9

Climate Change and Global Environmental Justice

Dale Jamieson

The centerpiece of the 1992 Rio Earth Summit was the signing of the United Nations Framework Convention on Climate Change (FCCC). The signatories to the Convention, numbering more than 160 countries, committed themselves to the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." To begin to reach this objective, the Annex I countries agreed to voluntarily stabilize greenhouse gas emissions (GHGs) at 1990 levels by the year 2000.[1] It soon became clear that while the European Union was likely to keep its commitment, the United States, Australia, New Zealand, Japan, Canada, and Norway would not. In 1995 the parties to the FCCC adopted the Berlin Mandate: they pledged that by the end of 1997 they would reach an agreement establishing binding "quantified, limitation, and reduction objectives" for Annex I countries, and that no new obligations would be imposed on other countries during the compliance period. From December 1 to 10, 1997, the parties met in Kyoto, Japan, to try to negotiate the agreement.

In the run-up to Kyoto there was serious conflict between the developed and developing countries, as well as within both groups. The United States wanted an agreement that required stabilization at 1990 levels between 2008 and 2012. The European Union pressed for 15 percent reductions by 2010. On July 7, 1997, Foreign Minister Alexander Downer stated that "the only target that Australia could agree to at Kyoto would be one that allowed reasonable growth in our greenhouse emissions" (Australian Conservation Foundation 1998). The Alliance of Small Island States (AOSIS), whose very existence is threatened by sea-

level rise, proposed stronger measures than anyone would accept. India and China were mainly concerned to avoid undertaking new commitments but some Latin American countries, such as Chile and Argentina, signaled a willingness to do more.

Less than five months before the Kyoto meeting, the U.S. Senate unanimously passed the "Byrd Resolution," directing the president not to sign any agreement that requires the United States to limit or reduce GHGs, unless the same agreement also "mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period." The Clinton Administration, which had agreed to the Berlin Mandate, also supported the Byrd Resolution, declaring that it would strengthen the American hand at Kyoto. When President Clinton announced the American negotiating position on October 22, 1997, he stated that "the United States will not assume binding obligations unless key developing nations meaningfully participate in this effort" (Clinton 1997).

The Kyoto meeting was a "make-or-break" moment in the development of the international climate regime. Had the parties to the convention not been able to reach an agreement in Kyoto it is likely that the global effort to limit GHG emissions would have fallen apart. But after pulling some "all-nighters," the delegates to the conference managed to hammer out an agreement.

Four provisions are central to the Kyoto Protocol. First, the Annex I countries agreed to differentiated, binding targets that would reduce GHG emissions to about 5 percent below 1990 levels sometime between 2008 and 2012. Second, performance in meeting these targets will be assessed on the basis of "sinks" (e.g., tree planting) as well as "sources," and virtually all GHGs, not only carbon dioxide, will be taken into account. Third, emissions trading among Annex I countries and between Annex I countries and developing countries will be permitted. Finally, the Protocol reaffirmed that developing countries will not be subject to binding emissions limitations during the compliance period of this Protocol.

Hovering in the background are enormous uncertainties about how emissions can be monitored and how changes in sinks can be measured. But many important issues were left unresolved even in principle by the

last-minute compromise reached in Kyoto. For example, the Protocol does not specify sanctions for nations that do not keep their commitments. Nor does it address the extent of emissions trading and exactly how it will be implemented. Since it is now clear that the United States as well as some other Annex 1 countries plan to reach their targets primarily by purchasing credits rather than by reducing emissions, this issue is rapidly moving to the center of the debate. While some progress has been made on these issues in subsequent meetings in Buenos Aires in November 1998, and Bonn in November 1999, most major decisions have been deferred.

Debates about climate change are as much about the distribution of wealth, power, and authority as they are about whether or not scientists have accurately depicted the natural and human systems that contribute to climate change. How we as individuals should act in the face of the rapid anthropogenic environmental changes that are now sweeping the globe with disastrous consequences for many of our contemporaries, future generations, and nonhuman nature is one of the most interesting and important ethical issues that climate change confronts us with. But just as important are the ethical questions that underlie our collective responses to climate change. For what is at issue in these debates are the moral principles that will govern future global environmental governance. As Miller and Edwards point out in chapter 1, rising atmospheric concentrations of carbon dioxide and other greenhouse gases raise important questions not only about the nature and extent of anthropogenic degradation of the global environment but also about "how people of vastly unequal technological capacity and means are going to live together on the planet."

