

The Policy Dynamics of Global Change

by Radford Byerly, Jr.

The importance of global change is obvious to many people: concerned citizens, scientists, politicians. Yet it seems that relatively little is being done that will be effective in mitigating adverse effects of global change. For example, in 1987 Congress passed, and the president signed, a law recognizing the importance of one significant facet of global change, the greenhouse effect. Provisions of that act delegated to the Environmental Protection Agency (EPA) the duty of "developing and proposing to Congress a coordinated national policy on global climate change." Passage of this law perversely seems to demonstrate a lack of understanding of global change and the futility of current actions, for surely EPA with its short-term focus and locally regulatory approach is not the agency to deal with a problem global in scope and decadal in time scale. Further, the act seems to contradict the National Climate Program Act of 1978, which assigns to the Secretary of Commerce, i.e., to the National Oceanic and Atmospheric Administration (NOAA), responsibility for a national climate program.

A second example is the recently completed Montreal protocol on substances that deplete the ozone layer. No sooner was it ratified by the U.S. Senate than a report by the National Aeronautics and Space Administration suggested that more stringent controls are needed.

The Policy Problem

The social or policy sciences are very difficult to apply to problems like global change because of politics and ideology. Moreover, definite information about future global change is not yet available for the social sciences to use, and there seems to be no institution, government agency, or well-organized community into which to integrate policy research.

Policy problems are rooted in the nature of global change. From the point of view of a policymaker, global change looks particularly perverse. First, global change is simultaneously

local and global. No one country can forestall change. Effects and benefits vary from place to place. For example, attempts to control carbon dioxide emissions would have local costs but global benefits.

Second, global change is a long-term problem—stretching over decades to centuries. How can marginal economies such as in Bangladesh invest in the distant future? Also, we know the world and social values will change; how can we know what is best for citizens of the year 2100?

Third, global change problems are inextricably linked to everything else. Helping in one area may hurt in another, and we may not be able to know about such side effects until they occur.

Finally, global change is dominated by uncertainties. For example, we don't know future carbon dioxide emissions or concentrations. And even if we knew the concentrations, we still could not predict the physical climate changes they would cause. If we could accurately predict climate changes, we would not know the socioeconomic effects. If we could project adverse future socioeconomic effects, we could not prescribe a policy to mitigate them. And finally, if we could prescribe an effective mitigation policy today, we do not know how effective or acceptable it would be in a future society.

Reflection on the difficulty of generating crisp and effective policy action regarding global change reveals three possibly clarifying general principles. These principles may also apply more broadly, i.e., to other areas of interaction between science and society.

The first principle is that *no one is in charge of policy related to global change*. (This could be more generally formulated "No one is in charge of policy," but the most general form "No one is in charge" is rejected as overly cynical.)

Of course one might insist that by definition the president is in charge of U.S. policy because he is in charge of all policy. But that is a formal and hollow assertion. Overall priorities are set by the president, but specific policy options are generally under the purview of the relevant agencies.

This leads to a corollary: in the case of global environmental change, individuals are in charge of parts of the problem. For example, EPA, in response to several laws, is in charge of pollution. But the laws establishing EPA set up many short-term regulatory deadlines on which EPA focuses its attention. The National Oceanic and Atmospheric Administration is in charge of programs that deal with weather, climate, ocean fisheries, and satellite observation. The Department of Energy (DOE) has a relevant mission, but a few years ago attempts were made to abolish that department. The emasculation of EPA and the attempted abolition of DOE by the past administration illustrate part of the policy problem: agencies typically have gripping short-term concerns (such as how to keep programs going during a hostile administration while facing deficit-driven and Gramm-Rudman-enforced budget cuts). Therefore it is difficult for agency leaders (like the leaders of Bangladesh) to worry about global change impacts that may be years away.

The second principle is that *officials are saturated with information*. The corollary here is that officials are also saturated with demands for action, and sometimes they are paralyzed by demands for conflicting actions. This principle is contrary to the assumption implicitly made by many scientists that policymakers are sitting, waiting with clean desks, for the information that will allow them to spring into action. Sadly, that is not the case (but imagine a wonderful headline, "Greenhouse Study Unleashes Congress").

Policymakers typically prefer to work with accurate, concise, timely, and politically relevant information: for ex-



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ample, "Texas, Louisiana, and Colorado want high oil prices, while New England wants low prices." For greenhouse warming the analogy would be "climate change helps Minnesota but shuts down Arizona." Of course, such information does not tell the whole story.

