

## Decision Making in an Uncertain Climate Workshop Summary

Thursday, December 1, 2005

Henry Center for Executive Development  
Michigan State University—East Lansing

With funding from the National Science Foundation, Michigan State University's Environmental Science and Policy Program (ESPP) hosted a workshop on Thursday, December 1, 2005. The purpose of the workshop was to discuss how climate affects various sectors in Michigan and get input on what climate change information would be most useful for decision makers. The workshop was hosted by Dr. Tom Dietz (ESPP) and facilitated by John Beck (MSU Labor and Industrial Relations).

### Participants

Jeff	Andresen	MSU, Geography (Pileus Project)
Joe	Arvai	MSU, ESPP & CARRS
George	Berghorn	Michigan Forest Products Council
David	Bidwell	MSU, Sociology & ESPP
Jeanne	Bisanz	MSU, Geography (Pileus Project)
Roy	Black	MSU, Agricultural Economics
Doug	Buhler	MSU, Crop and Soil Science
David	Campbell	MSU, Social Science
Jay	Charney	USDA Forest Service
Karen	Chou	MSU, Animal Science
Tom	Dietz	MSU, ESPP
Ned	Dikmen	Great Lakes Boating Federation
Patrick	Doran	The Nature Conservancy
Erin	Dreelin	MSU, Fish and Wildlife
Maya	Fischhoff	MSU, ESPP
David	Gard	Michigan Environmental Council
Vince	Hellwig	Michigan Department of Environmental Quality
Rick	Hula	MSU, Political Science
Dave	Hyndman	MSU, Geology
Gary	Kitts	Michigan Public Services Commission
Ed	Klim	International Snowmobile Manufacturers Association
Lori	Langone	MSU, CARRS
Zoe	Lipman	National Wildlife Federation
Sabrina	McCormick	MSU, ESPP & Sociology
Aaron	McCright	MSU, Lyman Briggs & Sociology
David	Morris	Michigan Economic Development Corporation
Sarah	Nicholls	MSU, CARRS
Larry	Olsen	MSU, Entomology
Ted	Parson	The University of Michigan
Larry	Pederson	Michigan Department of Natural Resources
Jiaguo	Qi	MSU, Center for Global Change
Laura	Reese	MSU, Urban Planning
Harry	Sheehan	Washtenaw County Drain Commission

Rachael	Shwom	MSU, Sociology & ESPP
Mark	Swartz	Michigan Department of Agriculture
Brian	Teppen	MSU, Crop and Soil Sciences
Merritt	Turetsky	MSU, Plant Biology
Julie	Winkler	MSU, Geography (Pileus Project)
Yingming	Zhao	MSU, Fish and Wildlife

### Workshop Format

The workshop began with brief presentations by Dr. Jeff Andresen and Dr. Julie Winkler from the Department of Geography at Michigan State University (MSU). These presentations reviewed the current state of knowledge regarding climate change and potential effects of climate change. Slides from Dr. Andresen's presentation are available at <http://environment.msu.edu/climatechange/>.

The participants were divided into five small discussion groups, designated by colors (red, blue, silver, green, and gold). These groups met in breakout rooms to discuss the following questions:

#### Questions A (red and blue groups)

- Which aspects of climate change and its impacts matter most to you and your organization?
- What information about climate change (and in what form) would be most useful to you and your organization?

#### Questions B (silver, green, and gold groups)

- What are the most important research areas and questions to address regarding climate change and its impacts?
- What aspects of climate change and its impacts are logical targets for MSU research?

Each group presented a summary of their discussions to the full group. These presentations were followed by a full group discussion.

### Summaries of Small Group Discussions

The following bullet points were recorded on overhead transparencies by the discussion groups and presented to all participants.

#### Red Group

1. Which aspects of climate change and its impacts matter most?
  - Winter recreation activity and related economic activity (ranging from manufacturing through lodging, tourism, and community vitality)
  - Planning and development of trails
  - Draining infrastructure needs—agricultural productivity—implications for other Ag investments (herbicides/pesticides/fertilizers to remain viable)
  - Tourism
    - Quantify relationships between tourism and climate: variability, temperatures, wetness

- Adaptation possibilities—market alternatives and opportunities (helping make business decisions)
  - Public information and education on impacts and what individuals and sectors can do (+what information public agencies can distribute and how)
    - The balancing and interpretation of the information
    - Communicating the variability, uncertainty, and state of knowledge
  - Dependable information for investment decisions
  - For long-run conservation, sustainable management of vegetation types and habitats, which are at more risk to climate change, which may be more exposed to future health or viability problems?
  - Translating/interpreting communicating the information
2. Information is very sector/market specific—the Devil’s in the details

