

1990

The Global Warming Crisis, If There is One, and the Law

Christopher Stone

Follow this and additional works at: <http://digitalcommons.wcl.american.edu/auilr>



Part of the [International Law Commons](#)

Recommended Citation

Stone, Christopher. "The Global Warming Crisis, If There is One, and the Law." *American University International Law Review* 5, no. 2 (1990): 497-511.

This Article is brought to you for free and open access by the Washington College of Law Journals & Law Reviews at Digital Commons @ American University Washington College of Law. It has been accepted for inclusion in *American University International Law Review* by an authorized administrator of Digital Commons @ American University Washington College of Law. For more information, please contact fbrown@wcl.american.edu.

AFTERWORD

THE GLOBAL WARMING CRISIS, IF THERE IS ONE, AND THE LAW

Christopher D. Stone*

The editors have offered me the last word. The opportunity is generous. But the space is unfortunately too short to do justice to such an excellent collection of papers. Trying to compose a response, I am struck by how many distinct problems there are from the perspective of implementing workable legal strategies.

In one class of situation, where a nation extinguishes its own elephants or tigers or trees, the absence of any transboundary "trespass" deprives complainants of relief under general principles of international law. A nation that undertakes a large scale deforestation project thereby impairs a valuable planetary service it had been providing: withdrawal of carbon dioxide from the atmosphere. But as a practical matter the outside world is left to leverage whatever changes it can by such devices as attaching conditions to loans and aid, or by offering outright pay-offs like debt-for-nature swaps.

In a second class of situation, pollution from one state crosses a common border into a neighboring nation. Those with a taste for irony can imagine the deforesting nation, above, not as a lapsing *importer* of CO₂, but having matured into a flourishing *exporter* of some other gas, perhaps sulphur fumes. Although the degree of harm caused may be comparable, in the eyes of the law there is a world of difference. A scattering of opinions and authoritative pronouncements suggests the availability of judicial relief against the boundary-violating "trespasser." But as I shall explain more fully below, problems of proof and of jurisdiction render the transboundary trespass remedies a weak practical protection for individual victim nations, and even more unreliable

* Roy P. Crocker Professor of Law, University of Southern California.

as a bulwark for the biosphere as a whole.¹

In another class of cases, the harm can be traced to activities that transpire within national territories (such as the operation of factories); but the effects are felt in the global commons areas before they rise to the level of causing judicially cognizable injury to any sovereign that might sue on its own account. Such is the case with chlorofluorocarbons (CFCs) and the other ozone-depleting agents. The stratospheric ozone layer, like a species of whale, is a consumable public good. It is therefore likely to go "overgrazed" absent the kind of far-reaching international accord represented by the Montreal Protocol, the lessons of which Ambassador Benedick, one of its chief architects, draws for us.

Pollution from ships, the situation which Paul Hagen treats so admirably, is a token of yet another problem type. Here the activity complained of degrades the global commons (the oceans and its living resources). But, unlike the situation with CFCs, the injuring substances are being *released* on the commons area as well as working their mischief there. Historically there has been less resistance to regulating what nations do on the commons directly than to regulating what they do within their own sovereign territories that spills over into the commons areas. As a consequence, the international community has had far more success protecting the oceans from pollution released on the high seas (as justly as Mr. Hagen condemns the feebleness of present law) than from the far more alarming volume of waste that runs and blows into the seas from land-based sources.

The transboundary shipments of hazardous waste, the subject of the Basel Convention, present a distinct situation, legally and philosophically. While the typical transboundary pollution involves one state's involuntary invasion of another, here we appear to be dealing with willing sellers and willing buyers of risk: consensual transboundary pollution, we might call it.

There is a general presumption that the law ought not to interpose itself between willing contractors, at least in the absence of the several well-recognized exceptions such as consent to a battery and where one party's consent is not adequately informed. Do such exceptions apply here?

