Uncommon Dialogue Summary

Managing the Risks of Extreme Climate Events and Disasters

April 11, 2013

As severe storms make headlines around the world, climate adaptation has become an issue of increasing importance, not only for the sake of humans but also for the conservation of our planet. On April 11, 2013, the Stanford Woods Institute for the Environment brought academic leaders together with decision-makers and policymakers to aggregate the most current information on climate change risks, share best practices for encouraging climate adaptation and formulate new strategies for moving forward.

Dialogue Overview

The purpose of this Uncommon Dialogue was to understand the links among climate change, climate extremes and the risk of disaster, and to identify research needs and policy recommendations that motivate and provide incentives for building resilience in an era of climate change.

Sharing perspectives were specialists in climate and climate adaptation, experts in disaster recovery and disaster risk reduction, and representatives from businesses, nongovernmental organizations and governments that can play a role in reducing disaster risk and building resilience. Participants were encouraged to consider knowledge gaps that need to be filled as well as policy options that might be considered.

The dialogue began with a framing talk on the state of scientific knowledge on climate change, climate extremes and disasters. Panel discussions focused on investments in preparation, response and recovery; the roles of the public and private sectors, universities and the media in preparing for extreme climate events; and disaster risks in California.

Next Steps

Toward the end of the day, participants identified a series of topics that warrant deeper investigation. See “Issues Identified for Additional Discussion” at the end of this document. We are now in the process of developing steps to pursue these issues.

Acknowledgments

We are indebted to the meeting participants who took time out of their busy schedules and provided their recommendations and knowledge during this all-day meeting. We extend our thanks to Bob Litterman, who generously sponsored this Uncommon Dialogue.
Dialogue Summary

The world has centuries of experience in managing the risks of disasters but very little experience with risks due to climate change. In fact, it is difficult to ascertain which extreme weather events can be attributed to climate change. As scientists accumulate more and more data on the inevitability of extreme weather due to climate change, it is important to understand how to reduce the risks of disaster. What investments in risk reduction are the most beneficial? How should climate risk be incorporated into planning and policy decisions? What roles can public, private and nongovernmental leaders play in helping prepare for extreme weather? And what lessons can we learn from the state of California’s approach to climate adaptation? These and other questions were debated during the Uncommon Dialogue on “Managing the Risks of Extreme Climate Events and Disasters.”

The conversation began with a summary of current scientific knowledge regarding climate change by Stanford Woods Senior Fellow Chris Field, a Stanford professor of biology who co-chaired the United Nations Intergovernmental Panel on Climate Change (IPCC) Working Group II that released a special report in late 2012 called "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation." He also is the founding director of the Carnegie Institution's Department of Global Ecology at Stanford University.

Field said the risks of climate extremes and damages from extremes have already increased. Impacts depend on the nature and severity of events, vulnerability and exposure. Disaster risk results from the overlap of these three drivers. For exposed and vulnerable communities, even non-extreme weather and climate events can have extreme impacts. From 1970 to 2008, more than 95 percent of natural disaster deaths occurred in developing countries. However, economic losses due to severe weather are much higher in developed countries.

If you plot weather incidents on a graph, it resembles a bell curve. What’s noticeable, Field said, is that some kinds of extreme weather events – one or both “tails” of that curve – are increasing. Climate models project more frequent hot days through the 21st century almost everywhere. Extreme “20-year” summers will occur almost every year, almost everywhere, and heat waves could cause tens of thousands of deaths. It is not yet possible to project a change in the frequency of hurricanes, but average wind speeds in hurricanes are projected to increase globally.

The difference between how we used to talk about climate change and how we talk about it now is that we now appreciate the consequences that extreme events can have. An occasional hot spell can be uncomfortable, whereas prolonged high temperatures can lead to water stresses and deaths.

Field listed four key solutions:

- A portfolio of actions: communicate risk, reduce risk, transfer risk, respond to risk
- Multi-hazard management approaches
- Benefits from linking actions at many scales, from local to global (state, federal and international)
- An iterative approach based on the limitations of what works and doesn’t work in climate adaptation

Field said, “There are lots of opportunities to reduce disaster risk, but the ones that make the most sense are those that help manage disaster risk now and also help improve people’s livelihoods and well-being.”
Investing in Preparation, Response and Recovery

The first panel discussion explored the experience we’ve had in reducing risks due to climate change – not much, as it turns out. When major storms destroy coastline and hurricanes flatten buildings, there is lots of speculation as to whether those events were due to climate change. Often the clamoring of homeowners and business owners leads to immediate rebuilding in the same location. Does that make sense? Without much data on hand, leaders have a hard time making a case for change.

