

The Global Warming Tragedy and the Dangerous Illusion of the Kyoto Protocol

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Now we can go home and look our children in the eye and be proud of what we have done.

—Margot Wallström

Commissioner for the Environment, European Union¹

Little attention was paid to intergenerational justice as compared to intragenerational justice within the [climate change] negotiations.

—Matthew Paterson

Keele University²

In Bonn in July 2001, and in a subsequent clarificatory meeting in Marrakesh the following November, 178 of the world's states reached agreement on the details of a protocol to combat global climate change brought on by anthropogenic emissions of greenhouse gases. Despite the fact that the United States had refused to endorse the agreement, representatives of the participating governments, and many newspapers around the world, expressed elation. After the Bonn meeting, Michael Meacher, Britain's environment minister, said: "Climate change is the single greatest threat to the human race. This agreement is a historic day that all of us will remember."³ His sentiments were echoed by Pete Hodgson, New Zealand's energy minister, who claimed, "We have delivered probably the most comprehensive and difficult agreement in human history."⁴ Commenting after the later meeting in Marrakesh, David D. Doniger, director of climate programs for the Natural Resources Defense Council, called it "by far

the strongest environmental treaty that's ever been drafted," with compliance conditions that are "as good as it gets in interna-

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¹ Quoted in Paul Brown, "World Deal on Climate Isolates US," *Guardian*, July 24, 2001, p. 1.

² Matthew Paterson, "Principles of Justice in the Context of Global Climate Change," in Urs Luterbacher and Detlef F. Sprinz, eds., *International Relations and Global Climate Change* (Cambridge: MIT Press, 2001), p. 122.

³ Quoted in Brown, "World Deal on Climate Isolates US."

⁴ *Ibid.*

tional relations.”⁵ Margot Wallström, the environment commissioner for the European Union, went so far as to declare, “Now we can go home and look our children in the eye and be proud of what we have done.”⁶

In this article, I argue for two general theses. First, the rhetoric and euphoria surrounding the 2001 deal are misplaced. This is not because Kyoto is too demanding, but rather because it is much too weak. In particular, the Kyoto agreement does little to protect future generations. On the contrary, it seems—at best—to be a prudent wait-and-see policy for the present generation, narrowly defined. As such, it is hardly a model for future environmental regulation, and no cause for optimism. Hence, even those countries that have endorsed the Kyoto agreement should be wary of looking their children in the eye, and none should relish facing their children’s children. Second, the central flaw of the Kyoto Protocol can be explained in terms of the underlying structure of the climate change issue. Climate change involves the intersection of a complex set of intergenerational and intragenerational collective action problems. This structure, and in particular its intergenerational aspect, has not been adequately appreciated. Yet until it is, we are doomed to an ineffectual environmental policy.

The article has two main parts. In the first, I examine two standard theoretical models of the global warming problem and explain why those analyses provide an insufficient picture of the climate change problem in general and the Kyoto Protocol in particular. In the second, I introduce my alternative intergenerational analysis, and argue that this characterization helps to explain why the climate change problem seems significantly more difficult to resolve than the standard accounts suggest.

THE KYOTO DEAL

The Kyoto Protocol is best understood in light of its history. The political story begins with the Earth Summit of 1992. Meeting in Rio de Janeiro, the countries of the world committed themselves to the Framework Convention on Climate Change (FCCC), which requires “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (Article 2). But the road from Rio to Marrakesh, where the protocol implementation details were finalized, was extremely bumpy. To begin with, the major component of the FCCC was an agreement to accept “common but differentiated responsibilities.” According to this idea, the richer, industrialized nations would take the lead in cutting emissions, while developing countries would take action only in the future. Hence, initially, the rich nations, who are referred to as Annex I countries in the convention, agreed to stabilize their emissions voluntarily at 1990 levels by 2000. But it soon became clear that such commitments would prove ineffective. In particular, the United States, Australia, New Zealand, Japan, Canada, and Norway made no moves toward meeting their targets; and although the European Union looked likely to succeed, this was only because the United Kingdom and Germany posted sharp reductions in emissions for economic reasons unrelated

⁵ Andrew Revkin, “Deals Break Impasse on Global Warming Treaty,” *New York Times*, November 11, 2001, p. A8. Others were more circumspect, but still positive. Olivier Deleuze, Belgium’s energy and sustainability minister, said that he would rather have “an imperfect agreement that is living than a perfect agreement that doesn’t exist.” Quoted in Andrew Revkin, “178 Nations Reach a Climate Accord; U.S. Only Looks On,” *New York Times*, July 24, 2001, p. A1.

⁶ Quoted in Brown, “World Deal on Climate Isolates US.”

to climate change. As it turned out, U.S. emissions increased 12 percent over the period.

After the failure of voluntary measures, the parties met in Berlin in 1995 and agreed in principle to binding targets. Then, in December 1997, the parties met in Japan to negotiate the Kyoto Protocol. The protocol set specific emissions targets for the Annex I countries, amounting to an overall reduction in their emissions to roughly 5 percent below 1990 levels by 2008 to 2012. However, it involved two significant concessions to the richer countries. First, Article 3 stipulated that carbon “sinks” (such as forests) as well as sources of greenhouse gases would be counted toward meeting a country’s obligations. Second, Article 17 allowed countries to trade their emissions targets, so that the rich countries could buy credits from other countries in order to emit more than their own initial allotment.

The Kyoto Protocol was a historic step. But matters soon took a turn for the worse. First, in The Hague in November 2000, a subsequent meeting to thrash out details broke down without agreement. Then, after initially saying it would support the protocol, in March 2001, when faced with an imminent meeting in Bonn to agree on compliance mechanisms, the Bush administration withdrew U.S. support. Condoleezza Rice, the national security adviser, voiced the view of many when she pronounced the Kyoto Protocol thereby “dead.”