In this chapter I will address some competing conceptions of global environmental justice that lie at the heart of the North-South debate about climate change. I argue that the post-Kyoto process must find ways of addressing contentious normative issues, including those bound up with scientific representations of nature, if we are going to be able to mobilize support among diverse and far-flung publics for the kinds of foundational social and economic changes that will be needed to seriously address climate change. As Sheila Jasanoff (1997a, 242) has observed, scientific knowledge can only achieve public credibility and

"political authority when the boundaries of the relevant moral-political space [are] redrawn so as to accommodate the interests of all parties."

I begin with a brief discussion of the relations between scientific knowledge and conceptions of justice. I then characterize two competing conceptions of global environmental justice and go on to suggest a proposal of my own that incorporates various elements of them. Finally I speculate on how the climate change issue is likely to develop and draw some conclusions.

Scientific Knowledge and Conceptions of Justice

The question of relationships between scientific knowledge and conceptions of justice is a large one. The simplest thing to say (echoing Hume) is that an "ought" cannot be derived from an "is," and so insofar as science is a purely descriptive enterprise it can never tell us how the world ought to be. While this is true, it does not take us as far as it may seem. Logical derivation is one relation that may hold between beliefs, but it is not the only one. Moreover, it is hard to defend the idea that science is a purely descriptive enterprise. Scientific knowledge informs normative commitments, undermines them, and shapes them in all sorts of other ways both gross and subtle.[2] While I cannot provide a full account of the relations between science and conceptions of justice here, I will discuss some examples of these relations in the context of climate change.

One principle at work is this: In order for the language of justice to come into play, there must at least be the serious possibility of people significantly affecting each other's interests. What this means in the context of climate change is that if human activity does not pose a threat to climate stability, then questions of global environmental justice do not arise with respect to GHG emissions. This principle explains in part why the discussion of climate change has focused so centrally on science.[3] A strong case for skepticism about the reality of climate change undercuts the debate about what are morally acceptable (or required) policy responses.

A second general principle at work is that "*ought* implies *can*." People or nations cannot be morally obliged to do what they cannot do. Thus there can be no moral injunction that requires humans to fly or cats to be vegetarian. Similarly, some argue that the United States cannot reasonably be required to conform to the Kyoto reductions since it would not be possible for the United States to do so. This argument, of course, trades on treating a lack of political will as if it were equivalent to some strong form of impossibility such as physical impossibility.

Science enters the debate about justice in various other, more subtle, ways as well. Scientific debates about "the facts" are often proxies for debates about moral responsibility. For example, a recent study suggests that North America is such a large carbon sink that the United States may be neutral with respect to its contributions to concentrations of atmospheric carbon dioxide (Fan et al. 1998). Many scientists are disposed not to believe these results. Some worry that "groups opposed to the Kyoto treaty will seize on the estimate to argue that the United States doesn't need to reduce its emissions to comply with the accord" (Kaiser 1998, 386). Sure enough, Steven Crookshank of the American Petroleum Institute says that this study "calls into question the scientific basis on which we're making these decisions, when we still don't know if the United States is even emitting any carbon in the net" (Kaiser 1998, 387).

Scientific and moral authority are sometimes explicitly linked. The science most influential in shaping the discussion relating to the FCCC has been that collected and organized by the Intergovernmental Panel on Climate Change (IPCC). In 1988 the IPCC was convened by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP). The IPCC published major reports in 1990 and 1996, and has also produced a stream of occasional studies, assessments, and discussion papers. Hundreds of scientists from all over the world have been involved with the IPCC in various ways. The IPCC process is one of the most ambitious attempts ever mounted to mobilize science for the purposes of making international law and policy.