Many of the nations that appear willing to dispose of the world's wastes are abjectly poor, and, tragically, unoccupied spaces may be one

1. There is no reason to suppose that the level of transboundary pollution that will be mutually agreeable to two neighboring nations settling a transboundary conflict will be the optimal level from the perspective of the world community.

of their most marketable "resources." Thus, perhaps the question of how much intervention is justified in this area of global waste trade, in the light of all that can be said against paternalism, is one that will have to be reached eventually. But we are not at that point yet. The several analyses of traffic in transboundary waste gathered here—the best I have ever seen—convince that the prevailing conditions justify stronger international measures than the Basel Convention has provided. David Hackett shows that at present "the information flow in both directions is not sufficient to allow for reasoned judgment."² The area is replete with unaccounted-for third party risks to transit states and neighbors who share the depositing state's water resources. The fact that many of the prospective receiving nations are less than democratic raises uncomfortable questions about whose consent is being given (no matter how "informed") and for whose benefit. Nor can the sellers in good conscience blink the fact that whatever representations the receivers make about their disposal facilities, the group includes many who are unlikely to store the hazards well, and so on.

Ms. Petsonk suggests that United Nations Environment Programme (UNEP) should foster a cartel of waste storing nations that would issue a gradually constricted stock of tradable waste import rights. This is the kind of bold and imaginative idea that we should welcome. But I must say that, on first reading at least, the cartel idea leaves me cold. I had supposed that cartels were in bad odor for good reasons. By artificially raising the price of waste disposal, a purchasing cartel would not only lead to practices that were presumptively inefficient, but—even more troubling—to many that were illegal or just plain outside the law. As the price of waste disposal were driven upwards, there would be a tendency to dump more of the stuff illicitly at sea.

Moreover, it is not immediately apparent how a cartel would improve the practices of waste-disposing states, or why it should allay the suspicion that leaders of some developing countries may be accepting wastes to line their own pockets or build their paramilitary forces in disregard of their nation's best interests. Under a cartel, any self-benefiting leader would have monopoly profits, and not merely competitive gains, to dip his hands in.³ The best that can be said for the cartel idea is that

2. Hackett, *Assessment of the Basel Convention on the Transboundary Movements of Hazardous Waste*, 5 AM. U.J. INT'L L. & POL'Y 291, 318 (1990).

3. I am not clear how the import rights system ties in with the cartel. The devices are certainly separable. Ms. Petsonk envisions a gradual shrinkage of the waste permits as a way of gradually squeezing the waste producing nations to develop better production and waste disposal techniques. That may be her aim, but one doubts it would be the cartel's. The cartel's preferred "output" of purchases would be lower than the com-

we know, or ought to know from history, that absent barriers to entry of a sort that are beyond the capacity of the international community to impose, they do not last.

GLOBAL WARMING

Not being able to comment on all of the papers in detail, I am inclined to concentrate on Cameron and Zaelke's splendid contribution on global warming and the international legal process. There are two reasons to do so. First, as international environmental law bursts with more and more activity, the whole law-making and decisional process becomes increasingly complex, fragmented, ill-defined, and, in light of the jobs it is being called upon to perform, perhaps puerile. Cameron and Zaelke are responding to this large picture by trying to provide a global overview of the area and its linkages and to identify the capacities of the various types of organizations, fora, and legal strategies that give the field its texture and potential.

The second reason that their paper invites special comment is the focus on global warming. I presume that Cameron and Zaelke do so because climate change is a particularly tough subject for the law to get a handle on.⁴ That makes it pedagogically useful for exploring how far various strategies might stretch. But global warming is a problem worth talking about in its own right. Whatever skepticism persists in the scientific community, the public has adopted global warming as its most mesmerizing mega-threat—even more fervently than it did the opposite alarm that was being sounded only fifteen years ago, that we should be readying ourselves for a forthcoming, crop-murdering ice age.⁵ The warming threat is winning politicians and opening purses.

petitive level, but not so low, we expect, as UNEP's. Would not the cartel gradually come to resist UNEP, pressing to hold price and output at the levels that would maximize the cartel members' profits, while UNEP was pointing for a still lower, environmentally sound supply of permit rights? It makes one wonder how control would be vested, particularly when the monitoring of the traffic and of the world-wide rights system would be so plainly difficult.

4. For example, in contrast with some other vast-scale problems, such as ocean resources and broadcast frequencies, the climate does not lend itself to privatization as a practical option. We *can* (not that we necessarily should) carve up the ocean into more or less "privately managed" Exclusive Economic Zones; the atmosphere and ozone layer are entrenched public goods.

