

## **Chapter 9: Scott Barrett, Johns Hopkins University, Paul H. Nitze School of Advanced International Studies**

Our chairman, Ernesto Zedillo, opened this session by saying that the wise persons at Davos had declared climate change to be the world's most important problem. He disagreed with this assessment; he thinks nuclear proliferation is a bigger problem; and he may well be right. What impresses me most about climate change, however, is less its importance than its complexity. Global climate change is almost certainly the world's most complex challenge today. It may well be the most complex challenge the world has ever faced.

It is from this perspective that the Stern Review surprised me. Stern and his colleagues looked carefully at this very complex problem and derived a very simple conclusion—that “the benefits of strong, early action considerably outweigh the costs;” that atmospheric concentrations should be prevented from exceeding twice the pre-industrial level; and that the benefit-cost ratio of doing so is about 10:1. To add to my surprise, Stern's conclusions contrast with the mainstream literature. What are the reasons for the difference? There are many reasons, but one is especially important. Stern's conclusions derive in large part from his ethical reasoning.

That ethics should prove decisive may surprise other people, but it did not surprise me. The debate about climate change policy has focused on the science, the economics, and the politics—all of which are important. Perhaps Stern's greatest contribution is to show us (or, rather, to remind us) that the ethics are at least as important.

Where I disagree with Stern is in thinking that the case for “strong, early action” to reduce emissions is as clear-cut as his analysis implies. I am not saying that his conclusions are wrong; I am saying that other conclusions can be supported.

Though Stern recommends urgent action, he also says that, “Only a small portion of the cost of climate change between now and 2050 can be realistically avoided, because of inertia in the climate system.” The aim of acting urgently is thus to help future generations. This is why ethics are important to Stern's analysis. He argues that the current generation should take action for the sake of the future.

The generations that will benefit the most from this urgent action will not be born for some time. According to Stern, “Preliminary estimates of average losses in global per-capita GDP in 2200 range from 5.3 to 13.8%, depending on the size of the climate-system feedbacks and what estimates of ‘non-market impacts’ are included.”

These are substantial damages, but over the next 194 years more than the climate will change, and some of these other changes are also relevant to this analysis. One such change expected by Stern is a significant rise in per capita consumption. “In the baseline-climate scenario, 5° C warming is not predicted to occur until some time between 2100 and 2150. By then, growth in GDP will have made the world considerably richer than it is now.” So Stern’s review urges the current generation to sacrifice for the future, even though the future will be better off.

It may surprise casual readers of the Stern Review that the future is expected to be better off than the present generation. Wouldn’t climate change make the future worse off? It would, compared to the alternative of no climate change; but growth, compounded over many decades, increases incomes substantially. Climate change may hit future generations hard in percentage terms, but many decades of growth may be more than able to absorb this loss. Even taking climate change into account, the future can be much better off than the present.

So the question is how much the current generation should assist the future, when the future is expected to be better off. This is where ethics matter. The calculus of this choice hinges on how the benefits of reducing emissions today—avoided future damages—are weighted relative to the costs of reducing emissions today.

There are two ethical components to this relative weighting. The first is how we weight the wellbeing of future generations relative to our own. Are future generations worth any less, simply because they exist in the future? Stern says yes but only because there is a chance that the future will not exist. The possibility of extinction is relevant, but the weight we attach to the future is fundamentally a social choice; it may reflect more than the probability of the Earth being hit by an asteroid.

The second value is how we compare the wellbeing of societies having different per capita consumption levels. These include richer and poorer communities today, and richer and poorer generations. Stern also chooses a relatively low value for this

parameter. A higher value, reflecting a greater concern for equity, would have discounted the future more heavily simply because, in Stern's analysis, the future is expected to be better off. It is this second parameter—this equity parameter—that I shall focus on here.

Though Stern uses a small value for this parameter, his words suggest a deep concern for equity. Stern argues that rich countries should reduce their emissions today to help today's poor countries decades from now ("There is no single formula that captures all dimensions of equity, but calculations based on income, historic responsibility and per capita emissions all point to rich countries taking responsibility for emission reductions of 60-80% from 1990 levels by 2050"), because poorer countries are more vulnerable to climate change ("The impacts of climate change are not evenly distributed—the poorest countries and people will suffer earliest and most."); but he concludes that today's relatively poor generation should help richer generations living in the future.

There seems to be an inconsistency here. The problem is that, in Stern's model, as in all other models of its kind, the only way in which rich and poor societies interact is via emission levels. A different model that allowed rich countries to assist the poor sooner and in other ways would yield a different result. A higher value for the ethical parameter would increase transfers from rich countries to poor countries but shift these transfers away from mitigation and towards adaptation assistance.

My main complaint with the Stern Review is that it chose single values for the two ethical parameters. It would have been better, in my view, had Stern examined a range of values. As I said before, these values are ultimately social choices. Before choosing them, society should be able to examine the consequences of these choices.

In a postscript to his Review, Stern includes a sensitivity analysis—in my opinion, a major improvement. This analysis shows that a higher value for the equity parameter would weaken the case for taking strong action now.

When I say, "weaken," I mean relative to using a lower value for this equity parameter. Importantly, in this sensitivity analysis, Stern introduces a third parameter. This is not an ethical parameter but one reflecting the sensitivity of damages to climate change. A higher sensitivity can offset choice of a higher ethical parameter. This is important to understand: if there is reason to believe that damages will turn up sharply as

concentrations rise, then the case for limiting concentrations will not be highly sensitive to the choice of ethical parameters.

Let me, however, return to the equity problem. Is it better to cut emissions today so as to reduce climate change damages experienced by poor countries in the future, or is it better to make other investments that can benefit poor countries today—and, in the bargain, help to insulate them from future climate change? Of course, we need to do both, and Stern would agree with me here, but how should we balance these allocations? They are not separate problems. Investments in adaptation should be co-determined with the emissions path.

