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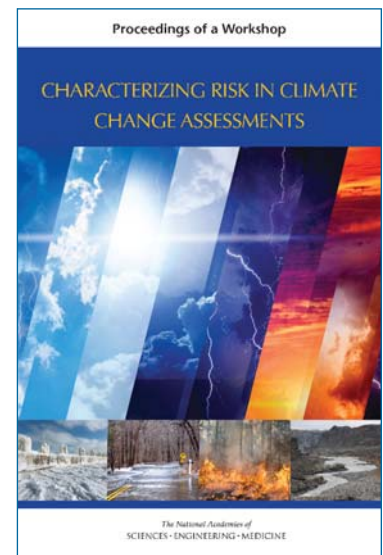
Characterizing Risk in Climate Change Assessments: Proceedings of a Workshop

Understanding the risks of climate change is critical to sound decision making for policy makers and officials at every level. Characterizing those risks clearly and accurately to support decision makers in their efforts to reduce greenhouse gas emissions, reduce vulnerability to hazards resulting from changes in climate, and increase resilience to those hazards is a primary goal for the National Climate Assessment (NCA), a program of assessments conducted by the U.S. Global Change Research Program (USGCRP).

At the request of the USGCRP, the Board on Environmental Change and Society of the National Academies of Science, Engineering, and Medicine held a workshop to explore ways to frame the hazards, risks, and opportunities presented by climate change in the upcoming fourth and subsequent NCA reports. The workshop planning committee's charge was to provide guidance to the developers of the NCA on how to characterize and communicate climate change risk. The workshop's presentations and discussions are captured in *Characterizing Risk in Climate Change Assessments: Proceedings of a Workshop* (2016). This document describes highlights from that workshop.

Planning committee chair Joseph Arvai noted that uncertainty cannot be eliminated from scientific projections, but the NCA provides “an opportunity to address risk even in a climate of uncertainty.” John Holdren, director of the Office of Science and Technology Policy, noted that until now, risk has been defined in terms of physical and biological events, and that more attention to the consequences of these events for human well-being is needed. Alice Hill of the National Security Council described climate change as an “urgent and growing threat to homeland security” and said that government reports have not adequately communicated the reality that “decisions being made today will really tie the hands of those who come after us.” She pointed to areas where decisions are failing to address expected effects of climate change, such as in infrastructure funding and municipal planning.

Ben Sanderson of the National Center for Atmospheric Research discussed the challenges of using modeling to assess the likelihood of catastrophic future events. He emphasized that current models are not adequately portraying the most serious risks, “even though we cannot confidently rule out” such risks. He offered suggestions for improving modeling to better estimate those risks. Robert Kopp of Rutgers University discussed ways to address uncertainty in climate change assessments. One approach uses econometric analysis to separately assess uncertainties at different links in the chain—such as emissions levels, changes in global temperature, and socioeconomic responses. He also discussed ways to address uncertainty about climate “tipping points” and the risks whose probability may be most difficult to assess. He noted that decision makers need not only to consider modeled projections but also to assess their own responsibilities, levels of acceptable risk, planning time horizons, and other factors.



Robyn Wilson of the Ohio State University and Robin Gregory of Decision Research and the University of British Columbia drew on research in decision and communication science to identify challenges in communicating about climate risks and suggest effective ways to convey information to NCA users. Wilson said that linking the science to potential impacts, alternatives, and tradeoffs would be most engaging to users. Gregory advocated a decision-pathways approach and suggested ways to frame tradeoffs that involve moral considerations and competing values.

Inês Azevedo of Carnegie Mellon University spoke about methods for analyzing and comparing the benefits and costs of interventions intended to reduce the impacts of climate change. She explained that the benefits and costs of interventions—such as expanding alternative energy sources—vary by region because of differences in weather and climate, demographics, and other factors, so region-specific analysis is a necessary for effective decision making.

Past NCA reports focused on particular regions and sectors, including the Southwest; coastal regions; and the interactions among energy, water, and land use. Three panels of experts discussed ways the fourth NCA could be more useful to decision makers concerned with those three topics. Some issues—including the extreme difficulty of precisely estimating the probabilities of hazards at local levels—were relevant to all three topics. Presenters for each topic also advocated shifting the focus of the NCA4 from characterizing risks to analyzing options for responding to expected changes.

In the closing session, participants discussed key ideas for improving future National Climate Assessments.

Characterizing risks. Participants emphasized the need for useful and accessible descriptions of risks and their implications for society. Several said that assessments often pay insufficient attention to worst-case scenarios that can result from low-probability but high-consequence events or from cascades of hazards. One noted that, though they may be very unlikely to occur, these are the things that “keep people up at night.” Participants noted the importance of helping nonspecialists to understand that even though science cannot offer high confidence in the likelihood of some of the most serious outcomes, planning for them is necessary anyway. Participants recommended prioritizing the risks for which the time available to prepare is shortest and paying more attention to the ways in which people—particularly the most disadvantaged—are vulnerable to climate change.

Conveying risk information and identifying connections across sectors and regions. Much discussion focused on understanding the needs of particular audiences for the NCA, which include government officials at all levels as well as decision makers outside of government. Participants recommended the involvement of audience members in identifying the questions they want the NCA to answer and engaging them in considering the threats they face. Several noted that case studies can highlight the kinds of tradeoffs that decisions will require, such as between adaptation and mitigation and between the needs of different regions and stakeholders, and can illustrate the ways different options affect risks. Several participants emphasized that engagement is most critical when risks affect multiple regions or sectors. A participant suggested that the NCA develop uniform metrics for risk, particularly nonmonetary risks. Several participants suggested that the NCA reports be made more interactive and include links to other resources, decision-support tools, case studies, and research.

The workshop closed with comments from Michael Kuperberg, executive director of the USGCRP. He noted that the USGCRP’s founding legislation calls on the program, not only to analyze climate change but to assist the nation in responding to it, and that it is committed to doing this. Among the key points he drew from the workshop were the need to characterize cascading hazards and the range of possibilities, to focus on regional issues, to consider timelines for changes and responses, and to work with institutions that have their own constituencies to address the practical limitations of the assessment program.

For More Information . . . This Workshop Highlights was prepared by the Board on Environmental Change and Society (BECS) based on the workshop proceedings *Characterizing Risk in Climate Change Assessments: Proceedings of a Workshop* (2016). The workshop was sponsored by the National Aeronautics and Space Administration. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of any organization or agency that provided support for the project. Copies of the report are available from the National Academies Press, (800) 624-6242; <http://www.nap.edu> or via the BECS page at http://nas.edu/risk_climatechangeassessments.

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