5. Compare S. SCHNEIDER, *THE GENESIS STRATEGY* 90 (1976) (relating, in the course of expressing general concern about climate variability "the warnings of several well-known climatologists that a cooling trend has set in—perhaps one akin to the Little Ice Age") with S. SCHNEIDER, *GLOBAL WARMING* (1989) (emphasizing the risks of global warming); see also P. EHRLICH & A. EHRLICH, *THE END OF AFFLUENCE* 28-29 (1974) (foretelling widespread famine as crops not genetically prepared for cold climate collapse in the face of plummeting global temperatures).

Nonetheless, one may wonder whether it makes sense to hitch so much of the movement's credibility and energies on a relatively speculative, controversial and long-range prospect, if that means, as it must, withdrawing attention from a whole host of more immediate problems.

A. GLOBAL WARMING AND CUSTOMARY LAW IN A CONTENTIOUS LITIGATION

Cameron and Zaelke ask us to start by imagining a Third World island nation that I will call A. As a consequence of greenhouse warming, A may face, sometime in its future, considerable damage from sea level rise and storm surges. Suppose A, in common with many poor countries lacking legal counsel, were to find itself well-advised. What legal and diplomatic options would be available?⁶

First, Cameron and Zaelke examine the recourse available to A under general principles of international law. That is, suppose A decides to haul some greenhouse gas producing nation to the International Court of Justice (ICJ) (or other available forum) under the law as it stands without negotiating any special new climatic treaty.

Agreed, there is a lot of encouraging in general language to be found in the old familiar standbys such as *Trail Smelter* and *Corfu Channel*. But those cases have little resemblance to A's cause of action. In *Trail Smelter* the United States sued Canada to redress damages from fumes

6. The tenor of their article is to assume that if only A were well informed, it would seek ways to brake greenhouse warming. I am not so sure. A might side with the considerable body of scientific opinion that remains highly skeptical about the global warming alarums, particularly in regard to the more apocalyptic scenarios, such as the great melting of the Antarctic ice sheet, a fable which seems to live a life of its own in the press, with little nourishment from science. And even if A finds credible a 20-30 centimeter sea rise in 50 years it still has to estimate and then discount the expected damage which would result. So remote a future does not cast much of a shadow in the present. To illustrate, imagine a calamitous Flood that will cause A (for pleading purposes, let's pick a whopping big number) \$1 billion in damages but will not occur until 50 years hence. At a 10% discount, the present value of the loss shrinks to only \$900,000. A's new counsel will respond that even \$900,000 is nothing to sniff at, particularly if it all comes out of the pockets of the rich industrialized defendants anyway. But A's diplomats may still have pause. Are we to assume A emits, or has no ambitions of emitting, greenhouse gases itself? Would it want to "win" something like \$1 million if the judgment could rebound against its own freedom to raise cattle and burn coal? Moreover, however little A's leaders may know law, they are not ignorant of the link between their own fortunes and that of the rich industrialized bad guys. Any nonmarket restraints on carbon use are going to hamper the industrialized world's economies—and therefore restrict their abilities to buy materials from, lend to, and aid Third World countries like A. The point is that even if global warming should be headed off, one ought not blithely to assume that is a battle which small poor nations will be prepared to spearhead. They, like us, have to balance remote and speculative contingent losses from warming against the present certain and solid pressures to feed the hungry and house the homeless.

that were wafting from a Canadian smelter south across the border into the State of Washington. In *Corfu Channel* two British warships, making innocent passage, were sunk by Albanian mines moored in Albanian waters. Britain successfully sued Albania, the ICJ offering up at one point the quotation that gives Cameron & Zaelke heart: "the obligation of every state not to allow its territory to be used for acts contrary to the rights of other states." On the other hand, it appears from the full opinion that Albania's failure to give notice of the mines was its critical misstep (the ICJ so read *Corfu Channel* in *Nicaragua v. United States*), not the fact, alone, that it created a hazard.⁷

Moreover, in both *Trail Smelter* and *Corfu Channel*, the responsible party and the damage were manifest at the time of trial and no more difficult to measure than in any ordinary lawsuit; there were no serious scientific questions about complex causal chains or reciprocating injury.

None of those features fits the global warming scenarios. Most important, no one has provided persuasive evidence (1) that the earth is displaying a statistically significant elevation in global average temperature, much less (2) that any elevation anyone might claim to have located needs be attributed to anthropogenic activities, rather than to natural events triggered by volcanos or *El Niño* or—the most evident instigator of ice ages and their retreats—the geometric relations of the Sun and Earth.⁸ Much less could any plaintiff now show (3) which nation or nation was responsible for the as-yet unmaterialized warming condition, much less again, and most critically, (4) that the complaining state had suffered damage, or perhaps that damages of a judicially cognizable level and quality were imminent.