### Blue Group

<b>Aspects that Matter</b>	<b>Useful Information</b>
Frequency and intensity of rainfall events  Lake levels  Seasonal variations to be expected  Near-term impacts (e.g. 20 years)	continual increase in validity of modeling results (more predictive power)
Impact on society in general. How might people’s lives change?  Public Health Impacts  Drinking water availability <ul style="list-style-type: none"> <li>• Inter-regional population shifts</li> <li>• Menu of public planning responses</li> </ul>	Integration of scenario outputs with socio-economic models <ul style="list-style-type: none"> <li>• Manage different perceptions of “value” and “cost”</li> <li>• Address competing stakeholder interests (e.g., water level preferences)</li> </ul>
Education—public awareness of potential impacts	Optimal presentation of complex information  To what extent is skepticism a communication issue?
Impacts on Agriculture	Potential trade-offs (e.g. longer growing season, but more pests)
Integrated Stressors <ul style="list-style-type: none"> <li>• Land use</li> <li>• Toxics</li> <li>• Invasive species</li> </ul>	

Silver Group

## Research Questions

1. How do we communicate uncertainty in climate science (CS) to decision-makers?
2. How can we use existing scientific decision-models to transmit CS?
3. How do we communicate CS to different audiences:
  - politicians
  - business stakeholders
  - citizens
4. How can we make the inherently uncertain science environment “work” for the imperatives of politics? How can politics accommodate changing science?
5. How can we translate CS into recursive decision-making models?
6. How do we increase awareness within the scientific community of what state policy-makers are doing?
7. What are we trying to achieve out of the discussions about CS:
  - economics
  - quality of life
  - ethical obligations?
8. How do we balance critical analysis of scientific theory with the politics of dismissing theories and public confusion?
9. How do we best present data: graphically:
  - percentages
  - predictions
  - price-equated?
10. How do we make CS choices local:
  - roles for local stakeholders
  - roles for politicians
  - roles for individuals

Green Group

## Q1: Important Research Questions:

- Big limitation in climate models is understanding cloud dynamics
- Fish ecology as habitat warms; lake Erie is like Caribbean
- Agricultural changes necessitated by climate change. Can it be proactive (i.e. plant breeding) or is reactive acceptable? Resiliency.
- Health effects of climate change—fundable, i.e. linking environmental chemistry with biochemistry
- More generally, take our strongest technical areas and build on them, responding to stakeholder needs.
- Acknowledge stakeholder community that is already in place.
- Build linkages between climate-change related strengths and new outreach or strong outreach needs that we currently fail to address.

## 1. MSU Strengths

- Great Lakes State (fisheries, ecology)
- Agricultural focus distinguishes us from many universities (IPM, ecology, LTER)
- Extension system in place
- International

- Emerging—human health impacts—CIT, seed money from VP, CWS
- 2. Acknowledging Stakeholder Community
  - Extension links technical research with stakeholder needs
  - Part of adapting to climate change is using extension to gather external needs so MSU can effectively target research
  - Extension needs to broaden focus to include more stakeholders
    - Now: agriculture, urban
    - New Needs:
      - support broader economy with information—policymakers too
      - decision making/adaptation in uncertain future
      - communicate the best science
      - observe adaptation and future needs
      - communicate adaptation strategies (facilitating inter-stakeholder communication)

### Gold Group

- How do we translate information on climate variability to the public?
  - Not just variability, but also... impacts, mitigation, and adaptation
- Assertion vs. caution
  - Language barrier?
  - Yes but it goes beyond language
- One solution or approach:
  - Community participation in knowledge transfer rather than a data dump
- Identifying climate change related research
  - Scientific issues  $\leftrightarrow$  End Users
- We need a combination of “top down” and “bottom up” driven questions

### Research Needs

- Synthesis of information on what MI ecosystems look like in 50-100 years
- What do we know/think about climate controls on ecosystem boundaries, species distributions, biogeochemical function, etc.?
- We need to assess all knowledge
  - Expert knowledge
  - Public and unpublished data
  - Traditional and “other approaches”
    - Bayesian analyses, etc.
- We need to get conservative scientists to commit to sharing information!
  - Secret workshops?

### Research Questions (decisions)

- What are sectors/ecosystems/species that are sensitive to climate?
    - How much does climate have to change to impact that sector?
    - How likely are those climate changes
  - What is being missed/oversimplified in current modeling? Models currently assume small and smooth, and often try to represent some opposing effects (enhanced CO<sub>2</sub> vs. soil drying for plant production)
1. How will variability in climate extremes influence ecosystem properties and functions

2. How will climate variability interact with existing and novel stresses such as diseases
3. What are the positive and negative feedbacks of ecosystems to climate change?  
Ex. Decreased soil moisture=drier wetlands=increased woody spp=increased CO2 sequestration

#### MSU Strengths

1. Coupling direct and indirect effects of climate change to agricultural yield/tourism
  - Soil moisture→NPP and soil chemistry→crop and food safety
  - PILEUS!
2. Coupling downscaling climate approaches to questions surrounding water and aquatic ecology
  - Fisheries
  - Wetlands
  - Sustainability center (build on existing momentum)
  - Water center (build on existing momentum)
3. Development of approaches to validate GCM/RCM models.
  - Remote sensing institute
  - LTER databases

#### Full Group Discussion

During the full group discussion, David Bidwell and Rachael Shwom took notes on a laptop computer. Key topics from this discussion are listed below.