Yet, much to everyone’s surprise, Rice’s diagnosis turned out to be premature. The protocol did not collapse in Bonn. Instead, a full agreement was negotiated, with the European Union, Russia, and Japan playing prominent roles. At a later meeting in Marrakesh, the final details of the plan were thrashed out, including the thorny issue of a compliance mechanism. The protocol was

then sent to governments for ratification. By the end of 2003, almost all of the major players, including the European Union and Japan, had ratified the Kyoto Protocol, and it needed only ratification by Russia to meet the threshold of support—at least fifty-five countries responsible for at least 55 percent of emissions—necessary to pass into international law.⁷

THE USUAL ANALYSES

There are two main standard analyses of the climate change problem, each based in game theory. I will argue that we should reject both. Before I do so, I want to clarify my approach by considering an objection that game theory is misguided in general, and in any case irrelevant to the *ethics* of international affairs, because it assumes that individuals and states are motivated exclusively by self-interest.

I agree with this general criticism of standard game theory. Nevertheless, I do not think that this is enough to undermine the application of game theoretic analyses in specific cases. Most people will agree that self-interest is at least *one* of our major moti-

⁷ At this point, ratification by Russia is not a foregone conclusion. President Putin promised in 2002 to have the process under way by the beginning of 2003, but by October 2003 this had still not occurred. Many commentators had initially assumed that Russia would be eager to ratify, since the economic collapse following the end of Communism had reduced its own emissions and therefore appeared to give it a large surplus of permits to sell once the Kyoto targets were in place. More recently, however, some have expressed doubts about this scenario. For example, in October 2003, Andrei Illarionov, an advisor to President Putin on economic policy, was widely reported to oppose Russian participation, saying that it would “doom Russia to poverty, weakness and backwardness.” See Tim Hirsch, “Climate Talks End Without Result,” BBC News, October 3, 2003; available at news.bbc.co.uk/1/hi/sci/tech/3163030.stm; and Paul Brown, “EU Presses Moscow to Save Kyoto,” *Guardian*, February 26, 2003, p. 13.

vations. Hence game theory can be useful in cases in which some form of self-interest happens to be dominant. This, I believe, is true of climate change, although only in a very specific and limited way: first, the actual, unreflective *consumption behavior* of most individuals is based on *perceived self-interest*; second, this self-interest is often narrowly economic; and, third, it is such behavior that prompts much of the energy use that causes the problem of climate change. These claims about self-interested motivation are considerably weaker and much less controversial than the standard game theorist's assumption. More importantly, they are fully compatible with ethical analysis. For example, my own view is that any solution to the problems I identify will require calling on motivations other than those of narrow, economic self-interest, and in particular moral motivations associated with our obligations to future people. But this is fully compatible with the claim that our normal, unreflective consumption behavior is narrowly economic and (at least as we perceive it) self-interested. Indeed, part of the point of my analysis will be to explain why such behavior is problematic and needs to be changed.

Let us now return to the two standard game theoretic models of climate change. One might reasonably be called the optimistic, and the other the pessimistic, analysis. The optimistic analysis arises because a global cut in greenhouse gas emissions initially seems to be a pure public good—nonexcludable and nonrival in consumption. That is, once the good is available to some, others cannot be prevented from consuming it, and one person's consumption does not limit or inhibit another person's consumption. The optimistic analysis has two critical features.⁸ The first is that it takes climate change to be resolvable even with

less than full participation of the polluting parties. So long as a large enough coalition can be found, the problem of global warming can be successfully addressed. The second is that it assumes that members of this group do not require any additional incentives to cooperate. The benefits of cooperation alone are sufficient to secure their participation, even given the costs such participation involves.

Three factors make the optimistic analysis seem plausible. First, there is a basic theoretical point. The climate change problem depends on the total global emissions of greenhouse gases. Hence, what is needed to address it is a cut in this global total. But this means that the geographical distribution of cuts across countries is irrelevant. For, from the strictly physical point of view, it does not matter where the allowed emissions, and so where the cuts, occur. Thus, for example, suppose that a 20 percent cut in global carbon dioxide emissions were needed. This could be met either by the United States acting alone (since it accounts for about 23 percent of the emissions) or by more modest cuts by a group of less polluting nations acting in concert.

Second, this analysis is politically important since it strongly suggests that a truly global agreement on emissions reduction is not needed—global cuts could be achieved without full participation. And this supports

⁸ In game theory, such a situation can be described as a many-person Battle-of-the-Sexes game. Global warming is described in these terms in Jeremy Waldron, "Who Is to Stop Polluting? Different Kinds of Free-Rider Problem" (Cornell University, 1990, unpublished). See also Nick Mabey, Stephen Hall, Claire Smith, and Sujata Gupta, *Argument in the Greenhouse: The International Economics of Controlling Global Warming* (London: Routledge, 1997), pp. 356–59, 409–10; and Barrett, "Political Economy of the Kyoto Protocol," *Oxford Review of Economic Policy* 14 (1998), pp. 36–37.

an optimistic reading of the Bonn agreement: one might think that, even without the United States, the rest of the countries of the world can effectively combat global warming.

Third, the analysis initially appears to be supported by the political events of 2001. For example, it is widely said that the United States stands to gain the least from action to combat climate change.⁹ If this is correct, one would expect it to remain outside the cooperating group since it has the least to gain from being the marginal cooperating player. But one would also expect it to encourage the group to form, and to support the participation of the marginal player—which initially appeared to be Japan. And the political evidence fits: the United States has been keen to keep Japan in the agreement, and so forestall its collapse.¹⁰ For another, consider Japan and the other crucial player, Russia. In the wake of the United States's withdrawal from the Kyoto agreement, Wallström is reported to have said, "We [the European Union] are fully aware of the fact that we will have to look at how to keep Japan on board in order to keep the Kyoto process alive." As it happened, both Japan and Russia demanded and received significant concessions from the other parties—principally the EU—in order to remain in the agreement. Indeed, Japan is reported to have won concessions that effectively reduced its reduction target from 6 to 1 percent.¹¹ Furthermore, developing countries maintained that they faced other, more pressing issues, and so refused to agree to binding emissions targets because they had the highest costs of participation. Finally, although the 2001 agreement on compliance conditions contains penalties for those who do not meet their targets, none of these is external to participation in the agreement itself. (There is no link to other issues, such as trade.) This suggests that there are sufficient internal incentives to comply with the agreement.