Absent damages, what about an injunction to prevent future harm? It is true that the award in *Trail Smelter* included injunctive relief in the form of an order that Canada institute an abatement regime. But in *Trail Smelter* the injunction was entered in the wake of proof of damages. That is a far cry from enjoining a sovereign in anticipation of damages that are remote and contingent. Moreover, *Trail Smelter* was disposed of on the basis of a submitted *compromis* in which the parties had specifically empowered the arbitrators to render injunctive relief if it should prove (as it did) appropriate. Short of such a specific empowerment, mutually accepted by both parties, injunctions, even in the sly

7. See *Case Concerning Military and Paramilitary Activities in and Against Nicaragua* (Nicar. v. U.S.), 1986 I.C.J. 14, at 112 (June 27, 1986). This might suggest, unencouragingly, that a global polluter would escape liability, at least under the *Corfu Channel* rationale, simply by disclosing—giving notice that it intended to pollute.

8. See Bryson, *Will There Be a Global 'Greenhouse' Warming?*, 16 ENVTL. CONSERVATION 97 (1989).

guise of “provisional relief,” are rare and reserved for such episodes as Iranians storming the United States embassy, where the misconduct is outrageous and injury is not speculative but demonstrated.⁹

And one more reason why contentious litigation should not be over-sold. International tribunals had jurisdiction over Canada and Albania because all parties agreed to submit their controversies. In so submitting, neither defendant was really putting much money on the line. (Canada wound up paying only \$400,000 in compensation, Albania £850,000.)¹⁰ By contrast, any nation that allows adjudication of its global warming liabilities faces a risk, however slight, of owning up to, or ducking out of, a pretty stiff check. It has been estimated that to the United States alone, the costs over the next century, of limiting carbon dioxide emissions to 1990 levels would range from \$800 billion to \$3.6 trillion.¹¹ Those are big numbers, not calculated to lure a major polluting state through the courthouse door—especially where, as in international law, there is no way to make it show up if it does not want to.

In summary, the prospects of a successful contentious litigation—the prospects even of getting it launched—are frankly slender.

B. GLOBAL WARMING IN AN ADVISORY OPINION

Cameron and Zaelke raise, as a more realistic prospect, eliciting an advisory opinion from the ICJ aimed “at creating a structure for a new regime of global environmental protection.” Might something usefully be achieved by this route? Possibly. One can imagine a whole host of matters one might wish the World Court to clarify. These would include defining: (i) the ambit of state responsibility; (ii) how damages would be measured; (iii) the responsibilities, if any, of damaged states to mitigate damage (for example, by building sea-walls); (iv) special rules regarding threatened loss of sovereign territory by flooding; (v) the place of special defenses such as “unclean hands” (could a nation that was itself emitting greenhouse gasses participate in a suit or any recovery?); and (vi) probably much else that any good gang of lawyers could think of.

9. See C. GRAY, *JUDICIAL REMEDIES IN INTERNATIONAL LAW* 11-17 (1987).

10. See *Trail Smelter Case (U.S. v. Can.)*, 3 R. INT'L ARB. AWARDS 1905 (1941), reprinted in *Trail Smelter Arbitral Tribunal (United States v. Canada)*, 35 AM. J. INT'L L. 684, 697 (1941). Canada bore additional unreported costs of abatement. *Id.* at 725-731. Britain's award against Albania was for damage to the warships and injuries to naval personnel. *Corfu Channel Case (U.K. v. Alb.) (Assessment of Compensation)* 1949 I.C.J. 4, at 244 (Apr. 9, 1949).

11. See Passell, *Cure for Greenhouse Effect: The Costs Will Be Staggering*, N.Y. Times, Nov. 19, 1989, at A1, A10.

No one knows, however, how amenable the World Court would or should be about stepping in to "create a structure." I presume the ICJ is not a whole lot less leery than a United States court about handing down a judgment, much less a structure of detailed rules, in response to questions that remain abstract and unripe. That, at any rate, would be for the Court to decide. From the environmental movement's perspective, the case could be supported as part of a two-step procedure, a prelude to treaty formation. Anything that could be eked out in an advisory opinion would guide treaty negotiators as to the "default" rules with which they had to begin. And even should the Court refuse to flesh out the law at all (my bet is that it would do little more than to reaffirm the "sic utere . . ." sentiment of *Corfu Channel*), that itself would underscore the need for, and presumably spur, the convention negotiating process.