Despite its scientific credentials, different constituencies see the IPCC in different ways. Since most of the scientific expertise relating to climate change is in the industrialized world, and indeed in only a few highly specialized research centers (Hadley in the United Kingdom; CCCMA in Canada; Max Planck Institute in Germany; GISS, GFDL, Livermore, Lamont-Doherty, and NCAR in the United States; Macquarie University in Australia, among others), the IPCC's attempts at inclusiveness are seen

by some as a noble dream and by others as a cruel deception. Academics who write in the tradition of science studies have seen the IPCC as a paradigmatic institution for creating apparently natural facts through the artful use of social processes (Jasanoff and Wynne 1998). Environmentalists typically view the IPCC as the voice of reason and dispassionate objectivity in the cacophony of greed and self-interest characteristic of environmental politics. But leftists who oppose "globalism" and rightists who are against "internationalism" have seen the IPCC as a malevolent conspiracy. Even some who champion the IPCC see it as a conspiracy, but one that is benign (Lahsen 1999). The credibility and authority of the IPCC rests, in part, on perceptions of its moral and political authority.

These observations may help to explain cross-national differences in the acceptance of scientific claims about climate change, especially those emanating from the IPCC. From the beginning the IPCC's conclusions were more warmly embraced in Europe than in the United States. This is part of the reason why during the 1990s most European countries were reducing GHGs while the United States was still increasing them.[4] By the early 1990s the European debate had already moved away from the science of climate change to discussion of policy responses.

Developing-country views of climate science illustrate how the credibility of science is conditioned by the moral and political structures of global society. One of the peculiarities of the climate change debate in the United States is that much of the science that supports the case for climate change has been produced in that country, yet skepticism about climate change is more influential in the United States than in any other industrial country. This has certainly damaged the credibility of the case for climate change in the developing world. Americans who have promoted the idea of climate change have not been able to convince many of their fellow citizens (e.g., the Republican Congress) of its reality, much less have they succeeded in motivating them to take significant actions in response. When this apparently self-refuting nature of American climate-change science is combined with the standing skepticism that many Third World people have about knowledge produced in the developed world, it is not surprising that many developing countries have refused to take the climate change issue seriously even though they may have the most to lose if climate change is in fact underway.

A final example of how perceptions of moral authority can condition particular scientific claims emerges from recent activities in the United States that have fragmented the unity of industrial opposition and helped move the American debate over climate change away from the question of whether climate is changing toward the question of what we should try to do about it. In a speech at Stanford University in 1997, Sir John Browne, CEO of British Petroleum, acknowledged the threat of climate change and went on to sketch some steps to address it. This was the first major crack in the united front that major corporations had erected to defend their interests against possible climate stabilization policies. In his October 22 speech later that year, President Clinton began to reframe the domestic political discussion of climate change when he declared that "the problem is real" (Clinton 1997). And although most of the American business community opposed the Kyoto Agreement, their coalition continued to fragment throughout 1998, the warmest year since at least 1856. In May 1998, the Pew Center on Global Climate Change was launched with the support of such corporations as American Electric Power, BP America, and Weyerhauser. The Pew Center explicitly accepts "the views of most scientists" and views Kyoto as the first step in addressing climate change. Throughout the unusually warm summer of 1998 the President and Vice President repeatedly linked various weather anomalies to climate change. On October 20, 1998, executives from General Motors, Monsanto, and British Petroleum held a joint press conference with the World Resources Institute in which they declared that "climate change is a cause for concern, and precautionary action is justified now" (*Greenwire* 1998). In 1999 such companies as Ford Motor Company followed Shell Oil, United Technologies, and BP Amoco in withdrawing from the Global Climate Coalition, the industry lobbying group that campaigns against climate change measures. Shell, United Technologies, and BP Amoco went on to join the Pew Center's "Business Environmental Leadership Council." Although a stubborn band of contrarians continues to have the ear of the Republican Congress, warmer temperatures and the breakup of the industrial coalition

have fractured the moral authority behind critiques of climate science, and the discussion has dramatically shifted away from climate models toward economic models.

Global Environmental Justice: The View from Above

Differences between the United States and developing countries are grounded in competing views of global environmental justice. In this section I concentrate primarily on the American position on climate change.

In the United States the debate about reducing GHG emissions centers on self-interest and national interest rather than on appeals to morality. Studies have been thrown around about how compliance with the Kyoto Protocol would devastate the economy or put Americans at a competitive disadvantage. The debate has been dominated by hypersensitivity to the domestic politics of which sectors would win and which would lose as a result of controlling GHGs. There is also a backlash, at least in Congress, against government regulation, and the Kyoto Protocol is seen as underwriting government intrusion in the economy. In addition to these factors, the United States is in a period of confusion and ambivalence about its role in the world. This is well symbolized by a series of votes in April 1999, in which the U.S. House of Representatives both failed to support the NATO air campaign against Serbia, and voted twice as much money for carrying out the campaign as the president had requested.

