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What Is Climate Change?

Believe it or not, the Framework Convention on Climate Change (FCCC), focused on international policy, and the Intergovernmental Panel on Climate Change (IPCC), focused on scientific assessments in support of the FCCC, use different definitions of climate change. The two definitions are not compatible, certainly not politically and perhaps not even scientifically. This lack of coherence has contributed to the current international stalemate on climate policy, a stalemate that matters because climate change is real and actions are needed to improve energy policies and to reduce the vulnerability of people and ecosystems to climate effects.

The latest attempt to move climate policy forward was the Ninth Conference of Parties to the FCCC, held December 1 to 12, 2003, in Milan, Italy, which took place amid uncertainty about whether the Kyoto Protocol, negotiated under the FCCC in 1997, would ever come into force. The protocol requires ratification from countries whose 1990 greenhouse gas emissions total 55 percent of the global total. This level will not be reached as long as countries with significant emissions (including the United States and, thus far, Russia) refuse to ratify the protocol. Not surprisingly, climate policy experts have begun to look beyond the Kyoto Protocol to the next stage of international climate policy.

Incompatibility between the definitions used by science and policy organizations is an obstacle to effective action.

Looking beyond Kyoto, if climate policy is to move past the present stalemate, leaders of the FCCC and IPCC must address their differing definitions of climate change. The FCCC defines climate change as "a change of climate that is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere, and that is in addition to natural climate variability over comparable time periods." By contrast, the IPCC defines climate change broadly as "any change in climate over time whether due to natural variability or as a result of human activity." These different definitions have practical implications for decisions about policy responses such as adaptation. They also set the stage for endless politicized debate.

For decades, the options available to deal with climate change have been clear: We can act to mitigate the future effects of climate change by addressing the factors that cause changes in climate, and we can adapt to changes in climate by addressing the factors that make society and the environment vulnerable to the effects of climate. Mitigation policies focus on either controlling the emissions of greenhouse gases or capturing and sequestering those emissions. Adaptation policies focus on taking

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steps to make social and environmental systems more resilient to the effects of climate. Effective climate policy will necessarily require a combination of mitigation and adaptation policies. However, climate policy has for the past decade reflected a bias against adaptation, in large part due to the differing definitions of climate change.

The bias against adaptation is reflected in the schizophrenic attitude that the IPCC has taken toward the definition of climate change. Its working group on science prefers (and indeed developed) the broad IPCC definition. The working group on economics prefers the FCCC definition; and the working group on impacts, adaptation, and vulnerability uses both definitions. One result of this schizophrenia is an implicit bias against adaptation policies in the IPCC reports, and by extension, in policy discussions. As the limitations of mitigation-only approaches become apparent, policymaking necessarily has turned toward adaptation, but this has generated political tensions.

Under the FCCC definition, "adaptation" refers only to new actions in response to climate changes that are attributed to greenhouse gas emissions. It does not refer to improving adaptation to climate variability or change that are not attributed to greenhouse gas emissions. From the perspective of the FCCC definition, without the increasing greenhouse gases, climate would not change, and the new adaptive measures would therefore be unnecessary. It follows that these new adaptations represent costs that would be unnecessary if climate change could be prevented by mitigation strategies. Under the logic of the FCCC definition of climate change, adaptation represents a cost of climate change, and other benefits of these adaptive measures are not counted.

This odd result may seem like a peculiarity of accounting, but it is exactly how one IPCC report discussed climate policy alternatives, and thus it has practical consequences for how policymakers think about the costs and benefits of alternative courses of action (see IPCC Second Assessment Synthesis of Scientific-Technical Information relevant to interpreting Article 2 of the UN Framework Convention on Climate Change at http://www.unep.ch/ipcc/pub/sarsyn.htm). The IPCC report discusses mitigation policies in terms of both costs and benefits but discusses adaptation policies only in terms of their costs. It is only logical that a policy that offers benefits would be preferred to a policy with only costs.