C. A GLOBAL WARMING TREATY

No one doubts the general virtues of special subject treaties over customary law. Treaty negotiation presents an opportunity to translate the airiness of the general principles into concrete and reckonable detail. A toothy compliance machinery need not be required as part of the treaty; but where compensation or other forms of liability are desired, they can be drafted in ways that clarify and alleviate the time-consuming and exacting elements of legal proof that hamper enforcement under the general principles.

Then, too, treaties can be drafted to restrict national action preventively—in advance of legally provable harm—while ordinary customary principles incline to hold the law powerless until harm has occurred or is imminent. And treaties can be designed to cure uncertainties of jurisdictional competence by including consent of the signatories to the authority of the ICJ (or some other forum). Questions of standing can be resolved as well. It is particularly intriguing to imagine treaties that would grant standing to special guardians appointed to represent the otherwise unrepresented portions of the global commons.

Finally, the fact that treaty-made law involves a consensual law-making procedure adds to its legitimacy—to a willingness to comply. This is one reason why Cameron and Zaelke are anxious to bring nations like A into the treaty-making process, even though others will be wary that by drawing more parties into the negotiations, each with its own agenda, the path to consensus becomes that much more thorny.¹²

12. Indeed, the authors put a positive twist on a linkage of issues and parties that I

What, then, about a global warming treaty?

Certainly no one doubts the wisdom of furthering world-wide cooperative efforts to monitor and evaluate climatic trends, particularly to provide the earliest warning possible if the data begins to signal some accelerating or even nonlinear "surprises." But negotiating a multilateral treaty with substantive bite—one which would mandate a near term, significant reduction or even "freeze" on global warming agents—is another matter. Negotiators would face far tougher impediments than those dealt with in negotiating restrictions on chlorofluorocarbons, sulphur dioxide and, more recently, nitrous oxides.¹³

Let me scan *just a sampling* of the potential bases for a falling out among the negotiators.

1. *Conflicting Scientific Evaluations*

There is general agreement that the blanket of greenhouse gases is thickening and that, other things being equal, the effect of this thickening blanket will be to increase average global temperature. But other things are not equal, and many potentially significant variables have yet to be accounted for in the best present General Circulation Models, things ranging from ocean and cloud dynamics to the effects of *other* airborne junk, such as sulfate particles, which are assumed to counteract the warming by reflecting away inbound radiation. There is thus less consensus that the planet is or will be warming appreciably than on the proposition, say, that the ozone layer is thinning and CFCs are the principal culprit.

As long as doubts among reputable scientists persist, so will reluctance to enter into negotiations, especially among the developed nations, which are leery of an ambush by the LDCs.

2. *Conflicting Attitudes Towards Hazard Prevention*

The more sober advocates of short-term action are not even claiming

expect will give many seasoned negotiators pause: "The problems presented by climate change also present opportunities to re-examine and correct many of the underlying problems of development that have led to the current dilemma . . . including trade issues, debt, technology transfer, technical assistance, and financial assistance." *Id.* at x.

13. In regard to the sulfur dioxide emission agreement, one may note that most industrialized nations had already begun SO₂ reductions in the 1970s, with emissions down 20-60% in the 1975-84 period. See WORLD RESOURCES INST. & INT'L INST. FOR ENV'T & DEV., WORLD RESOURCES 1988-1989 165 (1988). The signatories simply ratified the direction in which the industrialized nations were heading. That is not the situation that awaits greenhouse gas negotiators.

a consensus of peril exists. Their position is to remind us that there never will be 100% agreement on anything; and that the downside risks are so great, and the time-frame for gearing up the necessary changes so extended, we are making a worse and worse bet the longer we temporize.