In his October 22, 1997, speech President Clinton did make a moral appeal when he stated that "if there are dislocations caused by the changing patterns of energy use in America, we have a moral obligation to respond to those to help the workers and the enterprises affected." And although the president noted that "the United States has less than 5 percent of the world's people, enjoys 22 percent of the world's wealth, but emits more than 25 percent of the world's greenhouse gases," he did not cast this observation in the language of morality. Instead he went on to say that "we must begin now to take out our insurance policy on the future" (Clinton 1997). While American opposition to Kyoto might therefore be viewed as resting on national interests, these conceptions of interests are constructed against a backdrop of moral claims about such issues as efficiency, feasibility, and fairness.

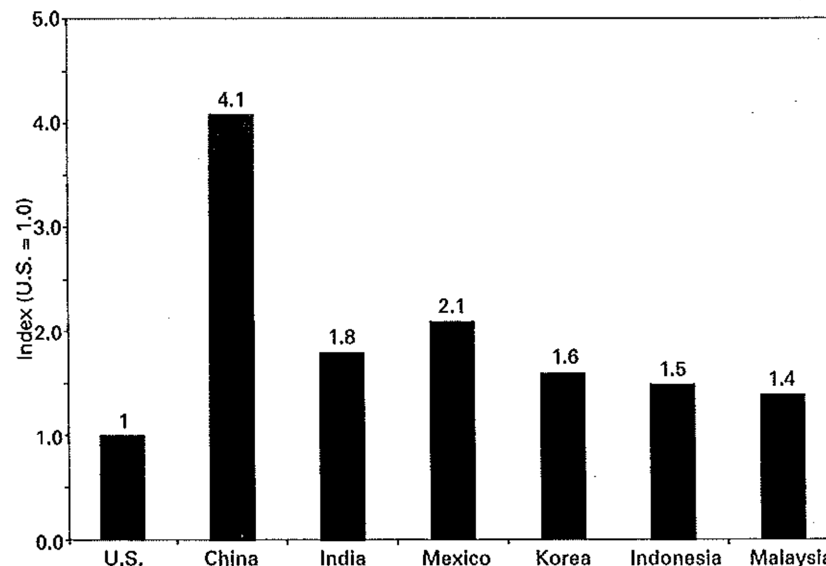

Figure 9.1
1995 Energy/GDP ratios for the United States and several developing countries.
Source: President's Council of Economic Advisers, 1998, 29.

The appeal to efficiency rests on the fact that developed countries generally produce more GDP per unit of energy than developing countries,[5] as can be seen from figure 9.1. Any policy that restricts energy use on the part of the developed countries will only lead to a more inefficient global economy, which will be bad not only for people in the industrial countries but for the world as a whole. The CEO of Exxon went so far as to visit China in the run-up to Kyoto, where he argued that restrictions on GHG emissions for developed countries was bad for China, since anything that is bad for the economies of the developed world will ultimately hurt China's export industries. He was not found to be terribly convincing.

A second argument appeals to feasibility. Just as the United States could not remain half slave and half free, so restricting the emissions of only a small number of countries and leaving the emissions of most countries uncontrolled cannot possibly be an effective permanent solution. Two arguments are given for why this is so. First, in the post-Kyoto world, energy-intensive industries in the developed countries will simply