Unfortunately, the optimistic analysis has two problems. First, the Kyoto Protocol contains no commitment by anyone to enforce a global ceiling. Instead, it calls only for individual, differentiated targets for those countries that participate. Furthermore, since many major emitters are either outside the regime, or else not committed to reductions, overall global emissions will continue to rise, and rise significantly, for the foreseeable future. Second, and more importantly, it would be virtually impossible for the participants to enforce a global ceiling, because the global warming problem occurs in a dynamic context. Instead any "cuts" are calculated against totals for current emissions. But the potential gains from greenhouse gas emissions have not yet been exhausted. Therefore, for any stable policy, what really needs to be assessed is whether a

⁹ Sometimes this is based on analysis. See, e.g., Robert O. Mendelsohn, ed., *Global Warming and the American Economy* (London: Edward Elgar, 2001), which argues that the economic benefits of global warming will marginally outweigh the costs in the United States. Sometimes, however, it seems simply to be inferred from the U.S. stance in negotiations. See, e.g., Mabey et al., *Argument in the Greenhouse*, p. 408; and W. A. Nitze, "A Failure of Presidential Leadership," in Irving Mintzer and J. Amber Leonard, *Negotiating Climate Change: The Inside Story of the Rio Convention* (Cambridge: Cambridge University Press, 1994), pp. 189–90. In both cases, there is a serious problem in coming up with realistic assessments of possible costs. For a much more complex analysis, see National Assessment Synthesis Team, *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change* (Cambridge: Cambridge University Press, 2000); available at www.usgcrp.gov/usgcrp/nacc/default.htm.

¹⁰ In the immediate aftermath of the United States's withdrawal from the Kyoto agreement, the U.S. president and Japanese prime minister agreed to high-level bilateral talks on areas of common ground and for common action on climate change. Shortly after Japan started to express reservations about ratification in January 2002, the second round of talks took place in Tokyo. Japan ratified later that year.

¹¹ Scott Barrett, *Environment and Statecraft: The Strategy of Environmental Treaty-Making* (Oxford: Oxford University Press, 2003), pp. 371–72.

group of nations could enforce a ceiling against the *potential* emissions of noncooperating countries. And this seems seriously unlikely. Consider the following (very rough) calculations. The current human world population is about 6 billion people. Total global projected emissions of carbon dioxide from energy consumption were 26.4 billion tons in 1991. This suggests a per capita emission rate of 4.4 tons. But the U.S. population currently emits at a rate of 20.5 tons per capita. Moreover, there is no reason to believe that even this per capita rate exhausts the potential gains of carbon emissions—the United States alone is planning a 30 percent increase in energy use in the next few decades. So, suppose a group of countries were to try to ensure a global ceiling of a 20 percent cut on the 1991 emissions. This would be a total of 21.1 billion tons. But, at current per capita U.S. emission rates, this total could be exceeded by a country or group of countries with a population of just over a billion—such as China—even if the cooperating group cut its emissions down to nothing. More realistically, any noncooperating country or countries with currently low emissions but a total population of 250 million could negate a 20 percent cut if they emitted at current U.S. levels.¹²

The optimistic scenario is, then, untenable, because any group formed to combat the problem could not achieve its goal without absorbing astronomical costs. The claim that a large coalition of countries could effectively address climate change is therefore false or, at best, deeply misleading. Combating climate change requires full cooperation of at least all countries of significant size, including the United States, China, and India. The countries that might not be needed are only those with low emissions and small populations.

What then explains the Kyoto Protocol and the behavior of the players?¹³ One pos-

sibility is provided by a more pessimistic analysis. Under this scenario, full cooperation is required to solve the problem, and each agent prefers the outcome produced by cooperation over that produced by noncooperation. Nevertheless, each agent prefers not to cooperate, whatever the others do. This is a traditional tragedy of the commons, or Prisoner's Dilemma, model.

Global warming has often been described in these terms.¹⁴ And it is easy to see why. Countries might rationally prefer cooperation to mitigate climate change to complete noncooperation, but there are very large economic incentives to defect from any agreement. Furthermore, this tendency to defection seems to be reflected in the political history. As we have seen, international global warming policy has been characterized by voluntary commitments made and broken, agreements to reduce emissions without any corresponding action, and significant attempts to free ride.¹⁵

Still, the pessimistic analysis does not so easily explain either the persistence of the global

¹² Figures from the World Resources Institute, as cited by the UNEP Climate Change Information Kit, www.unfccc.int/resource/iuckit/index.html.

¹³ Among the other possibilities are that the countries ratifying the Kyoto Protocol have misidentified the problem, or that they see it as a necessary first step toward a full compliance solution. The first seems unlikely; the second raises the question of why there is not greater urgency.

¹⁴ See Marvin S. Soroos, *The Endangered Atmosphere: Preserving a Global Commons* (Columbia, S.C.: University of South Carolina Press, 1997), pp. 260–61; Peter Danielson, "Personal Responsibility," in Harold Coward and Thomas Hurka, eds., *Ethics and Climate Change: The Greenhouse Effect* (Waterloo, Ontario: Wilfred Laurier Press, 1993), pp. 95–96; and Barrett, *Environment and Statecraft*, p. 368.

¹⁵ See Donald Brown, *American Heat: Ethical Problems with the United States' Response to Global Warming* (Lanham, Md.: Rowman & Littlefield, 2002); and Peter Singer, "One Atmosphere," in *One World: The Ethics of Globalization* (New Haven: Yale University Press, 2002).

warming problem or the Kyoto Protocol itself. This is because it is not pessimistic enough. Prisoner's Dilemmas are not usually irresolvable. For one thing, since all parties to such a situation agree that individual action leaves them worse off than they would otherwise be, all should be motivated to seek an agreement. For another, there are circumstances in which stable agreement is possible. For example, solutions are often available when parties are involved in repeated interactions, and when there are broader considerations of self-interest at stake in a wider, multi-issue context of cooperation. Furthermore, such circumstances ought to obtain in the climate change case: not only must countries make repeated agreements on greenhouse gas abatement over time, but they must do so in a context where global cooperation on other issues—the environment, the global economy, and security—must also take place.¹⁶ Given all this, if global warming really were a Prisoner's Dilemma, and if the countries of the world were serious about it, we would expect a truly comprehensive global agreement on greenhouse gases, involving strong links to other cooperative issues, such as trade and security. But we have now had more than a decade without any sign of either. What might explain this?