These people are inclined to invoke the concept of "insurance" as a justification for quick and costly action. Although the fit of insurance to the proposal is a little loose,¹⁴ the idea is that we should be prepared to pay a "premium," measured in the costs of constrained carbon use (even costs that, had we perfect knowledge, would not be warranted) in order to make sure the risks do not materialize and bring down catastrophic losses in the future.¹⁵

This may be right, in the sense in which one might be advised "to insure" against loss of his or her house by installing a sprinkler system. But that depends of course on the risks of fire and the costs of the system. Thus, while the "insurance" metaphor puts a question nicely, it does not put, much less answer, the critical one: How much of a premium is warranted? One excellent EPA study concluded that imposing a worldwide tax of up to 300% of the cost of fossil fuel would delay the onset of a 2 degrees Centigrade warming by only five years—from 2040 to 2045.¹⁶ How much is each proposed level of carbon constraint worth: 1 or 5 or 10% of Gross National Product?¹⁷ What will be

14. It is intriguing to consider introducing "insurance" in a somewhat more technical sense that has been done in the discussion so far. I say "somewhat," because, aside from the Flood, we have little actuarial data on ecodisasters. But we might think of global warming as a risk which, if it comes, will produce an uneven distribution of winners and losers. Even if, as is possible, local gains will, on net, dominate local losses, that will not make the local losses less calamitous to those who will suffer them. And "local" disruptions can have increasingly serious repercussions on all of us. Perhaps among the many options we should be considering in the face of these prospects is a fund to compensate those who will suffer from global calamities, an "insurance fund" in this sense, one that spread among the world community the risks of damages the elimination of which fell below what could be presently warranted on a cost-benefit basis. (We could even consider a tax on carbon-emitters as a source of "premiums" which would both nourish the fund and gently dampen the risk-creating activity, in the manner of third-party insurance). These are technical issues on which we would do well to involve people who are experts on insurance.

15. See Ruckelshaus, *Toward a Sustainable World*, SCI. AM., Sept. 1989, at 166, 166; S. SCHNEIDER, GLOBAL WARMING, *supra* note 5, at 283.

16. See S. SEIDEL & D. KEYES, CAN WE DELAY A GREENHOUSE WARMING? 4-12, 4-31 (1983) (available at Environmental Protection Agency).

17. See Manne & Richels, *CO₂ Emission Limits: An Economic Cost Analysis for the USA* (Nov. 1989) (paper funded by the Electric Power Research Institute) (forthcoming in *The Energy Journal*) (projecting that for the United States, the costs of restricting carbon emissions to their 1990 rate, gradually reducing them to 80% of the 1990 rate by 2020, and stabilizing them thereafter would entail losses of roughly 5% of total annual macroeconomic consumption; discounted to a present (1990) value at 5%,

gained, and what lost, if over the next five or ten years we defer a freeze and mobilize scientific efforts to produce a clearer picture? Those are the real, and the really divisive questions.

3. *Conflicts Arising from the Unevenness of Impacts Across Space*

In the case of most global hazards, say, ozone depletion and nitrous oxide fluxes, the damages are projected to fall unevenly across regions, so that some locales will be more harmed than others. But no one has suggested that any area faces any local *benefits* from those things. Not so with climate change.

Suppose the earth does heat up. While air conditioning costs would go up in hot areas, by the same token, heating costs would go down in the cold ones. No one knows which effect would dominate. The prospect of local droughts are ordinarily emphasized, but on balance the amount of precipitation worldwide would be expected to increase.¹⁸ In fact, a warmer, moister, more carbon-dioxide rich atmosphere, together with longer (frost free) growing seasons is viewed as generally favorable to the growth of biomass, overall (with some variable impacts on plants by species and local conditions). SCOPE, The International Council of Scientific Unions' Scientific Committee on Problems of the Environment concluded:

given the uncertainties in regional scale estimates . . . and in the numerous deficiencies in methodologies . . . there is presently no firm evidence for believing that the net effects of higher CO₂ and climatic changes on agriculture in any specific region of the world will be adverse rather than beneficial. . . . [I]t is certain that some will gain and others will lose, although we know neither where they will be found nor the magnitude of the impacts.¹⁹

The fact that some nations presently feel the odds favor them coming out on top does not make negotiating an accord any easier. Consider the position of Russia. According to a United Nations Environmental Program study, the effect of a 1.5° C. temperature increase in the Central European area of the Soviet Union would be a 30% increase in wheat yield. Additionally, the area suitable for wheat cultivation would increase by 26%, providing an overall increase in wheat production of

the cost is estimated at \$3.6 trillion.