The bias against adaptation occurs despite the fact that adaptation policies make sense because the world is already committed to some degree of climate change and many communities are ill prepared for any change. Many, if not most, adaptive measures would make sense even if there were no greenhouse gas-related climate change. Under the logic of the FCCC definition of climate change, there is exceedingly little room for efforts to reduce societal or ecological vulnerability to climate variability and changes that are the result of factors other than greenhouse gases. From the broader IPCC perspective on climate change, adaptation policies also have benefits to the extent that they lead to greater resilience of communities and ecosystems to climate change, variability, and particular weather phenomena.

From the restricted perspective of the FCCC, it makes sense to look at adaptation and mitigation as opposing strategies rather than as complements and to recommend adaptive responses only to the extent that proposed mitigation strategies will be unable to prevent changes in climate in the near future. From the perspective of adaptation, the FCCC approach serves as a set of blinders, directing attention away from adaptation measures that make sense under any scenario of future climate. In the face of the obvious limitations of mitigation-only policies, reconciling the different definitions of climate change becomes more important as nations around the world necessarily move toward a greater emphasis on adaptation.

Why it matters

The narrow FCCC definition encourages passionate arguments not only about whether climate change is "natural" or human-caused, but whether observed or projected changes rise to the level of "dangerous interference" in the climate system. The goal of the FCCC is to take actions that prevent "dangerous interference" in the climate system. In the jargon of the climate science community, identification of climate change resulting from greenhouse gas emissions is called "detection and attribution." Under the FCCC, without detection and attribution, or an expectation of future detection and attribution, of climate changes that result in "dan-

gerous interference" there is no reason to act. In a very real sense, action under the FCCC is necessarily based on claims of scientific certainty, whereas inaction is based on claims of uncertainty.

But climate change is about much more than perceptions of scientific certainty or uncertainty. As Margot Wallström, the European commissioner for the environment, told *The Independent* in 2001 in response to U.S. President George Bush's announcement that the United States would pull out of the Kyoto Protocol, climate change "is not a simple environmental issue where you can say it is an issue where the scientists are not unanimous. This is about international relations; this is about economy, about trying to create a level playing field for big businesses throughout the world. You have to understand what is at stake and that is why it is serious." It seems inescapable that climate policy involves factors well beyond science. If this is indeed true, debates putatively about science are really about other factors.

For example, even as the Bush administration and the Russian government note the economic disruption that would be caused by participating in the Kyoto Protocol, they continue to point to scientific uncertainty as a basis for their decisions, setting the stage for their opponents to argue certainty as the basis for changing course. Justifying the decisions not to participate in the Kyoto Protocol, a senior Russian official explained, "A number of questions have been raised about the link between carbon dioxide and climate change, which do not appear convincing. And clearly it sets very serious brakes on economic growth, which do not look justified." The Bush administration used a similar logic to explain its March 2001 decision to withdrawal from the Kyoto Protocol: ". . . we must be very careful not to take actions that could harm consumers. This is especially true given the incomplete state of scientific knowledge of the causes of, and solutions to, global climate change." The FCCC definition of climate change fosters debating climate policy in terms of "science" and thus encourages the mapping of established political interests onto science.

A February 2003 article in *The Guardian* relates details of the climate policy debate in Russia that show how the present approach fosters the politicization of science. The article reports that several Russian scientists "believe global warming might pep up cold regions and allow more grain and potatoes to be grown, making the country wealthier. They argue that from the Russian perspective nothing needs to be done to stop climate change." As a result, "To try to counter establishment scientists who believe climate change could be good for Russia, a report on how the country will suffer will be circulated in the coming weeks." In this context, any scientific result that suggests that Russia might benefit from climate change stands in opposition to Russia's ratification. Science that shows the opposite supports Russia's participation. Of this situation, one supporter of the Kyoto Protocol observed, "Russia's ratification [of the protocol] is vitally important. If she doesn't go ahead, years of hard-won agreements will be placed in jeopardy, and meanwhile the climate continues to change." In this manner, science becomes irrevocably politicized, as scientific debate becomes indistinguishable from the political debate.