Undoubtedly, some technical and political issues are at least partly to blame. For example, a shift away from fossil fuels, the main anthropogenic source of greenhouse gas emissions, would require considerable technological advances and large investment, and would have profound social consequences. Furthermore, any actual allocation of greenhouse gas emissions to different countries will raise fundamental issues of international fairness and have large, and potentially radical, implications for the distribution of economic benefits. It will also threaten powerful private interests, such as those of the multinational energy companies. Still, I do not think that

these factors alone are sufficient to explain the extent of our inaction. For if the problem of climate change is (or could potentially become) as big as it appears, parties to a Prisoner's Dilemma would presumably recognize this threat and act accordingly. This suggests that the problem of global warming is not primarily a Prisoner's Dilemma, and that other forces are in play. Prominent among these forces is a separate and even more fundamental problem of intergenerational unfairness. The presence of this problem undercuts the very motivation of countries to act, primarily because governments cannot be relied upon to represent the interests of their countries' citizens in perpetuity. This poses a much more severe public policy challenge than would an ordinary Prisoner's Dilemma. And this is the real global warming tragedy.

THE PURE INTERGENERATIONAL PROBLEM

Carbon dioxide, the main anthropogenic source of global climate change, is a long-lived, well-mixed gas, whose radiative effects are felt for hundreds of years. Hence, the full, cumulative impact of *current* emissions will not be realized until the beginning of the twenty-second century and beyond.¹⁷ The potential costs of global warming can there-

¹⁶ See Hugh Ward, "Game Theory and the Politics of Global Warming: The State of Play and Beyond," *Political Studies* 44, no. 5 (1996), pp. 850–71.

¹⁷ I am setting aside the possibility of abrupt threshold effects. There has been significant work on such effects recently, and they pose a real ethical challenge. Since climate change in the next few decades will be caused largely by *past* emissions, even the possibility of abrupt change in the next couple of decades does not undermine my general argument about the incentives in play for *current* emissions by the present generation. See U.S. National Research Council, Committee on Abrupt Climate Change, *Abrupt Climate Change: Inevitable Surprises* (Washington, D.C.: National Academies Press, 2002), p. 1.

fore be substantially deferred. Furthermore, the main benefit of carbon dioxide emissions—the energy produced by burning fossil fuels—is realized now, and is largely consumed by the present generation.¹⁸ These facts suggest that the current generation has a powerful self-interested reason to carry on polluting, while those who live in the future have a similar reason for wanting that pollution to stop.

The exact form of the intergenerational problem depends partly on how we are to understand the phrase “those who live in the future.” So far, it has been introduced only by contrast to the current generation. However, there are important subdivisions among those who live in the future that give rise to subsidiary problems, all of which must be taken into account but each of which has a slightly different structure.

Let us begin with what I call the Pure Intergenerational Problem. Future generations are sometimes defined as those future people whom those presently alive will not live to meet.¹⁹ If one conceives of future generations in this way, the intergenerational problem has a tragic structure, and is a commons. But it is not a tragedy of the commons in the usual sense. It is worse, for three reasons.

First, a normal tragedy of the commons arises in part because the parties have no way *in fact* of ensuring reciprocal behavior. But in the pure intergenerational problem matters are much worse because the parties cannot *in principle* ensure reciprocal behavior. Since no distinct generation can interact with any other, *reciprocity* as such is impossible.

Consider the case of climate change. Each generation has an interest in the earth’s relative climatic stability, and so in its ability to absorb carbon dioxide. But future generations have no control over what the current generation does with that capacity: whether it stays within, exceeds, or destroys it. On the

one hand, they are not around to represent their interests. On the other, they have no bargaining power—there is little that they might offer the current generation in exchange for taking into account their interests, and even less that the current generation could not in any case take.²⁰ Hence, control of the situation rests completely with the current generation and, other things being equal, one would expect it to act self-interestedly and overpollute.

Second, in a normal tragedy of the commons, each party prefers the cooperative outcome to that of noncooperation. But in the pure intergenerational problem, the first generation capable of overpollution does not prefer to cooperate. It has already inherited a planet that is not overpolluted, hence, it will achieve nothing for itself by holding back, but can make substantial gains from extra pollution.

¹⁸ Of course, some rewards are passed on in the form of technological advances and increases in the capital stock. This raises the prospect that future generations might be compensated for the damage they inherit through having better resources with which to deal with it. However, in general, the point is limited because much of the benefit of emissions is not passed on but simply consumed; technology and capital are far from perfect substitutes for environmental quality; and the precise physical effects of global warming are unpredictable but likely to be severe, and possibly catastrophic, so that effective deployment of the inherited benefits to mitigate them would be extremely difficult.

¹⁹ Avner de-Shalit, *Why Posterity Matters: Environmental Policies and Future Generations* (London: Routledge, 1995), p. 138.

²⁰ Although there might be certain goods of respect, or continuation of traditions and projects that might matter to earlier generations and are within the power of future people, I doubt that these would be sufficient to deter current people from overpollution where that is perceived to be strongly in their interest on other grounds, at least so long as the relevance of the pollution-based goods is couched solely or primarily in terms of their contribution to the *well-being* of the current generation. See also John O’Neill, “Future Generations: Present Harms,” *Philosophy* 68, no. 263 (1993), pp. 35–51.

Third, and perhaps worst of all, this situation is iterated. As each new generation comes into existence, it occupies essentially the same circumstances as the first generation. It can take its climatic situation as given, and this gives it no incentive to restrict its pollution below the maximum possible.

OVERLAPPING GENERATIONS

Unfortunately, the definition of future generations as those future people whom those presently alive will not live to meet seems too restrictive from the point of view both of climate policy and of what we usually mean by the term.

First, such a definition makes future generations fairly remote in time. For example, it might reasonably be expected that some child born somewhere today might live for 100 to 120 years, and might meet a child set to have similar longevity in the days before her death. Hence, it is plausible to think that a genuine future generation in the pure sense may not come into existence for 200 to 250 years (and perhaps longer, if human conditions improve significantly during that period). But many of our concerns about future people have a shorter time horizon than that.

Second, these concerns include some of those surrounding climate change. In particular, the response of the climate system to current emissions of carbon dioxide is expected to continue for more than 100 years. Though significant, this lag is short enough that it is not just those who we will never meet who will be affected by those emissions. For one thing, some people who have been born fairly recently may still be around; for another, many of those who are relatively young now will live to meet a significant number of those living then. (This is not to say that *no part* of the challenge caused by current emissions is a pure inter-

generational problem. The warming effects of those emissions on the total dynamic climate system will no doubt persist for much longer than a century, and some of the impacts will presumably be irreversible, while others will require large subsequent investment if they are to be reversed.)

