views have been put forward by Kuper (2000) and Sen (2002). In Jamieson (2005b) I have discussed this view in some detail from a utilitarian perspective.

61. Dobson (1998) chides me for largely ignoring this view in Jamieson (1994). I have been helped by his discussion.

62. Cf. Anatole France who derided the claim that laws against sleeping under bridges apply equally to the rich and poor.

63. I have selected Sierra Leone for my example since it ranks dead last in the United Nations Development Programme's Human Development Index (UNDP, 2000).

64. While philosophers often draw technical distinctions between duties and obligations, for the present purposes I use these terms interchangeably.

65. Of course a Hobbesian or Communitarian could consistently hold that there are extensive and rigorous transnational duties but that they are not duties of justice. This sort of Hobbesian or Communitarian could agree with much that I say.

66. See Sachs (1993, p. 5) on the idea of the global middle class.

67. A clarification (at the behest of Walter Sinnott-Armstrong): my claim is that (everything else being equal) X's contributing significantly to causing a problem that harms a generally identifiable moral patient is a sufficient (not a necessary) condition for supposing that X has a duty with respect to the contribution.

68. Schelling (1992, p. 7).

69. Indeed, it may be obligatory to carry some of them out. There are a number of ways of defending such a claim in detail; one such way is by recourse to a moral theory that I call "progressive consequentialism" in unpublished work.

70. Because climate change involves actions in which some identifiable people and corporations are involved in inflicting harms on other people, there is beginning to be interest in viewing these actions as candidates for legal remedies. There has been discussion of such litigation in the pages of *The New York Times*, *The Economist*, and the *Financial Times*, as well as in the offices of various reinsurance companies and multinational corporations (or so it is said). However, the most severe consequences of climate change will be suffered by those in the further future, and there are serious philosophical problems about how duties to such beneficiaries should be understood. See Parfit (1984) and Howarth's essay in this volume.

71. Indeed, I believe that there is generally a movement toward environmental justice becoming the key organizing concept of environmentalism (see Jamieson, 2005c).

72. See Jamieson (2005b) and Gardiner (2003).

73. Cf. the following remark from Melissa Carey of Environmental Defense: "The Earth is round, Elvis is dead, and yes, climate change is happening."

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REFERENCES

- Abramovitz, J., Banuri, T., Girot, P., Orlando, B., Schneider, N., Spanger-Siegfried, E., Switzer, J., & Hammill, A. (2002). *Adapting to climate change: Natural resource management and vulnerability reduction*. Gland, Switzerland: IUCN – The World Conservation Union.
- Adger, N., Huq, S., Mace, M., & Paavola, J. (Eds) (2005). *Fairness in adapting to climate change*. Cambridge, MA: The MIT Press.
- African Development Bank, Asian Development Bank, Department for International Development, United Kingdom, Directorate-General for International Cooperation, The Netherlands, Directorate General for Development, European Commission, Federal Ministry for Economic Cooperation and Development, Germany, Organisations for Economic Development, United Nations Development Programme, United Nations Environment Programme, & the World Bank. (2003). *Poverty and climate change: Reducing the vulnerability of the poor through adaptation*. Washington, DC: The World Bank.
- Agarwal, A., & Narain, S. (1991). *Global warming in an unequal world*. New Delhi, India: Centre for Science and Development.
- Agrawala, S. (1998). Context and early origins of the Intergovernmental Panel on Climate Change. *Climatic Change*, 39, 605–620.
- Athanasiou, T., & Baer, P. (2002). *Dead heat: Global justice and global warming*. New York: Seven Stories Press.
- Ayres, R. U., & Walters, J. (1991). The greenhouse effect: Damages, costs and abatement. *Environmental and Resource Economics*, 1(3), 237–270.
- Babiker, M. H., Jacoby, H. D., Reilly, J. M., & Reiner, D. M. (2002). The evolution of a climate regime: Kyoto to Marrakech. *Environmental Science and Policy*, 2/3, 195–206.
- Beitz, C. (2000). Rawls's law of peoples. *Ethics*, 110(4), 669–696.
- Boot, M. (2002). *The savage wars of peace: Small wars and the rise of American power*. New York: Basic Books.
- Brown, D. (2002). *American heat: Ethical problems with the United States' response to global warming*. Lanham, MD: Rowman & Littlefield Publishers.
- Buchanan, A. (2000). Rawls's law of peoples: Rules for a vanished Westphalian world. *Ethics*, 110(4), 697–721.