This helps to explain why all parties in the current climate debate pay so much attention to "certainty" (or perceptions of a lack thereof) in climate science as a justification for or against the Kyoto Protocol. Because it requires detection and attribution of climate change leading to "dangerous interference," the FCCC definition of climate change focuses attention on the science of climate change as the trigger for action and directs attention away from discussion of energy and climate policies that make sense irrespective of the actual or perceived state of climate science. The longer the present gridlock persists, the more important such "no-regrets" policies will be to efforts to decarbonize the energy system and reduce human and environmental vulnerability to climate.

Under the FCCC definition of climate change, there is precious little room for uncertainty about the climate future; it is either dangerous enough to warrant action or it is not. Claims about the existence (or not) of a scientific consensus become important as surrogates for claims of certainty or uncertainty. This is one reason why climate change is often defined as a risk management challenge, and scientists promise to policymakers the holy grail of reducing uncertainty about the future. In contrast, the IPCC quietly notes that under

its definition of climate change, effective action requires "decision-making under uncertainty"—a challenge familiar to decision-makers and research communities outside climate science.

The FCCC definition of climate change shapes not only the politics of climate change but also how research agendas are prioritized and funded. One result of the focus on detection and attribution is that political advocates as well as researchers have paid considerably more attention to increasingly irrelevant aspects of climate science (such as were the 1500s warmer than today?) than to providing decisionmakers with useful knowledge that might help them to improve energy policies and reduce vulnerabilities to climate. It is time for a third way on climate policy.

Reformulating climate policy

The broader IPCC definition of climate change provides less incentive to use science as a cover for competing political perspectives on climate policy. It also sets the stage for consideration of a wide array of mitigation and adaptation policies. Under the broader definition, the IPCC assessments show clearly that the effects of climate change on people and ecosystems are not the result of a linear process in which a change in climate disrupts an otherwise stable society or environment. The real world is much more complex.

First, society and the environment undergo constant and dramatic change as a result of human activities. People build on exposed coastlines, in floodplains, and in deserts. Development, demographics, wealth, policies, and political leadership change over time, sometimes significantly and unexpectedly. These factors and many more contribute to the vulnerability of populations and ecosystems to the impacts of climate-related phenomena. Different levels of vulnerability help to explain, for example, why a tropical cyclone that makes landfall in the United States has profoundly different effects than a similar storm that makes landfall in Central America. There are many reasons why a particular community or ecosystem may experience adverse climate effects under conditions of climate stability. For example, a flood in an unoccupied floodplain may be noteworthy, but a similar flood in a heavily populated floodplain is a disaster. In this example, the development of the floodplain is the "interference" that makes the flood dangerous. Under the FCCC, any such societal change would not be cause for action, even though serious and adverse effects on people and ecosystems may result.

Second, climate changes on all time scales and for many reasons, not all of which are fully understood or quantified. Policy should be robust to an uncertain climate future, regardless of the cause of particular climate changes. Consider abrupt climate change. A 2003 review paper (of which I was a coauthor) in Science on abrupt climate change observes that "such abrupt changes could have natural causes, or could be triggered by humans and be among the 'dangerous anthropogenic interferences' referred to in the [FCCC]. Thus, abrupt climate change is relevant to, but broader than, the FCCC and consequently requires a broader scientific and policy foundation." The IPCC definition provides such a foundation.

An implication of this line of thinking is that the IPCC should consider balancing its efforts to reduce and quantify uncertainty about the causes and consequences of climate change with an increase in its efforts to help develop policy alternatives that are robust irrespective of the specific degree of uncertainty about the future.

Whatever the underlying reasons for the different definitions of climate change, not only does the FCCC create a bias against adaptation, it ignites debates about the degree of certainty that inevitably lead to a politicization of climate change science. The FCCC definition frames climate change as a single linear problem requiring a linear solution: reduction of greenhouse gas emissions under a global regime. Years of experience, science, and policy research on climate suggest that climate change is not a single problem but many interrelated problems, requiring a diversity of complementary mitigation and adaptation policies at local, regional, national, and international levels in the public, private, and nongovernmental sectors.

An approach to climate change more consistent with the realities of science and the needs of decisionmakers would begin with a definition of climate that can accommodate complexity and uncertainty. The IPCC provides such a definition. It is time for scientists and policymakers to reconsider how climate policies might be designed from the perspective of the IPCC.