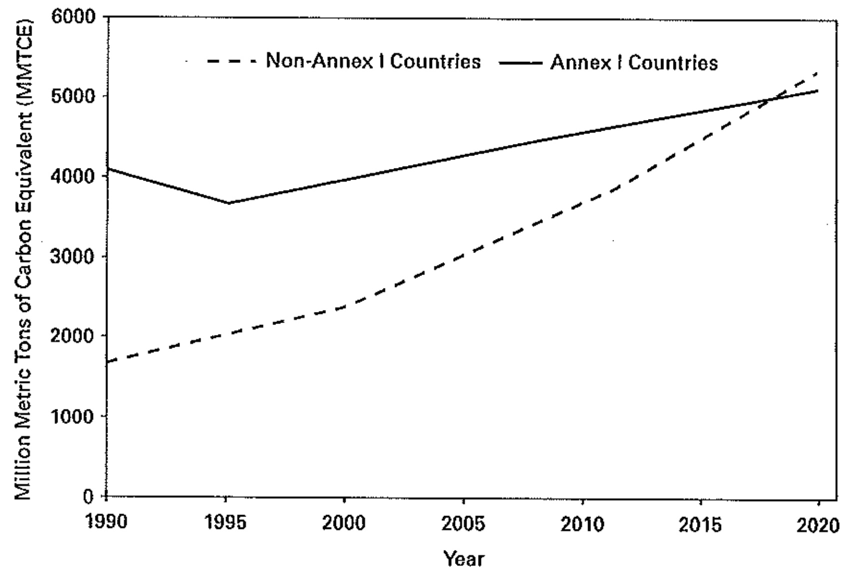

Figure 9.2
Projected emissions of Annex I and Non-Annex I countries without new abatement policies. Data represent million metric tons of carbon equivalent (MMTCE) from fossil fuel combustion. *Source*: President's Council of Economic Advisers, 1998, 11.

move offshore to escape emissions limitations. The same GHG emissions will occur, but the developed countries will no longer benefit from them. The second argument is that by 2020 the developing countries will be the largest emitters of GHGs, and over the next century their emissions will swamp those of the Annex I countries, as can be seen from figure 9.2, which graphs GHGs through time in million metric tons carbon equivalent (MMTCE).

The third argument against the Kyoto Protocol that is commonly given has a more distinctively moral tone: "It just ain't fair to single out a handful of countries for emissions control when the rest of the world goes unregulated." If climate change really is a global problem, then everyone in the world should do their part in solving it. The Kyoto Protocol violates a principle of equality that requires all countries to be treated the same, or (perhaps more subtly) a principle regarding the fair sharing of burdens.

Outside the United States these arguments are not seen as particularly persuasive. Probably most Europeans see the developed world as getting off easy in the Kyoto Protocol. Even countries like Australia, Norway, and New Zealand, which argued for increases in their emissions, did not for the most part argue on the basis of general principles like efficiency or equality. Instead they claimed that they were special cases and should be exempted from requirements imposed on larger, richer industrial countries with more diversified economies.

In my opinion, the most serious of these arguments given for the view from above is the second one. Anyone who appreciates the seriousness of climate change should recognize the importance of eventually bringing at least some of the developing countries into an emissions control regime. The question is how to do this in a way that is both fair and effective. Indeed, proposals not seen as fair by developing nations are not likely to be effective in bringing them into an emissions control regime (for a contrary view, see Victor 1999).

Global Environmental Justice: The View from Below

Like the Annex I countries, the developing countries are a large and diverse group of nations. I will focus mainly on the picture of global environmental justice that is commonly expressed in the climate negotiations by countries such as India and China. Roughly, their view is that if there is a problem about climate change, it has been caused by the developed countries; therefore, they are the ones who should be addressing it. This is really a version of the "polluter pays" principle. In this case the developed countries are the polluters, so they should pay to mitigate the damages.

This position can be bolstered by appeal to various principles of equality. One version of such a principle would ask which countries can afford to address GHG emissions without damaging the serious interests of their citizens. The answer would be the same one that the delegates to Kyoto arrived at: the developed countries. Another version of the appeal to equality would assert that reducing inequality between nations is in itself a good thing. So the provision of any global public good that requires developed but not developing countries to pay is a good thing.

The developing countries point out that throughout the nineteenth and twentieth centuries the nations of Europe and North America became rich by developing powerful industrial economies driven by fossil fuels. Four out of five pounds of carbon dioxide currently in the atmosphere were emitted by these countries. (Carbon dioxide has a residency time of 120 years in the atmosphere.) Although in recent years emissions have been growing in the less developed countries, the United States is still by far the world's largest emitter, with annual emissions one-third greater than China's and two-thirds greater than India's. Each year since 1990 the actual increase in American carbon emissions has been greater than that of any country except China and greater than the total carbon emissions of Brazil. On a per capita basis, Americans are responsible for more than seven times the emissions of the Chinese and eighteen times the emissions of the Indians. Moreover, it is unfair to equate the "necessary" emissions of the developing world, in their quest for minimally decent lives for their citizens, with the "luxury" emissions of the industrialized world produced by gas-guzzling second cars and overheated and overcooled homes and offices.[6]

It is easy to see why most developing countries are unwilling even to think about controlling their emissions until they see some real progress on the part of the developed countries in reducing theirs. The rich countries are the ones that have caused the problem, continue to emit more than their fair share per capita, and have the resources to develop and adopt alternative technologies. Moreover, they promised to stabilize their emissions at Rio in 1992 but failed to keep their promise. Even worse, it now appears that at least some Annex I countries are planning to fulfill their Kyoto agreements through clever bookkeeping rather than through emissions reductions. The Kyoto loopholes that make this possible involve counting sinks as well as sources in assessing performance, emissions trading, and reductions keyed to 1990 emissions levels.