The discussion revolved around the effects of extreme climate on global food markets, the role of insurance and law, and perceptions of risk by different stakeholders.

It was noted that extreme climate events have been increasing the stress on global food markets in the past five years, particularly in less developed countries. One speaker recommended improving policies related to food storage, putting better social safety nets in place and creating biofuel policies.

Another participant spoke of the inertia of humans when confronted with future risk and our willingness to do more to eliminate a risk than reduce one. He suggested looking at the institutions in society that have done a good job of being insightful in dealing with risk, such as the insurance industry. He spoke of the need to be “opportunistic” and make changes in land use when infrastructure needs to be rebuilt. To get people to think about the unthinkable, he suggested using tools like virtual reality visualizations that could let people see what it would be like to live in an area devastated by severe climate.

A professor referred to different value systems in the face of climate events, saying what is tolerable to one person may not be tolerable to another. One example given was New Jersey Gov. Chris Christie’s relaxation of building rules in order to rebuild the coastline in time for tourist season, whereas New York City Mayor Michael Bloomberg was insisting on new policy and a comprehensive plan for long-term sustainability by May 2013.

He noted that disaster response experts have traditionally tried to learn from individual events, but he said climate change means looking at a “moving target” and also considering future risk. He said New York City is involved long-term sustainability planning related to water, sewage and air pollution issues in an urban context. The city is using a baseline model and rapid assessment tools to deal with climate issues.

More data and maps are needed that show different scenarios of sea level rise. If you only show people a map of the most likely scenario, the professor noted, they are likely to feel they are safe if they live a few houses away from the danger zone.

The role of insurance was debated. One question: Should people be allowed to rebuild again and again in areas at repeated risk of extreme climate? There was a suggestion that the government undermine some insurance incentives and demand that people have certain types of coverage. A professor said, “Earthquake insurance is an example of how not to do it. The risk varies, but everyone pays the same.”

Field said, “One of the biggest challenges is justifying future preparations since we haven’t done that well in the past.” He promoted the idea of “iterative adaptation,” making small improvements based on the new knowledge we obtain from each climate event.
Roles for the Public and Private Sectors, Universities and the Media in Preparing for Extremes

The first panel after lunch discussed different contributions that public and private entities can make in getting people to take climate change seriously and to support climate adaptation measures.

One participant outlined the state’s new emphasis on integrating climate adaptation into its long-range planning. The private sector will have an important role, she said.

Another attendee said he’s noticed that fires in California tend to burn in the same areas over and over – areas where homes are built close to wild areas where brush can quickly become overgrown and a fire hazard if it’s not maintained. The state’s mutual aid system means, he said, “We actually move more people and faster than the military can” in the face of disaster, though he admitted it is “embarrassingly costly.”

A big problem, he said, is that people don’t believe they are going to be victims of a disaster.

Another participant said the more she learns about climate change, the more questions she has, and that extreme events magnify the questions. She zeroed in on the need for responsiveness to information and data. “There is almost no opportunity for institutions to understand standard climate change data,” she noted. Even more important is filtering that data through their respective needs. “If we start with self-interest, we get farther faster,” she said. Adapting strategy and planning is a lot more effective if it’s focused on economic aspects,” she added.

A woman who works on humanitarian response during disasters said, “You can’t just respond, you have to be proactive.” She emphasized making knowledge available to decision-makers and the media prior to emergencies. “A challenge for us in humanitarian aid is thinking of incentives to make people get better prepared,” she said, noting that people often assume they will be rescued when disaster hits.

During the discussion that followed, participants spoke of the need to connect the “science guys in the basement” with “operational guys,” so that data can inform decision-makers. Yet there is little clarity as to which level of government makes decisions regarding climate adaptation. When issues involve land use, they are largely under local control. For example, when the San Francisco Bay Conservation and Development Commission tried to adopt a shoreline building buffer policy, there was a huge outcry from local government.

The discussion turned to “risk communication,” the art of informing people about threats in a way that will motivate them to take action and not be overwhelmed. One participant spoke of the way people “frame” decisions, often poking holes in logical arguments because they take mental shortcuts and become irrational.

