Improving Decisions in a Complex and Changing World: New Approaches to Climate Change Decisionmaking Under Uncertainty

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The RAND Project Is Part of NSF Program to Improve Climate Change Decisionmaking

• Hypothesis
  – Significant improvements in decision support for complex and deeply uncertain policy problems made possible by recent advances in
    • Computer capabilities and
    • Psychology of decisionmaking

• Key research questions include:
  – What are the most effective ways to represent model outputs and their uncertainty for decision-makers?
  – How can computer-based tools be designed and used most effectively to aid decision-makers?
The RAND Project Aims to Improve Methods for Characterizing and Communicating Uncertainty

• Three research themes
  – Algorithm development for scenario generation and robust decisionmaking using models at different levels of aggregation
  – Research in psychology of judgement and decisionmaking (J/DM) under ambiguity
  – Evaluation of decision tools in practical application

• Two policy areas
  – Abrupt climate change
  – Long-term water resources management in California

• Five year effort in collaboration with:
  – Klaus Keller, Penn State, abrupt change
  – David Budescu, University of Illinois, judgement and decisionmaking
Case Study on Water Resources in California Will Assess Long-term Management Strategies

• Decision Problem
  – What water management strategies should the State pursue to meet diverse management objectives under uncertain conditions in the future?

• Research Questions
  – How to identify the most useful scenarios for decision making?
  – What mix of high and low-resolution models are most credible to stakeholders?
  – How to characterize significant, long-range uncertainty?
  – To what extent does robust decisionmaking help communicate uncertainty and build consensus among stakeholders with differing expectations, interests, and values?
Water Resources Research Moves from Simple Experiments to Deployment of Actual Tools

• First Year (2005)
  – Develop low resolution demand model
    • Contributed to quantifying DWR scenarios
    • Conducted initial analysis of robust policy options
  – Conduct initial stakeholder workshops on So. California water scenarios

• Second Year (2006)
  – Link decision support software to supply and demand model (WEAP)
    • Include climate impacts and multiple levels of aggregation
  – Conduct scenario discovery and robust decision analyses
  – Conduct stakeholder workshops to assess alternative characterizations of uncertainty, levels of aggregation, and policy framings

• Years 3+ (2007-2009)
  – Provide decision support tools to DWR and to stakeholders and evaluate their effectiveness
**Expected Results**

• Contributions to DWR include improved ability to:
  – Identify key scenarios
  – Characterize uncertainty
  – Evaluate policies
  – Communicate results to a wide variety of stakeholders

• Contributions to science
  – Improved understanding of the theory and practice of new methods and tools to support decisionmaking under conditions of deep uncertainty
Learn More

• Project website
  – http://www.rand.org/ise/projects/improvingdecisions/

• Recent article in Scientific American

• Scenario work for DWR
  – <http://www.waterplan.water.ca.gov/docs/cwpu2005/Vol_4/03-Data_and_Tools/V4PRD4-QUAN.PDF>