The whole story of the greenhouse effect begins with contradictory and varying predictions of climate change due to carbon dioxide, predictions generated by various complex general circulation models. Given such confusing scientific information about future climate change, policymakers typically assume climate will not change (during their term at least) and then resume comparing the relative political strengths of oil-producing versus oil-consuming states. They react this way even though if they looked at the historical record they might be convinced that climate does change.

The point is, policymakers today are both saturated with information on a number of urgent topics and cannot be expected to interpret complex information which is not easily presented in an almost binary fashion. Policymakers have to be given a message, not data.

The final principle is that *policymakers don't want more problems*. The corollary to this principle is that policymakers want solutions to problems that are thrust unavoidably upon them. Ideally they like the kinds of magical solutions called "silver bullets"—solutions with no costs and no side effects.

This corollary presents two dangers. The first is recognized in the homily that "for every complicated problem there is a solution that is simple, straightforward, popular, and wrong." This is why so many government programs are counterproductive; they have to be simple, straightforward, and popular in order to be adopted, and by the time the original good idea has acquired these characteristics, it no longer works. The second danger is that scientists will be led to promise

"silver bullet" solutions that they can't deliver, leading to loss of credibility and further inability to penetrate the policy process.

The hypothetical, facetious dialogue in the table below exemplifies the difficulty and hints at three kinds of problems:

- Our information is imperfect, which makes communication difficult. Also the lack of an organized demand for specific information useful to policymakers (a result of the first principle) means that our research activities, no matter how good, may only accidentally and sporadically tell policymakers what they need to know.
- At least in part because of the way it is presented, global change is often perceived as a small, barely detectable change that will occur somewhere else (often in the middle of the ocean) and/or years in the future. In accord with the second principle, politicians intuitively discount distant, future changes and give them a present value of zero.
- Finally, pressing, immediate problems tend to be addressed with short-term solutions, while long-term problems like global change can be, and pursuant to the final principle are, put off. Concentration on short-term problems and solutions is a fundamental problem of our form of government.

We are challenged to find a way to deal with long-term problems and to learn how to deal politically with elements of global change (which may help us learn how to deal with other problems such as population, arms races, and social inequality).

The Policy Solution

The solution involves working harder to develop and demonstrate the social and economic relevance of scientific information about global change, and thereby to help this information thrust its way into policymaking. Even though no one may be in charge, consideration of global change can be made a part of policymaking in the agencies that deal with bits and pieces of the issue.

Although eventually we may need to change our institutions in order to deal with global change, we need to begin working within the present system. The realpolitik of the policy world is that often decisions are made on the basis of blunt information and that the right information correctly presented could stimulate progress toward wise actions in response to global change.

Policymakers will have varying perceptions of global change; thus, different interests will be engaged. Therefore it is extremely unlikely that we can insert information about global change wholesale into policymaking.

Hypothetical scientist briefing a hypothetical policymaker on the real dangers of the greenhouse effect.

Scientist	Policymaker	Policymaker's Thoughts
"Carbon dioxide will double by the year 2010."	"That's nice"	(I need to see Joe about that noise in my car.)
"Global temperature will rise by 2° to 4°C."	"What effect will that have on my district this summer?"	(Doesn't sound like much to me.)
"We're not sure."	"Oh."	(I was right!)
"But sea-level may rise by 10 feet."	"Should I introduce a bill banning sea-level rise?" (Sardonically)	(I remember the King Canute story.)
"No, no all we have to do is quit burning oil and coal."	"And stop driving cars?"	(How do I get this guy out of my office?)

It is likely that for the foreseeable future we will have to work with those bits of information related to particular pieces of the policymaking process. Two challenges will be to maintain coherence while acting on these bits and pieces and to avoid appearing to be naive do-gooders; i.e., to avoid condescension.

If we can start taking action now, we do have time and resources to deal with global change. Perhaps we can take advantage of a characteristic of modern, Western industrial society: that is, the same high social and economic metabolism that causes large carbon dioxide emissions also creates rapid socioeconomic turnover, which may allow us to adapt to a changing climate and adapt our industrial practices for lower carbon dioxide emissions. We have wealth; with proper management the U.S. and a few other countries have the economic resources needed to make changes and still keep growing. Of course the question is: do we have the political will to make changes? If not, can we generate the political will?