Finally, the term “future generations” is also often used in a more generous sense. For example, people often refer to “our grandchildren” when talking about future generations. Here the idea seems to be to refer simply to all those not currently alive. And this clearly allows future people to overlap with those existing now.

Much of what is said about future people in the pure sense also applies to future people in the more generous sense. Indeed, it extends (in a graduated way) even to many people already alive. There are two general ways in which the overlap complicates the picture: potential reciprocity and personal attachment.

Overlapping generations potentially have the ability to harm and benefit us in response to our actions toward them. This suggests a force that will at least moderate the effects of the pure intergenerational problem through limiting the extent to which earlier generations are willing to take advantage of the later. Still, we should take care not to overstate the influence of this consideration. For one thing, many overlapping future people will have limited opportunities to benefit us (they will still be too young; we will be too old); for another, we can determine many of the circumstances within which their choices will be made. Finally, it may also be true that though there is overlap, it is not during the overlap that the problem is bad, or that complaints can be made (for example, because the next generation are still children when the overlap occurs). So, reciprocity by itself does not provide much ground for optimism.

The possibility of personal attachment—the idea that self-interest can be overridden or perhaps modified in the presence of strong concern for particular others—also seems of limited importance. For one thing, we must distinguish personal attachment from general altruistic concern for future generations. This suggests a model where genuinely personal attachment occurs only with contact. But, within the intergenerational setting, this kind of contact might be a long time coming, and so too late. For another, it is not clear that attachment would give concern with the necessary emphasis on the long-term interests of the future person, rather than on her interests during the period of overlap—which could be incorporated under the present person’s own limited time horizons.

These worries make it clear that the crucial issue with overlapping generations is the extent of our *present* concern for the well-being of those who will live when we have gone, and there is no reason to assume that such concern is an all-or-nothing affair. Instead, what seems likely is that it is graduated. On the one hand, we are generally less concerned with those whom we will never meet than with those not yet alive with whom there will be overlap, and less concerned with these than with people currently around. But, on the other hand, even when there is overlap, and we care about the well-being of at least some of the people who remain after we are dead, that concern tends to be less than our concern for individuals around now (even when the same people are at issue) and to decline over temporal distance. We might call this the overlapping intergenerational problem.

THE GOVERNMENTAL PROBLEM

A third common usage of “current generation” applies to an even smaller time scale, to

refer to “a single step in descent”—that is, the average time in which children are ready to take the place of their parents, normally thought to be about thirty years.²¹ Here again there are significant variations of the pure intergenerational problem.

First, governments and businesses are largely controlled by individuals in the forty-five to sixty-five age bracket. But this group has the most to lose from policies with short-term costs but long-term benefits. Second, those politically influential forces that might be mobilized to oppose such shortsightedness are also typically drawn from this demographic group. Third, even within this demographic group, the elites typically have relatively short time horizons (the next couple of elections, or the next few years of profits, at most). Hence, they have a strong incentive to ignore altogether, or at least defer action on, problems whose solutions demand high costs to be instituted on the present set of voters and other politically influential groups for the sake of benefits to those who do not currently have any political power. In short, there is a generational bias in the outlook and concerns of the governing age group, broadly understood, that tends to produce politicians of the obvious sort and to maintain them in power. Furthermore, this is an iterated problem that leads to the perpetual postponement of concerns with a long time horizon.

THE KYOTO PROTOCOL TARGETS

The intergenerational analysis provides a better account of the apparent intractability of the global warming problem than the two usual alternatives. It also better explains the structure of the Kyoto Protocol itself. This suggests that the best that can be said about

²¹ *Concise Oxford Dictionary*.

the Kyoto agreement is that it does something to protect the interests of the present generation, narrowly defined. In any case, it is clear that it seriously undervalues the future.

Let us begin by examining the commitments the protocol actually contains for particular countries and regions. First, and most prominently, the United States is absent. This is due largely to the political intervention of powerful industries that produce or are heavily reliant on energy. For example, three days after a *New York Times* front-page story reporting that the administration was planning to cut carbon dioxide emissions, intense lobbying by fossil fuel interest groups led to a sharp change in policy by President Bush, involving not only withdrawal from the Kyoto agreement but a commitment to produce 1,300 new power plants over twenty years, and so significantly *increase* emissions.²² But there are also other, deeper reasons for the United States's absence from the agreement. The United States is faced with potentially very high marginal costs as a result of its past energy practices and its current energy policy. It also seems likely to benefit considerably from the side effects of other nations' endorsement of the Kyoto agreement, in particular through the migration of dirty industries from cooperating countries to the United States, and from a lower international price for oil as a result of reduced world demand.²³ Furthermore, in the medium term the United States appears likely to suffer the least from the impacts of global warming due to its geographical location and the economic resources potentially at its disposal for adaptation. Finally, it seems of all countries to have the least grassroots political interest in global warming. While individuals might express concern in opinion polls, many claim that the political

reality is that Americans seem presently unable to contemplate even a very modest increase in gasoline prices.²⁴

Second, although developing countries are included in the Kyoto Protocol, they are not expected to make substantial reductions in either current or projected emissions. Instead, their development needs are seen as paramount during this period. Third, some of the major players in Annex I have agreed to the protocol in exchange for incentives that undermine its effectiveness. For example, if Russia agrees, it will apparently be on the basis that its current emissions are lower than its 1990 benchmark because of the economic collapse following the end of Communism. Hence, it will be motivated in large part by the income it expects to receive from the sale of carbon credits to other countries. Meanwhile, together with Russia, Japan and Canada have lobbied hard for increases in their allocations based on already existing carbon sinks—forests. And these and many other countries will be trying to meet some of their targets by buying unused capacity from Eastern Europe and the countries of the former Soviet Union.

²² Andrew C. Revkin, "Despite Opposition in Party, Bush to Seek Emissions Cuts," *New York Times*, March 10, 2001, p. A1; and Douglas Jehl with Andrew C. Revkin, "Bush, in Reversal, Won't Seek Cut in Emissions of Carbon Dioxide," *New York Times*, March 14, 2001, p. A1.