The Australian government plans to take advantage of the first loophole. By planting trees (many of them plantation pines that will be harvested for timber) in areas in which native forest was cleared before 1990, Australia may earn enough credits for increasing its sinks to significantly increase its emissions. The United States plans to achieve 75 to 85 percent of its emissions reductions by purchasing credits from other

countries, many of them from the former communist countries (President's Council of Economic Advisers 1998). The latter's GHG emissions have declined precipitously since 1990 as a result of their collapsing economies, leaving them with many salable permits. However, these permits really reflect what is sometimes called "hot air" (rather than emissions that would actually occur if they were not sold). Thus emissions trading not only allows some countries to avoid reducing their own emissions at home, but also results in GHG emissions that would otherwise not occur. Paradoxically the Kyoto Protocol has the potential for increasing GHG emissions rather than reducing them. This enrages environmentalists and many in the European Union. It also does little to convince the developing world that the rich countries are serious about climate change.

A Modest (?) Proposal

Progress within the climate regime seems likely to continue to elude negotiators so long as North and South continue to remain deadlocked over such basic moral issues. Is it possible to envision a way forward? In this section, I offer a modest proposal. 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 that constitutes this proposal has not been forcefully advocated because those who support one conjunct typically oppose the other. The proposal has been discussed by a number of authors, however, in varying degrees of detail (see Rayner et al. 1999 and the literature cited therein). This modest proposal is important both for its intrinsic fairness, and because it provides an illustration of how an explicit focus on normative principles might help shift grounds of debate, thus opening new opportunities for settlements that can bridge rather than exacerbate existing differences.

In my view both developed and developing countries have a point. The emphasis on efficiency being promoted by the United States is potentially good for the world as a whole. But the emphasis on equality on the part of the developing countries seems to me to be morally unassailable. The main problem with emissions trading as it is developing is that no serious thought is being given to what might be called the end game and 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, and principle 3 is implausible.[7] 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 have not 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, we have an interest in seeing that they are allocated toward efficient uses. But what this point bears on is how emissions should be allocated, not on how they should initially be distributed. Markets will allocate permissions toward 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 would thereby give someone a right to more emissions, or why being Brazilian or Chinese should give someone less of a right. The problem with this proposal is that it provides an incentive for pronatalist 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 seen the importance of establishing baseline years. There is no magic in 1990 as the reference year for emission stabilization. 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, 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.

Four 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 seem to some extent to be 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 were aware of any harms 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 granted it because she had no cows and did not think of land—much less this land—as property, much less her property. Suppose that I say that since we now have different understandings, I

am going to set matters right, and that henceforth 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. 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 do not 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 both Australia and the United States have had a difficult time in determining what compensation they owe their indigenous peoples. Determining the effects of unequal appropriation of the atmosphere 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. High quality of life, it is argued, is associated with high levels of GHG emissions. But 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 they cannot run well enough to improve the welfare of both buyers and sellers.

A third objection would come from some developing countries. My proposal brings them into the regime before developed countries have taken the first steps to reduce emissions. True enough, but the developing countries have the most to lose from climate change: If the regime is to be effective they will have to enter at some point anyway, and the terms that I have proposed are the most favorable ones they will get by a long shot.

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 vast improvement in these areas.

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 the developed to the developing countries, thus reducing global inequality. Too bad that it does not have much chance of being adopted.

Back Down to Earth: Prevention vs. Adaptation

By the end of September, 2000, the Kyoto Protocol had been signed by eighty-four countries and ratified by twenty-nine. What happens in the United States is especially important since, in order to take effect, the Protocol must be ratified by fifty-five countries that together emitted 55 percent of GHGs in 1990. Since the United States was responsible for about 38 percent of the world's emissions in 1990, the Protocol is unlikely to become law without American ratification (Bolin 1998).

