Toward A Central Focus on Decision-Making in the Assessment Initiative

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Background

One of the integrative activities of the Assessment Initiative (AI) is linking the work being done on uncertainty assessments within weather forecasts, climate variability and change projections, and impact analyses with that on decision- and policy-making. The ultimate goal of this integrative effort is to ensure that scientific information effectively connects with the needs of decision-makers.

To date, various projects in the AI have had some decision-making element, including the projects on California Water Resources (Yates, Tebaldi and Miller), Flood Management (Downton, Morss and others), Aviation Extremes (Brown and others), Wildfire Management (Miller and others), and others. One of the goals in each of these projects is to apply weather and climate information to a particular decision problem, which requires – to varying extents – interactions with decision-makers, connections to existing decision models, and/or understanding of the decision-process.

To approach the decision-process in a focused and systematic fashion, the AI is now moving toward developing projects that *begin* with a central focus on the decision-maker, the decision-making process, and the relevance of climate information, and specifically the relevance of obtaining information about uncertainty in climate research. Through qualitative and quantitative research on policies and the decision-making process, we will strengthen our interdisciplinary, integrative approach to impact assessment science.

Initial Objectives

Our first goal is to develop a systematic approach to determining where and when climate information, and information about uncertainty, matters to the decision at hand. Such an approach needs to:

- create a better integrative link between uncertainty analysis in weather forecasts, climate variability, climate change, impact analyses and decision- and policy-making
- develop a systematic approach to determining where and when uncertainty matters
- give scientists and decision-makers a procedure to identify where and how science can most effectively support decision-making

DUST – Decision Uncertainty Screening Tool

We have developed a stepwise, iterative approach that aims to improve the science / decision-maker interaction. It is based on the following premises:

- it places the decision-maker and the real-world process of making a decision at the center
- it assumes that credible, relevant, and accessible scientific information can be important inputs into decision-making

- it does not assume a particular normative approach to decision-making under uncertainty
- it does not favor a "top-down" or "bottom-up" approach to assessments

Ideally, the tool should work for all kinds of weather and climate-sensitive decisions, be applicable in a variety of decision-making contexts, work for a range of decision-makers (public and private sector); and be applicable at a variety of scales.

The stepwise, iterative process includes the following elements (see attached draft paper):

Step 1: Identify the stage in the decision process where climate science would enter
Step 2: Ensure that scientific input is truly useful
Step 3: Identify the type of decision problem the decision-maker faces
Step 4: Identify the specific decision challenge
Step 5: Identify necessary uncertainty analyses
Step 6: Conduct identified uncertainty analyses
Step 7: Communicate uncertainties back to the decision-maker

This recently developed tool now requires real-world testing. Some of the testing opportunities exist within the AI; others exist within ongoing and future ESIG/ISSE projects. A first test is currently underway in a research project conducted by a student intern (SOARS Program protégé Clarence Mann working under the guidance of S. Moser, L. Dilling, and R. Morss). His project focuses on air quality management in the Denver Metro Area and the use of climate and scientific information in that process.

Expected Outcomes

The systematic screening approach suggested through DUST helps achieve a number of outcomes. First, it helps streamlining and prioritization of uncertainty assessments since a blanket approach is likely to be unnecessary, and wasteful of time/personnel resources. Second, it affords greater transparency and awareness of the decision-making process. Third, DUST promises to be educational for scientists (and beginning scholars, students of applied science) previously less familiar with the policy- and decision-making sciences and practicalities. In a parallel fashion, walking through DUST could be educational for decision-makers. Finally, and maybe most importantly, DUST can serve as a boundary object, i.e., as a tangible "product" or "tool" around which scientists and decision-makers can interact, learn from each other, fine-tune products, build mutual trust and understanding, but also maintain the necessary boundary between science and decision-making.

Outlook to FY05 and Beyond

DUST is not conceived as an end in itself. As a heuristic and screening tool it supports the development of future research projects in which decision-making is more central to AI research efforts. We have recently begun exploration of new projects and new collaborations to this end. The following is a list of emerging themes and project topics that will be under development in the coming fiscal year and beyond:

1. ***NCAR-RISA Collaboration***
   Under the lead of Susi Moser, the AI will co-sponsor a workshop for representatives from the nine existing Regional Integrated Sciences and Assessment (RISA) teams, NOAA-OGP, and NCAR to explore opportunities to collaborate and support the fulfillment of common scientific and strategic goals. Promising opportunities for collaboration exist in regional climate change projections and impact assessments, as well as the study of science-stakeholder interactions. The primary outcome from this workshop will be a shortlist of highly promising joint NCAR-RISA collaborative efforts and concrete recommendations for effective implementation.
   Key AI Collaborators: Susi Moser, Linda Mearns, Tom Wigley and others TBD
   External Collaborators: RISA Team representatives, NOAA OGP officials

2. ***How Best to Present Uncertainty to Decision-Makers***
   At RAND Corp.'s new NSF-funded center for decision-making under uncertainty research is getting underway that focuses on how best to present uncertain information to decision-makers. Focal areas will be abrupt climate change and climate change impacts on California water resources. NCAR and the AI will collaborate on this project, supplying probablistic regional climate projections.
   Key AI Collaborators: Linda Mearns, Susi Moser, Claudia Tebaldi
   RAND: Robert Lempert
   Others: Klaus Keller (Penn State)

3. ***Exploring the Feasibility Limits of Adaptation Strategies to Sea-Level Rise***
   During FY05, under the lead of Susi Moser, we will develop an interdisciplinary research project on the physical, economic, social, ecological, and political feasibility limits of common adaptation strategies to sea-level rise. Likely to be initiated through a workshop with potential collaborators and stakeholders, the project will involve and integrate climatological, economic, environmental impacts, and robust policy analyses in a set of case studies to compare conditions of feasibility of different strategies. Potential case studies focus on California, Texas, Hawai'i, Alaska, and North Carolina.
   Key AI Collaborators: Susi Moser, Linda Mearns
   Potential external collaborators: Robert Lempert (RAND), Michael Hanemann (UC-Berkeley), Gary Griggs (UC-Santa Cruz); others TBD

4. ***Decision-Making at the Climate-Health Interface***
   During FY05, we will explore the use of weather and climate information in health-related decision-making. This would build on the AI's Climate & Health focal area and integrate it with related work done in NCAR's Atmospheric Chemistry Division. One of the promising aspects in this area include the cross-scale challenges of policy- and decision-making in the context of urban (water and air quality-related) health management.
   Key AI Collaborators: Linda Mearns
   NCAR: ACD colleagues TBD
   External collaborators: TBD