²³ Estimates of the value of these side effects vary enormously. For the EU, estimates range from 2 to 80 percent. See Intergovernmental Panel on Climate Change, *Climate Change 1995: Economic and Social Dimensions of Climate Change* (Cambridge: Cambridge University Press, 1996), pp. 397–439; cited in Barrett, *Environmental Statecraft*, p. 383 n. 22.

²⁴ See, e.g., Bill McKibben, "Some Like it Hot," *New York Review of Books*, July 5, 2001, p. 38, where former U.S. vice president Al Gore is quoted as saying, early in his term, "The minimum that is scientifically necessary [to combat global warming] far exceeds the maximum that is politically feasible." For a different view, see www.worldviews.org/detailreports/usreport/html/ch4s5.html.

Finally, the European Union plans to meet its obligations as a bloc, and so has an easier time because of gains made in the 1990s by Germany and the U.K. for unrelated economic, not environmental, reasons. Furthermore, the European Union can be expected to benefit from its projected expansion to include some Eastern European countries who, like Russia, are still rebounding from the economic decline accompanying the collapse of Communism. Hence, they are already below 1990 levels, and have credits to give. Even the European Union's projected cuts are therefore not as large as they might initially seem.²⁵

In light of all this, what is really achieved by the Kyoto Protocol, assuming it is properly implemented? The answer depends to some extent on the empirical issue of how big the cuts envisaged by the protocol really are. The original 1997 protocol intended to impose a 5 percent cut on 1990 levels for the Annex I countries. This was clearly weakened by subsequent negotiations, especially in Bonn and Marrakesh, but by how much? This is unclear, but two suggestions capture the extremes.

The more optimistic suggestion, prevalent in the immediate aftermath of the Bonn and Marrakesh meetings, is that the revised Kyoto deal would represent a 2 percent cut over 1990 levels for participating Annex I countries. Still, viewed statically, even this does not seem very impressive. First, climatologists often maintain that a reduction in anthropogenic carbon emissions of the order of 60 to 80 percent from 1990 levels is needed to maintain climate instability at its current level. Second, the original proposal of a 5 percent cut seems to have become salient because aggregate greenhouse gas emissions of the Annex I countries had *already* decreased by 5 to 6 percent below 1990 levels by the mid-1990s because of the

collapse of the economies of the former Communist countries. Hence, even if the United States had been included in the 5 percent cut, the original Kyoto Protocol would have involved at best only stabilization of emissions at the then current level for the industrialized countries, and likely a modest increase, given the concessions on sinks.²⁶ The idea of a cutback in absolute terms is therefore misleading. Third, talk of a shift from a 5 percent to a 2 percent cut obscures matters in another important way. In terms of the total *volume* of emissions for the industrialized countries, a 2 percent cut without the United States is, of course, substantially less than a 5 percent cut that includes the United States. Consider that, for the original proposal, "in absolute terms, the cutback for the United States from 1995 levels [until 2012] accounted for more than half of that required for the OECD overall and almost exactly [equaled] the increase allowed to Russia."²⁷ Hence, since the Bonn and Marrakesh deals do not involve the United States, and require very substantial extra concessions to Russia, they have both lost the country responsible for much of the initially projected cutback and increased the effective allocation to the country with the

²⁵ The United Kingdom is an exception here. In early 2003, it released a white paper promising deep reductions in emissions by 2050. Yet, even at this early stage, the House of Commons's Science and Technology Committee was reported as concluding that the white paper "contained few practical policy proposals that gave any confidence that its targets and aspirations could be met," and that, of the specific targets of 10 percent renewable power generation by 2010 and 20 percent by 2020, the former was said to have "no prospect," and the latter to be doubtful. Staff and Agencies, "'No Chance' of UK Meeting Greenhouse Targets," *Guardian*, April 3, 2003; available at politics.guardian.co.uk/green/story/0,9061,929046,00.html.

²⁶ Michael Grubb, Christiaan Vrolijk, and Duncan Brack, *The Kyoto Protocol: A Guide and Assessment* (London: Earthscan, 1999), p. 155.

²⁷ *Ibid.*, pp. 161–62.

greatest increase. So, the overall volume of emissions allowed by the Kyoto Protocol has increased dramatically with the new deal.

Still, considered in isolation these statistics paint too bleak a picture. From a dynamic point of view, a 2 percent cut even by only some industrialized countries would look considerably more important. If one considers what would be achieved against projected emissions under business as usual, it is clear that if the participating Annex I countries really reduced emissions by 2 percent from 1990 levels, they would be making substantial cuts by 2008 to 2012, on the order of 10 to 15 percent.

Nevertheless, this apparently good news should be approached with caution. The gaps between Kyoto commitments and 1995 emissions levels suggests that Russia can allow 41 percent growth, and those Central and Eastern European countries not bound for the European Union, 62 percent. By itself, a fifteen-member state European Union would have to cut back by 5 percent, but this will no doubt be moderated by the 21 percent increase allowed to newly admitted members. Of those left in the agreement, only Japan (15 percent) and Canada (14 percent) need to make substantial cuts. But we already know that Japan plans to meet much of its target by buying credits from Russia, and Canada (which is also likely to do this) is not only widely reported to be having severe difficulties in reaching its targets, but has declared that it is *unilaterally* taking a credit for sinks in order to increase its allowance.²⁸ Finally, it remains true that much of the alleged 2 percent cut by participating countries would be achieved by unrelated cutbacks that are already in place in Germany, the U.K., and the former Soviet Union, and that the nonparticipating countries will be sharply increasing emissions during this period. Some predict that

non-Annex I emissions will grow by 114 percent during the period, and that, even assuming the United States had been included in the revised protocol, this would lead to a global emissions rise of 31 percent above 1990 levels.²⁹ So, even on the 2 percent interpretation, the net effect of the revised Kyoto agreement (against the baseline of world emissions in 1990 together with reductions that have occurred anyway) would likely be to allow another significant worldwide gain by 2012. This is hardly a stellar achievement considering that we will then be “celebrating” the *twentieth* anniversary of the Rio Earth Summit and the Framework Convention on Climate Change.