- Cazorla, M., & Toman, M. (2001). International equity and climate change policy. In: M. Toman (Ed.), *Climate change economics and policy* (pp. 235–247). Washington, DC: Resources for the Future.
- Clausen, E., & McNeilly, L. (1998). *Equity and global climate change*. Washington, DC: Pew Center on Global Climate Change.
- Crisp, R., & Jamieson, D. (2000). A global resources tax: On Pogge on Rawls. In: V. Davion & C. Wolf (Eds), *The idea of political liberalism: Essays on Rawls* (pp. 90–101). Lanham, MD: Rowman & Littlefield Publishers.
- Crosson, P., & Rosenberg, N. (1991). Adapting to climate change. *Resources*, 103, 17–21.
- Davis, M. (2001). *Late Victorian holocausts: El Niño famines and the making of the Third World*. London: Verso.
- Dobson, A. (1998). *Justice and the environment*. New York: Oxford University Press.
- Fagan, B. (2001). *The little ice age: How climate made history, 1300–1850*. New York: Basic Books.
- Freeman, P., Martin, L., Mechler, R., Warner, K., & Hausmann, P. (2002). *Catastrophes and development: Integrating natural catastrophes into development planning*. Disaster Management Facility, World Bank, Working Paper Series no. 4. The World Bank, Washington, DC.
- Gallup, J. L., & Sachs, J. D. (2000). *The economic burden of malaria*. CID Working Paper 52. Center for International Development, Harvard University. Harvard University, Cambridge, MA.
- Gardiner, S. (2003). The pure intergenerational problem. *The Monist: Special Issue on Moral Distance*, 86(3), 481–500.
- Gardiner, S. (2004). Ethics and global climate change. *Ethics*, 114, 555–600.
- Glantz, M., & Jamieson, D. (2000). Societal response to hurricane Mitch and intra versus intergenerational equity issues: Whose norms should apply? *Risk Analysis*, 20(6), 869–882.
- Gore, A. (1992). *Earth in the balance*. Boston: Houghton Mifflin.
- Grubb, M. (1995). Seeking fair weather. *International Affairs*, 71(3), 463–496.
- Häkkinen, S., & Rhines, P. (2004). Decline of subpolar north Atlantic circulation during the 1990s. *Science*, 304, 555–559.
- Held, D. (2002). Law of states, law of peoples: Three models of sovereignty. *Legal Theory*, 8, 1–44.
- Hutton, W. (2002). *The world we're in*. London: Little, Brown and Company.
- Illiffe, J. (1987). *The African poor: A history*. Cambridge: Cambridge University Press.
- Intergovernmental Panel on Climate Change (IPCC). (2001). *Climate change 2001: Impacts, adaptation and vulnerability: A contribution of working group II to the Third Assessment Report of the Intergovernmental Panel on Climate change*. Cambridge: Cambridge University Press.
- Jamieson, D. (1990). Managing the future: Public policy, scientific uncertainty, and global warming. In: D. Scherer (Ed.), *Upstream/downstream: Essays in environmental ethics* (pp. 67–89). Philadelphia: Temple University Press.
- Jamieson, D. (1991). The epistemology of climate change: Some morals for managers. *Society and Natural Resources*, 4, 319–329.
- Jamieson, D. (1994). Global environmental justice. In: R. Attfield & A. Belsey (Eds), *Philosophy and the natural environment* (pp. 199–210). Cambridge: Cambridge University Press. Reprinted in Jamieson (2002).