- Is communication a research issue to be pursued at MSU?
- Sectors have differing time horizons for decision making
- Stakeholder input is needed to reframe research questions
- Research should focus on high stakes decisions in climate-sensitive sectors
- How much would the climate have to change before adaptation is needed?
- Communication is often an after-thought in research
- The public needs to understand science as a process, not a source of answers
- The development of interdisciplinary research requires that researchers share ideas and thoughts before they have been tested by peer review
- If wetlands become drier due to climate change, they may become eligible for development. At what point would this transition occur?
- Three potential areas of focus:
  - Research projects needed by decision makers
  - Scientific issues that need greater understanding
  - How do scientists and decision makers communicate in a meaningful way?
- Policy makers have the greatest long-term impact on the environment. Various sectors and researchers need to find common ground on which to influence policy making.
- Many policy makers have little background in science
- MSU Extension has an important role as the facilitator of multi-stakeholder dialogue
- Faculty members must build effective communications programs and then train extension agents to deliver them

- Research scientists have a responsibility to help average people use information to make decisions
- Convincing citizens to address climate change is difficult because there are many other issues to address
- Researchers need to communicate the local/state economic impacts of climate change to policy makers
- Important to understand the relative position of climate factors in decision making of each sector
- Research needs to address how to affect decision making at the individual level
- Elected officials are most concerned with immediate effects, rather than impacts that might be 50-80 years away
- We need visual tools that will help average people understand the potential effects of climate change
- Water issues are a strength of MSU; water affects most sectors in Michigan
- It is important to understand whether the International Joint Commission (IJC) can really influence lake levels
- Commercial navigators and recreational boaters rely on lake levels
- Water resources could become a key political and demographic issue, as water resources dry up in other regions of the U.S.
- It is important to understand social consequences of climate change; are some groups better able to adapt than others; who will be the winners and losers?
- Are various communication techniques needed to reach different audiences?
- Existing policy can limit the responsiveness of management agencies
- It is important to communicate about climate changes that have already occurred and the impacts that have resulted
- How do you inspire members of the public to get involved in these issues on a personal and professional level?
- Important to create easily understood indicators for climate change (example of “white shoe indicator” for water quality in Chesapeake Bay)

### **Key Themes for Follow-Up**

John Beck asked the participants to identify the top research questions or issues related to climate change in Michigan that should be addressed at future workshops or symposia. Input from the participants was recorded on flip charts and is summarized below.

- Impacts on Water
  - Quality (e.g., heavy metals)
  - Full cycle
  - Health
  - Availability
  - Agriculture
- Direct and Indirect Economic Impacts
- Effects on the Public’s Day-to-Day Lives
- Localizing Information
- Effects on Ecology
  - Wildlife
  - Services
  - Long-Term Conservation

- Preparing for Climate Change
- Integrated Stressors: How will Existing Problems be Affected?
  - Invasive species
  - Land use changes
  - Cascading complexity
- Support and Tools for Decision-Makers
- Economically Viable Solutions
- Communication of Current Data and Research to Decision Makers
- Lessons Learned from the National Center on Ecological Synthesis (NCES)
- Creating Participatory Research
- A Synthesis of Past Climate Changes and the Geologic Record
- State-of-the-Art Climate Modeling
- What do Policy Makers Need to Know?
- What do Researchers Need to Know to Improve Scenarios
- Economic Effects on Sectors
- Goal Setting: What is MSU Trying to Accomplish?

**Wrap-Up**

Tom Dietz summarized what he viewed as general themes from the workshop:

1. How do we deal with uncertainty and values in decision-making?
  - a. How do we express uncertainty and not confuse people?
  - b. How do we convey information to people?
2. Cross-stressors. Multiple issues compiling.
3. Adaptation, Resilience & Vulnerabilities
  - a. What do we know?
  - b. What do we see already?
  - c. What are the impacts on individuals' lives?
  - d. How can Michigan respond to climate change and what will be the impacts if we don't respond?

**Evaluation**

John Beck asked the participants to evaluate the workshop. Participants provided input on aspects of the workshop that were positive and aspects that should be handled differently in the future. These suggestions were recorded on flip charts.

Positive Aspects	Aspects to Change
Meeting format and agenda  Receiving information early in the day  Divergent interests identified common values  Facilitation  Multidisciplinary	Provide information on other regional/national climate change efforts  Mix decision makers and researchers in small groups  Provide MSU departments on participant list  Missing stakeholders: <ul style="list-style-type: none"> <li>• Elected Officials</li> <li>• State Insurance Commissioner</li> <li>• Top Michigan Industries</li> </ul>

	<p>(Automobile, Agriculture, and Tourism)</p> <ul style="list-style-type: none"><li>• Communications Experts</li><li>• Members of the Public</li></ul> <p>Better ratio of decision makers to researchers</p>
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If you need any additional information about this workshop, please contact Tom Dietz (tdietz@msu.edu).