Sobering as such observations are, recently some have suggested that the idea that Bonn and Marrakesh provide for a 2 percent cut over 1990 levels for the participating countries is wildly optimistic, because the changes to the protocol between Kyoto and Marrakesh are even more dramatic than previously recognized.³⁰ One study suggests that the revised Kyoto Protocol merely limits the growth of participants’ emissions to 9 percent above 2000 levels, and that, if current slow economic growth persists, this may amount to no cut

²⁸ Some claim that the Canadian ratification has more to do with the current prime minister’s wish to pose a difficult problem for his successor, a political rival, than any policy conviction. See Anne McLroy, “Gas-guzzling Canada Divided over Rush to Kyoto,” *Guardian Weekly*, November 7, 2002; available at www.guardian.co.uk/GWeekly/Story/0,3939,835242,00.html.

²⁹ See Grubb, Vrolijk, and Brack, *The Kyoto Protocol*, p. 156. A recent UN report anticipates that developed-country emissions will increase by 8 percent from 2000 to 2010. See U.S. Department of State, “U.N. Report Calls for Stronger Policies to Cut Greenhouse Gas Emissions,” June 3, 2003; available at usinfo.state.gov/gi/Archive/2003/Jun/22-438415.html.

³⁰ Mustapha H. Babiker, Henry D. Jacoby, John M. Reilly, and David M. Reiner, “The Evolution of a Climate Regime: Kyoto to Marrakesh and Beyond,” *Environmental Science & Policy* 5 (2002), pp. 195–206.

at all, since business-as-usual emissions would be lower than the constraint.³¹ If this is correct, then at best the current climate deal does very little to reduce emissions, and it may do nothing at all.

In conclusion, then, the current Kyoto Protocol does not look very impressive on either the optimistic (limited 2 percent cut on 1990) or pessimistic (9 percent growth over 2000, or no change) interpretations of the Bonn and Marrakesh agreements. In particular, it does not seem like a sincere global initiative to protect the interests of future generations from a serious threat. But I would argue that matters are actually even worse. For, although the Kyoto Protocol may have no effect on emissions, it does do *something*. As Wallström's rhetoric makes clear, it creates the comfortable illusion that serious progress is being made, and this is in itself a substantial obstacle to overcoming the global warming tragedy.

KYOTO'S FUTURE

Perhaps Kyoto's enthusiasts will object to all this pessimism. After all, they might say, the 2008–2012 targets are intended as only the first round in an ongoing schedule of such measures, and it is anticipated that the level of cuts will be deepened and their coverage expanded (to include the developing countries) as subsequent targets for new periods are negotiated. Once it is up and running, the Kyoto regime can be strengthened so as to make a serious contribution to addressing global warming.

There are several reasons to remain cautiously skeptical. To begin with, surely the history of the climate change problem should give us pause. Given the false promises of the past and the difficulties of securing even the weak current agreement, we should not just blithely assume that the

Kyoto agreement can be transformed into a meaningful program—that targets will be tightened, developing countries will agree to emissions ceilings in future periods, and the United States will eventually come on board. The United States in particular is busy investing in long-term capital stock that ties it into new emissions, and both the United States and developing countries will have more to lose in the future once they have made gains from the migration of dirty industries from the Annex I countries. Furthermore, even if these things do happen, we should not presume that they are motivated by, or reflect, the interests of future people. In many ways, the most testing times for the Kyoto framework are yet to come. This is especially so given that it does not yet address issues of equity and compensation for those nations that suffer disproportionately from the effects of climate change.

It is also worth noting that the optimism seems to rest on a charitable interpretation of the motivations of those countries, such as the states of the European Union and Japan, who are doing something significant, and to some extent going it alone. This interpretation suggests that, without solving the problem, such countries are at least trying to provide real global leadership by showing it can be done. This understanding may indeed be plausible for at least some leaders, governments, and organizations, and it has precedents in global environmental policy—such as the Nordic countries' attempt to deal with acid rain and the United States's efforts to address CFCs.³² Still, such efforts usually have only a limited time horizon—if they are not successful

³¹ Ibid., p. 202. They also claim that most of any reductions that might occur will be in non-carbon dioxide gases.

³² Soroos, *The Endangered Atmosphere*, p. 226.

fairly quickly, they tend to break down.³³ Furthermore, we must also consider a competing explanation for the behavior of at least some present participants—that they are really endorsing a moderated wait-and-see policy. Faced with significant evidence of warming, perhaps some countries are concerned primarily with the possible short- to medium-term impacts on their present populations and so see it as in their interests to try to *slow down the rate of increase* of emissions during that period, in particular by not committing themselves to long-term capital investments that increase its risk. This would explain why they are willing to take small, cautious steps that can be reviewed on a decade-by-decade basis. For taking low-cost measures to slow down the warming (as opposed to arresting it) is strongly in the interests of those who may be around for another twenty to forty years.

This impression of a policy dominantly based on short-term interests seems supported by the optimistic (2 percent cut) analysis of the revised Kyoto commitments. (By contrast, the pessimistic analysis suggests that the Kyoto process is a sham that achieves nothing except the illusion of progress.) But the best evidence for it comes from the agreement's much-lauded compliance regime.

According to the Bonn and Marrakesh deals, parties who do not meet their targets in a given period are to be assigned penalties in terms of tougher targets in subsequent periods (subject to a multiple of 1.3 times the original missed amount) and to have their ability to trade emissions suspended.³⁴ Initially, these penalties seem reasonably serious. But two considerations cast doubt on this. First, the sanctions appear substantial because it is natural to assume that permit trading will be a major way in which parties meet their obligations, that permits will be

costly, and that the 1.3 multiple is punitive. But the latter two claims are questionable. Some have recently argued that the price of permits will be extremely low absent U.S. participation, and that the 1.3 multiplier is equivalent merely to “a borrowing provision with an interest rate of 5 percent per annum.”³⁵ This suggests that the costs of noncompliance will be small and the deterrent effect will therefore be minimal.

Second, even if the penalties were in themselves serious, it is not clear that they could be made to stick. Not only is there the obvious, general problem of the lack of an effective enforcement mechanism in international relations, but there are also more specific obstacles to compliance. For one thing, lowering the future emissions target on a country that has missed its current target ratchets up the costs of compliance in the next period, and may make it impossible for the country to remain in the regime. Given that countries want others to remain in the regime, there is some incentive to avoid punishing transgressors, provided that they are at least somewhat cooperative. For another, since subsequent targets are not necessarily set prior to the knowledge that the existing target will be missed, the procedure is open to corruption. Subsequent targets can be relaxed so that compliance sanctions do not actually bite. Finally, and most importantly, the sanctions themselves are easy to evade. The background protocol structure contains two major opt-out clauses. First, while Article 18 of the Kyoto

³³ Ibid.