18. See UNITED NATIONS ENVIRONMENT PROGRAMME, *THE GREENHOUSE GASES* 22 (1987) [hereinafter UNEP, *THE GREENHOUSE GASES*] (reporting that, on the basis of an approximately 4 degrees Centigrade temperature rise, "three of the most recent model predictions suggest that overall precipitation will increase by between 7 and 11 percent").

19. Pittock, *The Carbon Dioxide Debate: Reports from SCOPE and DOE*, ENVIRONMENT, Jan.-Feb. 1987, at 25, 29.

64%.²⁰

Can we expect a nation so situated to pay more for heat and energy today in order to have less to eat tomorrow?

4. *Conflicts Arising from Conflicting Impacts Across Time*

Indeed, the effects of global warming may not only unfold across space in complicating ways; they may unfold with complications in time. Some commentators have visualized a scenario with warming producing a net benefit to the earth's inhabitants for 100 years, and then a downturn. Global warming negotiators would thus have to face "tradeoffs between succeeding human generations whereby the first few benefit substantially by imposing uncertain but potentially very large costs on [more distantly] future generations."²¹ Selecting the appropriate intergenerational discount rate—a knotty conundrum in the most straightforward scenarios—becomes all the more crucial and controversial.

5. *Conflicts Over Wealth Disparities and Related Moral Issues*

Even if the developed countries were substantially to reduce their carbon emissions, the inertia towards ever higher levels of greenhouse gases would not be derailed, owing principally to the projected rate of per capita energy growth in the more populous Third World. (This is another reason in favor of Cameron and Zaelke's proposal to bring in the less developed countries early).

Getting the LDCs to cooperate will be, and perhaps morally should be, particularly hard. The problem is not just the familiar claim that the LDCs bring to every negotiation: that the rich should shoulder more of the costs of any project than the poor. In the atmospheric context they have an even stronger argument. Consider India's demand that the developed world should pay it \$2 billion to sign the Montreal Ozone Protocol.²² Although the demand may sound affronting, it is not indefensible. Start by regarding the atmosphere rather crudely but realistically for a moment: as a useful "sink" in the Common Heritage of Mankind. The late developing nations can maintain that present pressures to reduce outgassing came about through no fault of their own, but because over the past two centuries the industrial world has been

20. UNEP, *THE GREENHOUSE GASES*, *supra* note 18, at 29.

21. D'Arge, Schulze, & Brookshire, *Carbon Dioxide and Intergenerational Choice*, 72 AM. ECON. REV. PAPERS & PROC. 251, 253 (1982).

22. *India Wants \$2 Billion from Others to Sign Ozone Depletion Montreal Protocol*, 12 INT'L ENV'T L. REP. (BNA) 389 (Aug. 9, 1989).

congesting the atmosphere—"taking" its absorptive capacities—without leaving, in the terms of Locke's proviso, "enough and as good for others."²³ How does one justly apportion the added costs the world now faces because of what we, the rich, have done?²⁴

6. Conflicts Over Linkage

The greenhouse blanket is a composite of several gases. CO₂, largely a by-product of fossil fuel burning, is the most abundant trace gas and has attracted the most attention. But the blanket is augmented by chlorofluorocarbons, nitrous oxide, water vapor, and methane, the last-named of which, principally agriculture-related, is increasing most rapidly.²⁵ Methane, moreover, is a far more effective "blanketer" than CO₂, each methane molecule having the potential to block 60 times the outbound energy of a CO₂ molecule.

Suppose now we are seeking treaty reductions to reverse the greenhouse build-up. Immediately there is a question of linkage. The CO₂ emitters, in particular the major fossil fuel burners (China, Russia, and the United States) may see little justification to negotiate a diminution in their emissions unless their cutbacks of CO₂ are linked to reductions by emitters of other greenhouse gases. This may not be an unreasonable demand, considering the suspicion that at the present margin a reduction in methane could be achieved more cheaply.²⁶ And then the negotiators have to decide whether to mandate a cut-back on a ton for ton basis, or to make special allowance for the different "blanketing" capacities of the various chemicals, or for their varying residence periods in the atmosphere.²⁷

23. J. LOCKE, *SECOND TREATISE ON GOVERNMENT* § 27 (1980).

24. More complicating: it was not "us," but, largely, our forbearers who congested the atmosphere; but are we not the beneficiaries of the capital stock those unrestricted emissions produced?