The United States signed the Protocol in November 1998, but the Clinton administration has stated that it will not submit the Protocol to the Senate for ratification until it gets "key developing countries to meaningfully participate." At the Fourth Conference of the Parties in Buenos Aires, Nauru, Niue, Argentina, and Kazakhstan volunteered to reduce the rate of their increases in GHGs on the same timetable as the Annex I countries. A good case can also be made for supposing that many developing countries, including China, are taking steps to reduce the rate of their increases of GHG emissions (Knight 1998). But clearly the American government is unimpressed. The administration's standard of "meaningful participation" is weaker than the Senate's requirement that there be an agreement than mandates specific limitations or reductions for developing countries, but the administration wants more from the developing countries than it got in Buenos Aires before it is willing to argue the case for ratification. Senator Hagel, the leading Republican sponsor of the Byrd resolution, was openly dismissive of Argentina's commitment to reduce its rate of increase in GHG emissions. Ultimately, however, what is important about the Byrd Resolution is not its language

but rather its unanimous passage, which indicated just how much opposition there was to the Kyoto Protocol in the U.S. Senate. The 1998–2000 Republican Senate was unlikely to ratify the Protocol under any circumstances, and even if the Democrats had taken control of the Senate in the elections of 2000 it would still have faced serious opposition. However, even if the United States succeeds in extracting more concessions from developing countries and the Kyoto Protocol is submitted and ratified in the future, it is far from clear that the United States would be able to keep its commitments. The heavy reliance on emissions trading in the administration's plan is in part a response to the enormous political, economic, and social obstacles to trying to get Americans to change their energy-profligate ways. The *New York Times* has reported that "since the early 1970s, as the average household has shrunk by a sixth, the average new home has grown by a third" (October 22, 1998, A-1). And because American GHG emissions have been on an upward trajectory since the country's 1992 promise to reduce emissions, meeting the Kyoto target will require a reduction of more than 30 percent from "business-as-usual" scenarios.

Even if every country kept its Kyoto commitments, the effect on the atmosphere would be relatively slight. In 2010 the difference between a world of perfect conformity to the Kyoto Protocol and a world with no such agreement at all is 1.5 parts per million (ppm) of carbon dioxide, the difference between an atmospheric concentration of 382 ppm and 383.5 ppm (Bolin 1998). To put the point in perspective, in the 1990s we have had a 0.25°C warming from the 1961–1990 baseline; perfect conformity to the Kyoto agreement would reduce the expected warming in 2050 from 1.4°C to 1.395°C (Parry 1998).

But much more may be at stake than 1.5 ppm of carbon dioxide or .005°C of warming. In the positive scenario the FCCC process is like the ozone regime. The initial highly publicized agreements at Vienna and Montreal were not sufficient for repairing the ozone layer, or even to prevent further depletion. The really strong agreements to phase out CFCs happened later, in London and Copenhagen, with much less publicity. From this perspective what is important is to bring the countries of the world into an emissions-control regime by getting them to agree to take the first steps, and then to revisit this agreement as the science

develops and the consequences of a warming are felt. Moreover, mandatory limits, even if they are relatively weak at present, send signals to the markets that the era of fossil fuels is over. New investment will move away from fossil fuels toward renewables, bringing about technical innovation and lower prices.

However, the more likely outcome (in my opinion) is that the attempt to control GHG emissions will fall apart. Diplomats may continue to fly around the world having meetings and coining acronyms, but none of this will matter much on the ground. Or perhaps in a fit of international honesty we may just give it all up. Either way, the world will turn toward adaptation. Indeed, influential voices in the research community are calling for just this shift in focus (Rayner and Malone 1997; Pielke 1998; Parry 1998).

Traditionally it is said that there are three options in responding to climate change: prevention, mitigation, and adaptation. But if the science is at all credible, then for some time prevention has not been an option. The debate is over mitigation. Will the world succeed in significantly mitigating climate change, or will we have a global policy of adaptation?