³⁴ See Marrakesh Accords (Advance unedited version), Accord L, Sec. XV, 5; available at unfccc.int/cop7/documents/accords_draft.pdf.

³⁵ See C. Bohringer, “Climate Politics from Kyoto to Bonn: From Little to Nothing?” *Energy Journal* 23, no. 2 (April 2001), pp. 51–71; and Babiker et al., “The Evolution of a Climate Regime,” p. 197.

Protocol requires that the enforcement of compliance rules be approved by amendment to the protocol, Article 20 stipulates that such an amendment is binding only on those parties that ratify the amendment. Hence, any party can escape compliance penalties simply by refusing to ratify the amendment necessary to punish it.³⁶ Second, Article 25 of the FCCC specifies that any country can leave the regime at one year's notice, three years after the treaty has entered force for it. Hence, all countries know that they can evade future penalties for current failure to comply with the treaty merely by exiting it at some appropriate point. They also know, given the fragility of the existing coalition, that other countries will not want this to happen; and that, since future targets are yet to be negotiated, there is an easy way to avoid this—one can simply be more generous with future emissions targets in order to offset the influence of any penalties.

TWO OBJECTIONS

I will close by considering two possible objections to this analysis. The first has sympathy with my negative assessment of the Kyoto Protocol, but claims that the protocol's failure is the result of a plurality of factors, among which the intergenerational problem is either not present, or at least not prominent or preeminent. Such factors might include the belief that global warming is not a significant problem; that it is subject to such deep uncertainty that there is no way rationally to assess the risks it poses; and that there is substantial disagreement about the best means of addressing it.

There is, no doubt, something to these claims, at least insofar as they seem to capture many people's *expressed* reasons for resisting substantial action on climate

change. Still, I doubt that they can explain the current debacle.³⁷ First, the role of scientific uncertainty is dubious. It is true that humanity's emissions of substantial amounts of greenhouse gases constitute a grand, long-term experiment whose results will not really be known for hundreds, if not thousands, of years—or, arguably, ever, since this is an experiment with no control. Nevertheless, the significant disagreement about human-induced climate change concerns its timing and magnitude, not the fact that it is occurring and will have significant consequences.³⁸

Second, even if one is unconvinced by the scientific consensus, it is almost impossible to deny that it implies that global warming poses at least a *credible threat* of some magnitude. Given this, the real policy question is what is to be done given the presence of such a threat.

Third, a refusal to address global warming on grounds of scientific uncertainty implicitly depends upon either endorsing the principle that we should do nothing about problems involving uncertainty or simply refusing to address this kind of problem. But the former seems hopelessly irrational, and reflects an unrealistic expectation of science, while the latter is nothing more than evasion.³⁹

³⁶ See Barrett, *Environment and Statecraft*, p. 384.

³⁷ For a more detailed discussion, see Stephen M. Gardiner, "Ethics and Global Climate Change" (forthcoming).

³⁸ See, e.g., Bjørn Lomborg, *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001), p. 259; and Brown, *American Heat*, ch. 6.

³⁹ Many skeptics are most concerned with the economic costs and benefits of climate change and its mitigation. Typically, they argue that the resources that would need to be employed combating climate change would be better spent on other things—such as global poverty relief. They do not deny that there is a problem, just that it is not the most serious problem we face. But clearly, this is an argument against wasting resources on a sham agreement.

Fourth, it is also not realistic to suppose that the current situation is caused by a disagreement about the means through which to achieve abatement rather than because of a lack of commitment to abatement. The basic framework for tackling global warming was agreed long ago, when the FCCC was accepted at Rio, and later ratified by all the major countries. Furthermore, historically, the major skeptic in the international arena has been the United States. But, even though it eventually repudiated the Kyoto agreement, the United States has been its major architect, since other countries were desperate to keep America on board.⁴⁰

Finally, if it were primarily the interests of the current generation that were at stake, it would be surprising if obstacles such as these proved insurmountable. Hence, it seems plausible that such factors initially seem so salient only because of the intergenerational problem. This suggests that an explanation of the global warming problem that excludes or marginalizes the intergenerational problem faces a considerable burden of proof.

The second objection to my analysis claims that the jubilant rhetoric surrounding the protocol is justified despite my criticisms, simply because the agreement was a major *political* achievement, given the overwhelming obstacles to any climate change treaty, and the last-minute U.S. withdrawal. I have several responses. First, the point of the objection may simply be that the Kyoto agreement established an important global precedent, and so was of great symbolic importance. But why should we—and future generations—count the making of an apparently toothless agreement that achieves little or nothing as establishing an important precedent?

Second, and more importantly, the objection appears to assume that we must

take the existing world system as given. It suggests that, given that system, the world is incapable of better, and so we should not be too demanding. But the shape of the existing system is one of the things that needs to be assessed. If the Kyoto agreement really is the best that is possible, that is simply a sign that humanity urgently needs a new, functioning system of global governance.

Finally, I am not convinced that the pessimistic assumptions underlying the second objection are correct. Although this is not the place to discuss the appropriate alternative to the Kyoto Protocol, some general features of a defensible regime that seem both clear and not at all utopian are worth mentioning. First, the global cap on emissions should be tighter than the Kyoto agreement envisages, and should gradually and explicitly lower over time. Second, the compliance regime should be stricter—in particular, there should be no opt-out clauses, and no opportunity to “renegotiate” future commitments based on past failures—and it should be tied to other global issues, such as trade. Third, all countries should be explicitly included in the regime, and something like a convergence of per capita emissions entitlements should be a core objective over time. Finally, the costs of adapting to warming to which we are already committed need also to be considered since these appear to fall disproportionately on poor countries who were not themselves responsible for the bulk of the past emissions. If the present generation were truly serious about confronting climate change, these are the kinds of features we would expect an international treaty to possess. The Kyoto Protocol possesses none of them. It is therefore seriously flawed.

⁴⁰ See Brown, *American Heat*.