What’s different now from the previous conversations about climate change is the difference in the scale. “A 4-degree C increase in temperature is qualitatively different,” said one professor. Another noted, “Everything you thought was correct to do is still important. It’s just more important.”

Disaster Risks in California

The final panel discussion focused on California’s big push to address climate adaptation in an updated strategy plan. Dozens of state agencies are thinking about ways to increase resiliency. The state has placed great emphasis on how the plan will be communicated. State planners are using more images in
the document, particularly those that feature average farmers and ranchers rather than government figures, because they seem to be more effective in risk communication. Message of “hope, pride and gratitude” resonate more than fear and lecturing.

Some emerging trends featured in the plan will be renewable energy, electric vehicles, biofuels and “transformational technologies” such as Google People Finder. The Federal Emergency Management Agency (FEMA) requires states to have multi-hazard plans in order to qualify for a disaster declaration. The state’s emergency plan will include lots of local partners, including hotels, cruise ships and the military. The California Emergency Management Agency will have a contingency plan for excessive heat emergencies and the state Department of Transportation is working on cool pavement standards. The state Environmental Protection Agency is working on extreme heat guidelines.

One area of major discussion is the jurisdictional shifts that may result due to climate change. For example, the California Coastal Commission is in charge of protecting beach access, but if you are arming some beaches, will other beaches disappear?

One participant said data is a powerful indicator of climate change and gave the example of plotting minimum March snow from 1976 through 2005, which implies an increased risk of wildfires.

Another person pointed out that conservation can play an important role in mitigating climate disasters, using green instead of gray infrastructure. He mentioned “horizontal levees” made of marshes and swales that cost much less to build than traditional sea walls.

That’s just what the San Francisquito Creek Joint Powers Authority is thinking about building at the intersection of San Mateo County and Santa Clara County in California. Local cities got together to address the floodplains they share that affect 8,400 parcels after an “off-the-charts flood” on Dec. 23, 2012. Among the challenges they face are the regulatory environment and communicating alternatives to constituents.

Climate change also poses a threat to forests, particularly at high elevations. By the end of this century, one speaker predicted, “There will be more extremes, more fuel and more fires in those areas.”

A participant noted that Stanford is working with the University of California at Berkeley to build a tool that will show scenarios for sea level rise on San Francisco Bay, demonstrating what will happen if protection is provided for some shoreline areas and not others. “It’s not really the technical knowledge that’s key here; it’s how it’s used,” he said. “The question is how we are going to get these 40 jurisdictions (in the Bay Area) to make these decisions.” He noted that adding protection for one area, such as San Francisquito Creek, could cause problems elsewhere. Another speaker said California’s state adaptation plan “goes exactly to that point.”

Someone pointed out that some people believe the solution (climate adaptation) is worse than the problem. For example, participants cited residents of coastal areas hit by Hurricane Sandy who were fighting efforts by FEMA to shore up coastlines because it ruined their views. Even showing people revised maps of where sea level rise is expected to occur can cause backlash. “When you get into issues of property value, people get really upset,” the person said.

He mentioned an area of New Jersey where most homeowners supported efforts to support dunes. Nevertheless, flooding occurred through the breach where one homeowner refused to put up dunes and all homes in the area were affected.
Toward the end of the day, another participant zeroed in on the issue of land taking and responsibility for risk. “Some of the solution is education,” she said. A professor responded, “The provision of information is one of the most important things we can be doing. It is frequently a hot potato because it can affect property value.” He added, “What really begins to worry me is if people begin to bring legal agreements into these discussions, using ‘takings’ to get around sovereign immunity. Then government may have to pay you for the decline in the value of your property.” Someone else pointed out, “The vulnerability was there before the information was there.”

**Issues Identified for Additional Discussion**

The daylong discussion concluded with a call for “different issues that might be worth a deeper dive.” Participants said they would like to explore:

- The role of insurance
- A better understanding of how risk communications can be applied and used by decision-makers
- Cognitive challenges and iterative planning: What are the ways we misunderstand risk and does that stand in our way?
- Environmental impact assessments and climate change
- Green infrastructure
- Quantification: How do we know if mitigation is going to be effective?
- A legal discussion of takings: What if we have a body of knowledge and don’t do anything about it?
- Synergies for working together

**Common Themes and Puzzles**

The Special Report on Managing the Risks of Extreme Events to Advance Climate Change Adaptation, approved and accepted by the Intergovernmental Panel on Climate Change (IPCC) in November 2011, tries to connect climate change science with decision-making, from the physics of the climate system to climate impacts, to disaster risk management and reduction.