- Jamieson, D. (2001). Climate change and global environmental justice. In: C. Miller & P. Edwards (Eds), *Changing the atmosphere: Expert knowledge and environmental governance* (pp. 287–307). Cambridge, MA: The MIT Press.
- Jamieson, D. (2005a). Duties to the distant: Aid, assistance, and intervention in the developing world. *The Journal of Ethics*, 9, 151–170.
- Jamieson, D. (2005b). When utilitarians should be virtue theorists. *Utilitas*. In press.
- Jamieson, D. (2005c). The heart of environmentalism. In: P. Pezzullo & R. Sandler (Eds), *Environmental justice and environmentalism: Contrary or complementary?* Cambridge, MA: The MIT Press. In press.
- Jones, C. (1999). *Global justice: Defending cosmopolitanism*. Oxford: Oxford University Press.
- Kates, R. (2001). Cautionary tales: Adaptation and the global poor. *Climatic Change*, 45, 5–17.
- Kelley, P. M., & Adger, W. N. (2000). Theory and practice in assessing vulnerability to climate change and facilitating adaptation. *Climatic Change*, 47, 325–352.
- Klineberg, E. (2002). *Heat wave: A social autopsy of disaster in Chicago*. Chicago: The University of Chicago Press.
- Korten, D. C. (1995). *When corporations rule the world*. West Hartford, CT: Kumarian Press.
- Kuper, A. (2000). Rawlsian global justice: Beyond *The Law of Peoples* to a cosmopolitan law of persons. *Political Theory*, 28(5), 640–674.
- Matthews, J. (1987). Global climate change: Toward a greenhouse policy. *Issues in Science and Technology*, 3, 57.
- Meyer, A. (2000). *Contraction and convergence*. Dartington, UK: Green Books.
- National Academy of Sciences. (2002). *Abrupt climate change: Inevitable surprises*. Washington, DC: National Academy Press.
- O'Neill, O. (1994). Justice and boundaries. In: C. Brown (Ed.), *Political restructuring in Europe: Ethical perspectives* (pp. 69–88). London: Routledge.
- Parfit, D. (1984). *Reasons and persons*. Oxford: Oxford University Press.
- Parry, M., Arnell, N., Hulme, M., Nicholls, R., & Livermore, M. (1998). Adapting to the inevitable. *Nature*, 395(6704), 741.
- Parry, M., Arnell, N., McMichael, T., Nicholls, R., Martens, P., Kovats, S., Livermore, M., Rosenzweig, C., Iglesias, A., & Fischer, G. (2001). Millions at risk: Defining critical climate change threats and targets. *Global Environmental Change*, 11(3), 181–183.
- Pielke, R., Jr. (1998). Rethinking the role of adaptation in climate change policy. *Global Environmental Change*, 8(2), 159–170.
- Pielke, R., Jr. (2005). Misdefining climate change: Consequences for science and action. *Environmental Science and Policy*. In press.
- Pielke, R., Jr., & Sarewitz, D. (2000). Breaking the global-warming gridlock. *The Atlantic Monthly*, 286(1), 55–64.
- Pielke, R., Jr., Klein, R., & Sarewitz, D. (2000). Turning the big knob: An evaluation of the use of energy policy to modulate future climate impacts. *Energy and Environment*, 11, 255–276.
- Pogge, T. (1994). An egalitarian law of peoples. *Philosophy and Public Affairs*, 23(3), 195–224.
- Rawls, J. (1999). *The law of peoples*. Cambridge, MA: Harvard University Press.
- Rayner, S., & Malone, E. (1997). Zen and the art of climate maintenance. *Nature*, 332–334.
- Reilly, J., & Schimmelpfennig, D. (2000). Irreversibility, uncertainty, and learning: Portraits of adaptation to long-term climate change. *Climatic Change*, 45, 253–278.
- Sachs, W. (1993). Global ecology and the shadow of 'development'. In: W. Sachs (Ed.), *Global ecology: A new arena of political conflict* (pp. 3–21). London: Zed Books.

- Sachs, W., Acsehrad, H., Akhter, F., Amon, A., Egziabher, T. B. G., French, H., Haavisto, P., Hawken, P., Henderson, H., Khosla, A., Larrain, S., Loske, R., Roddick, A., Taylor, V., Von Weizsäcker, C., & Zabelin, S. (2002). *The Jo'burg memo: Fairness in a fragile world, memorandum for the World Summit on Sustainable Development*. Berlin, Germany: Heinrich Böll Foundation.
- Schelling, T. (1992). Some economics of global warming. *The American Economic Review*, 82(1), 1-14.
- Schelling, T. (1997). The cost of combating global warming: Facing the tradeoffs. *Foreign Affairs*, 76(6), 8-14.
- Schelling, T. (2002). What makes greenhouse sense? *Foreign Affairs*, 81(3), 2-9.
- Schneider, S. H. (1989). *Global warming: Are we entering the greenhouse century?* San Francisco: Sierra Club Books.
- Sen, A. (2002). Justice across borders. In: P. de Greiff & C. Cronin (Eds), *Global politics and transnational justice*. Cambridge, MA: The MIT Press.
- Shue, H. (1992). The unavoidability of justice. In: A. Hurrell & B. Kingsbury (Eds). *The international politics of the environment* (pp. 373-397). Oxford: Oxford University Press.
- Shue, H. (1995). Avoidable necessity: Global warming, international fairness and alternative energy. In: I. Shapiro & J. W. Decew (Eds), *Theory and practice: NOMOS XXXVII* (pp. 239-264). New York: NYU Press.
- Singer, P. (2002). *One world: The ethics of globalization*. New Haven, CT: Yale University Press.
- Smit, B., Burton, I., Klein, R., & Wandel, J. (2000). An anatomy of adaptation to climate change and variability. *Climatic Change*, 45, 223-251.
- Smithers, J., & Smit, B. (1997). Human adaptation to climatic variability and change. *Global Environmental Change*, 7, 251-264.
- Spash, C. (2002). *Greenhouse economics: Value and ethics*. New York: Routledge.
- Stewart, R. B., & Wiener, J. B. (2003). *Reconstructing climate policy*. Washington, DC: AEI Press.
- Thompson, D. W. J., & Wallace, J. M. (2001). Regional climate impacts of the northern hemisphere annular mode. *Science*, 293(5527), 85-89.
- Toth, F. (1999). *Fair weather? Equity concerns in climate change*. London: Earthscan.
- United Nations Development Programme (UNDP). (2000). *Human development report 2000*. New York: Oxford University Press.
- Wenar, L. (2002). The legitimacy of peoples. In: P. de Greiff & C. Cronin (Eds), *Global politics and transnational justice* (pp. 53-76). Cambridge, MA: The MIT Press.