Clearly the whole problem is too big, too diffuse, and too interconnected to be tackled at once. It will be difficult to convince a particular policymaker to take a specific action because of a large global problem. So two things are needed—first, to break global change into small pieces; and, second, to bring it home, to show the local effects. In this way, we may be able to generate the political will to make changes.

Consider the example of water policy. The argument is that a greenhouse change in climate (i.e., one due to a greenhouse effect) may decrease precipitation in the already-arid western United States—which we will call greenhouse drought. We know from the historical record that there have been droughts in the past—so there exists both a need to study drought and some data from which to project future droughts. Of course greenhouse drought may be different if it becomes permanent, but its initial manifestation might be an increase in

the frequency of periods of drought.

Is there a policy problem? If we have too little rainfall and, thus, too little water, isn't that a simple physical fact? Is that all the information we need to transmit? Perhaps not. There is enough water in the West to accommodate a significant decrease in water availability without serious economic impact. However, many would argue that our present water policy locks us into a system in which water is made available at low cost for low-value uses. Therefore a different allocation policy could make adequate water available for economic purposes and also leave water in streams for recreation and for ecological conservation.

The present water allocation scheme in the west, "prior appropriation," was developed in frontier days when resources, including water, went to the first person to claim them. Since then many things have changed, including our society and values, but not our water policy. So we need to generate alternative policies and options that will work. While doing this we need to study how information is used in policymaking with the hope of applying what we learn to other areas.

How do we do this?

We don't have adequate models of future regional precipitation. Moreover, we don't have good models for relating precipitation changes to changes in stream run-off, i.e., to water availability. But we can avoid these difficulties by using historical drought data. We can use climate data to see what kinds of precipitation changes to expect and use run-off data to determine water availability. A study of what actually happened in past drought years can lead to an estimate of impacts. In other words, we can create a credible scenario (not a prediction) of future changes in water availability for policy analysis. We can take real data and insert a climate-change bias by increasing the frequency of periods of drought.

A next step could be to assemble a group of working officials concerned

with water policy and conduct a policy exercise using the scenario described above. Officials would be asked to react as the scenario unfolded, in a manner analogous to the war games played by defense officials. The water officials might see that present policies would not work in a greenhouse drought. They might develop new approaches that would work. By involving real officials, we should develop realistic solutions to the problem posed by the scenario.

There are two important points: first, an accurate climate prediction is not needed—we can use historical data to create a likely scenario. Second, because we know climate does change (with or without greenhouse effects), and droughts do occur, this is not really a new problem. We are finding ways to address an existing problem. That is, if working water managers are too hard-nosed to worry about vague future droughts due to a greenhouse effect, we can challenge them to put more resilience and robustness into their present water management policy so that even if climate doesn't change they will be better able to deal with natural variability.

Another benefit of such work is learning how officials perceive and respond to information about climate change, enabling us to make progress on the general problem of information utilization and perception.

The question must be asked: what do we do when we have exhausted the resilience in the system, when we have adapted as well as we can, and yet greenhouse drought continues to worsen? For example, what happens when the low value uses for water have all been cancelled? When all of the West's bluegrass lawns have been changed to xeroscapes? This is one way political will is generated. First, we hope that studies and projections can have some impact on the political process, but this may be only hope. Second, as the predicted changes begin to occur, and as the low-value uses begin to be wrung out of the system,

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then there will begin to be real support for the changes needed to stop or reverse greenhouse warming. We have to hope there is time.

Finally, what can individual scientists do? They need to do two things: first, be willing to pursue the interdisciplinary research necessary to understand global change. Along with this they must push funding institutions and universities to accommodate such research into their structures and their reward systems. And without compromising quality they need to guide their research into useful areas.

Second, scientists must be willing to push their results into the policy arena

while being realistic about the policy system. That means translating scientific data into policy information. It may mean travelling to state and national capitals to brief policymakers, or taking time to write popular articles. It may mean teaching interdisciplinary courses that will combine scientific and policy considerations.

The recent presidential campaign has revealed again the problems in our system, but the candidates cannot be totally blamed: sadly, we must admit that they may have correctly judged the state of the electorate. And at least those of us in academic institutions must confess that the state of the electorate is partly our product. T.S. Eliot has described the general situation:

“Our difficulties of the moment must always be dealt with somehow; but our permanent difficulties are difficulties of every moment.”

Greenhouse warming is an opportunity to begin building an informed, thoughtful, and farsighted electorate. From that a workable system and a better future can flow.

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