Yet, participants identified the need for information that is more relevant to decision-makers. The questions below identify important common themes coming out of the dialogue on this interface.

1. **What is the appropriate scale for decision-making? And how can we better achieve coordination for climate adaptation at larger scales?**

While the physics may guide us in defining the appropriate scale for adaptation, such scales are rarely in line with jurisdictions and existing scales of risk management. How can we create connected systems? Important lessons may be learned from the Netherlands and regional partnerships in California (Bay Area, San Diego, Sacramento). Importantly, there exist opportunities to learn from each other in different realities. There may also be an important role for a sequence of targeted adaptation plans (bottom-up) as opposed to master adaptation planning (top-down). To wait for large-scale collaboration may be unnecessary and may slow down adaptation, as compared to sequentially building up adaptation from the local scale. To be able to increase the resilience of the entire system, creativity may be needed in bringing together businesses in shared risks.
2. **Do we need more data and, if so, what additional data and information would be most useful?**

What inhibits us from acting with the information that we already have today? More data seems to be needed to: (1) downscale global information and distill information at the decision-making level, (2) develop effective measures to assess adaptation tools, (3) understand interactions between extreme risks, (4) relate extreme events to values of stakeholders, (5) understand how people make decisions about adaptation, (6) understand the effectiveness of green infrastructure in climate adaptation and (7) assess the long-term effectiveness of existing agencies and potential mal-adaptations. Another point is how knowledge and information interact with – and change – (property) values.

3. **While much attention today seems to be focused on "response" and "recovery," this action seems to be much more costly than "preparation," which requires efforts at every level of decision-making, including the individual one.**

Yet, there seems to be a continuing mismatch between resources for responding to extreme events and resources for prevention of extreme events. An important challenge in fostering the prevention culture seems to be the lack of incentives, particularly given that there exists a general expectation of response aid once an event has occurred. How can we separate urgent response aid from incentives to invest in prevention?

4. **Similarly, while much of the science so far has focused on the "most likely" or "average" outcome, the science needs to develop better insights into the controls of climate extremes, i.e., the "tails."**

Additionally, since extreme events are rare and may not receive the highest priority, what are the potential challenges to adaptation when those adaptations may only be relevant for rare events? How does exposure to extreme events accumulate to reduce long-term resilience? Can we learn from the Dutch experience in terms of planning for extreme events?

5. **How do we effectively communicate the risk of extremes? How do people make decisions about adaptation to extreme events? How to deal with disbelief of extremes is a real challenge.**

What is the role of education? And how do we separate the assumption that aid will come after an event from investing in prevention? If humans are predictably and consistently irrational, how do we play off of this attitude in disaster risk reduction?

6. **Do we truly understand existing risks already?**

How do we define acceptable risks, tolerable risks and intolerable risks, and how do these perceptions of risks change over time and space? How can we transfer knowledge and experience from one extreme event to prevention of another extreme event? What does the responsiveness to one extreme imply for other extreme events; for example, what does Sandy imply for low-lying countries? How does responsiveness differ across extreme event type and across actor levels?

7. **Disaster is a social phenomenon that depends on decisions about the location, organization and connection of assets and human livelihoods.**

An important focus may be on reducing future exposure through the right kind of planning
(statistic: 90 percent of the world’s infrastructure has yet to be built). While climate change presents new risks that affect disaster planning, to what extent has human expansion into more “risky areas” increased exposure to extreme events. What is the role of such long, slow changes in the creation of extreme events?

8. How do we cost effectively and in an actionable way make investments that reduce disaster risk in the short term while contributing to more resilient societies in the long term?

9. How do we reconcile such investments with the human and economic dimensions of re-location and changing property values? The current debates post Hurricane Sandy and potential trade-offs around the flood management of San Francisquito may provide rich examples of such trade-offs.

10. How do we finance adaptation with limited resources?

   There is a need to identify dedicated resources, and there is an important role for the private sector, given the significant amounts of required investments.

11. What is the interplay between climate change and strength of institutional governance?

   Strength of institutional governance is a key part of vulnerability, and weak institutions lead to high consequences in extreme events.