25. Graedel & Crutzen, *The Changing Atmosphere*, *SCI. AM.*, Sept. 1989, at 58, 64.

26. See Stevens, *Methane from Guts of Livestock is New Focus in Global Warming*, *N.Y. Times*, Nov. 21, 1989, at B-7 (suggesting that, at present margins, it might well be that methane, particularly the 15% attributable to livestock, is most cheaply amenable to reductions through the use of hormones and variation in cattle feed).

27. The expected "residence" of each carbon dioxide molecule has been estimated at 100 years; that of each methane molecule, only 10. Graedel & Crutzen, *supra* note 26, at 62. This whole situation is further complicated by the fact that, while methane, viewed as a greenhouse gas, is bad, in some reaches of the atmosphere it has the beneficial effect of "taking out" free chlorine, which is the critical culprit in the dynamics of the chlorofluorocarbon activities. *Id.* At least one group of scientists is trying to establish an index that would enable us to make comparisons among the various gases. See R. T. Ellington & M. Meo, *Avoiding the RAT Gas Trap: The Development and Use of a Greenhouse Gas Emissions Index* (Aug. 1989) (paper presented at the meeting of

7. *Conflicts Over Strategies*

Another potential conflict involves a selection of strategies, most fundamentally a choice between global-reaching, preventative strategies, and those that place more emphasis on local adaptations. Cameron and Zaelke incline towards the former view, as do most people, at least implicitly, when they refer to the problem as the "Greenhouse Effect" or "Global Warming." But as Tom Schelling reminds us, the change in one particular index (the level of atmospheric carbon dioxide, the global temperature) is not an evil in itself. What we are worried about are certain contingent, locally varying impacts for which those indices are at best rough proxies.²⁸ For people living in most American cities the particular concern is comfort (although they may feel the jolt of remote effects). For the people of Bangladesh, Egypt, and other low-lying coastal areas, including perhaps some in the United States, the peril posed by greenhousing is principally sea-level rise. For many farming people across the globe, the fear is a loss of precipitation and soil moisture.

Viewed from the perspective of social strategy, these are quite different effects, each with its own time-horizon and cost schedule. Those who face loss of agricultural water can envision dealing with the problem, when and if it comes, by better water management (micro-irrigation, impoundment, and so on) and perhaps the planting of less water-needy crops. As Schelling observes, for the United States, the policy issue may be a choice between conserving fuel *now* and conserving water *then*.²⁹ There is no *a priori* reason to conclude that the former option is superior. Those who risk inundation from sea-level rise face their own trade-offs between improving their present, often starkly impoverished standards of living, and the possibility that at some future date, long down the road, they may have to construct sea-walls or perhaps withdraw their entire populations to higher land.

The point is this. Where we might first suppose that the question is how to mobilize the global community to confront a single, unifying threat, we may find on closer inspection that the political reality is how to bring together nations that are facing a host of threats that are quite distinct and potentially quite divisive. It may indeed prove more efficient to lean less heavily on the strong suit of a treaty—prevention—in favor of more adaptation on a region by region basis if and when local

the American Institute of Chemical Engineers, Philadelphia, Pa.).

28. Schelling, *Climatic Change: Implications for Welfare and Policy*, in CHANGING CLIMATE: REPORT OF THE CARBON DIOXIDE ASSESSMENT COMMITTEE 449 (1983).

29. *Id.* at 450.

threats become better defined.³⁰

Again: to emphasize these impediments to a treaty is not to demean efforts to explore the possibilities. The history of the most similar agreements, those arising from the Convention on Long-Range Transboundary Air Pollution, suggest that we should anticipate drawn out, multi-staged negotiations, with a broadly drafted umbrella convention as a foundation, followed by a series of protocols spelling out undertakings in increasing detail. Given the nature of the problem and of the process, an early start is a good idea. So too is starting out with a sober sense of what we reasonably can and should be aiming for.

30. *Id.* Schelling suggests that many preventive measures, such as removing greenhouse agents from entering the air, involve asking the actor to bear the costs of providing positive externalities: to clean up the atmosphere at one's own expense (in part) for the benefit of others. Such measures are therefore hard to motivate. By contrast, the benefits of many techniques that would adapt to global warming symptoms, such as water conservation programs, are fully internalized by the actor; as a consequence, adaptation may be a preferred second best strategy.