There is a lot to be said for adaptation. Most countries are not currently well adapted to the variability that is part of a stable climate regime.[8] But a policy of adaptation without mitigation runs serious practical and moral risks. The practical risk is that a GHG forcing may drive the climate system into some unanticipated, radically different state, to which it is difficult to adapt.[9] The moral risk is that a policy of adaptation will be one that hits the developing countries hardest. For a global policy of adaptation is an expression of the "the polluted pay" principle rather than the "polluter pays" principle. This is because adaptation policies are typically national or subnational and require resources and knowledge. Since the developed countries have resources and knowledge, they will succeed in adapting to climate change. Since the developing countries do not have (the right sort of) resources and knowledge, they will suffer the worst effects of climate change.

We could try to internationalize adaptation by creating a global fund that countries contribute to on the basis of their GHG emissions and make withdrawals from on the basis of the climate change impacts that they suffer. Indeed, something like this is supported by those in the

research community who champion adaptation. Even more grandly we could envision, like Al Gore in chapter 15 of his book *Earth in the Balance*, a "Global Marshall Plan" aimed at "heal[ing] the global environment" (Gore 1992). If such a plan were focused on reducing the vulnerability of susceptible people to climate-related extremes, there is even some reason to believe that it would have some resonance with Western publics. The vocabularies of "at risk populations" and "humanitarian assistance" are already at play in the West, and the United States, for example, funds the International Research Institute for Climate Prediction in an effort to help developing countries respond to El Niño–like events (Glantz and Jamieson, forthcoming). Still, the rich countries, especially the United States, have the political equivalent of attention deficit disorder. Grand promises are made and big money is promised when a hurricane devastates Honduras (for example), but all this is forgotten when the next humanitarian crisis erupts. A "Global Marshall Plan" would require a level of non-crisis-sustained commitment that most Western societies seem incapable of maintaining. My gloomy conclusion is that if we had the moral and political resources to internationalize adaptation, the Kyoto Protocol would succeed and we could effectively mitigate the effects of climate change. The positive scenario envisioned by the optimists would prevail, and we would not need to focus our attention solely on adaptation.

Conclusion

In this chapter I have examined one of the ethical problems posed by global climate change. I have argued for one approach to mitigating climate change that would be both just and efficient. Unfortunately I am not sanguine about its prospects. A more likely option is an approach to mitigation that is not very responsive to concerns about justice, or what is even more likely, a slide toward adaptation, an outcome that is likely to be the most unjust of all.[10]

Notes

1. The Annex I countries are the members of the European Union (EU), the other members of the Organization for Economic Cooperation and Development

(OECD), and the "countries in transition," a euphemism for the European countries that were formerly communist. The Annex I countries are also known as "the rich countries."

2. For an excellent discussion of how scientific knowledge can undermine normative beliefs, see Rachels 1990.

3. But it is not the whole of the explanation. Americans have a deep cultural tendency to displace their moral and political differences onto scientific discourse. I have discussed this with respect to climate change in Jamieson 1990, 1991, 1992.

4. The usual political reasons were in play as well, such as Thatcher's desire to break the power of the coal miners' union.

5. All figures in this chapter are from the President's Council of Economic Advisers 1998.

6. For the claims and arguments reported in this paragraph see the work of the Centre for Science and Environment, especially their report *Politics in the Post-Kyoto World*, available at http://www.oneworld.org/cse/html/cmp/cmp334.htm.

7. Henry Shue (1995) has proposed a version of 4, and Eileen Clausen and Lisa McNeilly (1998) have proposed a version of 5. These are serious proposals that would have to be considered in a fuller treatment of this subject. For further discussion of these and other proposals see the papers collected in Toth 1999, and various papers by Michael Grubb, notably Grubb 1995.

8. The climate impacts community has argued this position for many years. For a sample of this literature, see the work of Michael Glantz and his colleagues in the Environmental and Societal Impacts Group at the National Center for Atmospheric Research (http://www.esig.ucar.edu).

9. The idea that a GHG warming may trigger a "climate surprise" is associated with the work of Wallace S. Broecker and his students and colleagues.

10. Earlier versions of this material were presented in lectures at the Society for the Social Studies of Science, the University of California at Davis, the Fondazione Eni Enrico Mattei in Venice, Italy, Politea in Milan, Italy, the Queensland University of Technology in Brisbane, Australia, Webster University in St. Louis, Princeton University, and Amherst College. In addition to those who took part in these discussions, I thank Roger Pielke Jr. (National Center for Atmospheric Research), James White (University of Colorado), various anonymous referees, and especially the editors of this volume, Clark A. Miller and Paul N. Edwards, for their hard work on various versions of the manuscript.