Let me give an example of what I mean. Climate change is expected to increase malaria prevalence in the future, mainly by expanding the range of the mosquito vector in higher elevations. Malaria might increase 5 %a century from now because of climate change. Mitigation could only reduce this increase a little bit. By contrast, investment in the R&D needed to discover and develop a malaria vaccine could reduce malaria prevalence across-the-board. It is also likely to benefit the poor countries much sooner. An investment of this kind would help today's poor countries today and not only a century from now.

The example of the malaria vaccine is best thought of as a metaphor for the kind of development that is needed. Investment in treatments and vaccines for the neglected diseases and for R&D to improve agriculture in the poorest countries is also needed.

Stern agrees that adaptation assistance is needed, but his postscript says that this “will come in large part through the delivery of the commitments made by rich countries to double aid by 2010 and the commitments made by many countries to meet the target of 0.7% of GNI by 2015.” I have four comments. First, promises of this kind have been made before without being fulfilled. Second, it is not the outlay that matters but the effect on development. Third, and as I said before, adaptation assistance needs to be an integral part of climate policy. Adaptation is a substitute for mitigation. If countries supply less mitigation, they should be made to contribute more to adaptation. Finally, the motivation for providing adaptation assistance would be different than for providing development assistance. The motivation would not be compassion; it would be an acknowledgement of a responsibility to help. The rich countries did not make the poor

countries poor, but they are largely responsible for the accumulation of greenhouse gases in the atmosphere.

The Stern Review not only makes the case for strong early action; it also makes the case for limiting atmospheric concentrations. How might we get from here to there? In my view, climate policy must be multidimensional. Five dimensions are especially crucial:

First: I agree with Stern that the richest countries should take steps to limit their emissions now. Different countries may choose to do this in different ways. They may also do this by establishing different goals. This is to be expected, because circumstances vary. However, there will be a tendency for countries to take comparable actions—comparable perhaps most especially in terms of marginal costs. To reinforce this tendency, and to provide a positive setting for goal setting, a declaratory agreement is needed—a treaty in which countries declare the steps they intend to take (Marc Levy calls this, “tote board diplomacy”). The main difference between this approach and Kyoto is that a declaratory agreement would drop the pretense that there would be international enforcement. For this declaratory agreement, enforcement would be internally driven; internationally, it would be helped by “naming and shaming.”

This first step is not enough; it will not stabilize concentrations. To do that, we need to be thinking long term and big. We need, in particular, to be thinking of fundamentally new energy technologies, diffused globally.

How do we raise the bar to this higher level? This is where the second and third dimensions come in.

Second: basic research is needed into new technologies. I do not believe that the incentives for countries to discover and develop these are strong enough for us to rely on unilateral efforts. International cooperation is needed. An example of what I have in mind here is the ITER, the next step in nuclear fusion research, which is being financed by European countries, China, India, Japan, Russia, South Korea, and the United States. We will need a multiple of agreements like this. In my view, developing such agreements should be a priority for climate diplomacy.

Third: we need a means to diffuse the technologies developed by this research. Moreover, this diffusion needs to be tied to the research. There is no point in discovering technologies that will ultimately fail to be diffused.

How to diffuse technologies? There are a number of ways, but one that I believe is especially important is to establish technology standards. Provided certain conditions hold, standards can cause technologies to be diffused without the need for strong enforcement. Establishing these technical standards will require yet more international agreements.

Fourth: as mentioned before, adaptation is also needed. Much adaptation will be undertaken unilaterally. Indeed, in many cases adaptation will be guided by the invisible hand. The big problem is with the poorest countries.

The poorest countries are vulnerable for three reasons. First, most are located near the equator; they are in a sense already “too warm,” and climate change will make them even warmer. Second, their economies are more dependent on the climate; agriculture as a share of income is much higher in poor countries than in rich. Finally, the poorest countries have the weakest institutions. They are the least capable of supplying the national public good of adaptation. Moreover, the market cannot be relied upon to help them. For the same reason that there is almost no R&D into the neglected diseases so we cannot rely on there being R&D that would help to make agriculture in the poorest countries less sensitive to climate change.

Most people think adaptation means raising dikes as the seas rise. But more needs to be done. We need to make poor countries less vulnerable and more resilient to climate change. This requires development assistance now.

Fifth: though not mentioned by Stern, we also need to establish a governance structure for geoengineering. These are engineering projects that can alter the climate directly (an example is throwing sulfur particles into the stratosphere). Geoengineering is the only means by which we can prevent abrupt and catastrophic climate change from occurring, after the first signs of such change appear. I do not believe that geoengineering should be used to limit “gradual” climate change. Its use would create new risks, and it would not address associated problems like ocean acidification. However,

geoengineering may be useful for temporary interventions to prevent possibly irreversible abrupt and catastrophic climate change.

The incentives to undertake geoengineering couldn't be more different from the incentives to reduce emissions. A single country can deploy a geoengineering project, whereas no country can stabilize atmospheric concentrations on its own. Geoengineering is also relatively cheap. Indeed, the problem with geoengineering is that a single country may have an incentive to do it on its own and yet all countries would be affected—and not necessarily for the better. It is therefore essential that use of this technology be determined within a global framework.

As I said before, climate change is the most difficult challenge the world has ever faced. It is certainly much harder than was the challenge 45 years ago of putting a man on the moon. Just as President John F. Kennedy said then, however, we should meet this new challenge not because it is easy but because it is hard, “because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win....” The Stern Review has contributed to the global discussion of how to determine the goal of climate policy. After this conversation has ended, we will need to face the practical challenge of how to build and sustain the institutions needed to achieve it.

## References

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