SLIDES: NOAA’s Applied Research and RISA

Harvey Hill

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NOAA’s Applied Research and RISA

Water, Climate, and Uncertainty
Implications for Western Water Law
Policy, and Management
Harvey Hill,
NOAA’s Office of Global Programs
June 12, 2003
Brief History

- ENSO forecasting became feasible roughly 15 years ago
- Feasible but not necessarily relevant to end-users
- NOAA responded by developing research programs to understand:
  - the climatic needs of end users,
  - The natural and social context in which climate sensitive decisions are made, and
  - The spatial and temporal climate information needs of decision-makers
“It isn’t possible to do good economic development thinking without understanding the physical environment deeply, in which economic development is supposed to take place.”

Jeffrey Sachs
- Scientific American Jan. 2003
RISA TEAMS

- Have taken the first steps in collaboration with decision makers to illustrate how climate information and predictions can be valuable in management processes.
RISA program objectives

- Conduct assessments to support decision-making
- To understand/articulate policy needs at a regional problem focus
- To increase the portfolio of options available to decision makers and increase the role of science in climate sensitive management processes
- To launch “next generation” integrated knowledge
- To enhance structured feedback -- scientific research agendas, and institutional capacity
- To support the Research Foundation for Climate Information Systems

*Regional refers to geographic regions which have some homogeneous characteristics either physical or institutional which allow the RISA teams to focus their interaction with decision-makers in a tractable manner.*
Normally the government drifts along at about 8,000 m.

Every few years there's a drought. When it gets really bad, it suddenly rains politicians, experts and media.

They form pools of expertise and funding to cope with the drought cycle.

As soon as the good years return, they evaporate back to 8,000 m.
Climate, Water, and Regional Integrated Sciences and Assessments

- Approximately 70% of the RISA budget is allocated to climate sensitive water related research.
- RISA teams of physical and social scientists with decision makers strive to identify improved climate sensitive water management practices and policies.
- Activities by team:
  - Arizona - Groundwater/water policy
  - Colorado - Streamflow Institutions/water law
  - California - Streamflow/Snowpack forecasting
  - Pacific NW - Columbia/energy/salmon/institutions
RISA Framework

- Climate, Terrestrial, & Aquatic Monitoring Research
- Economic and Human Dimensions Research
- Regional Integrated Sciences and Assessments: Decision-support & Services
- Selected Applications: Ecosystem, agriculture, health, energy etc.

Roger Pulwarty
Assessments involve:

1. Climate and environmental monitoring and research,

2. Economic and Human Dimensions research, especially on trends and factors influencing climate-sensitive human activities,

3. Applications and decision support i.e. the transformation and communication of relevant research results to meet specific needs and inform the provision of services in a region.
Integrating Research, Information and Policy

(a) Historical model

Science: Knowledge production

Society: Impact and response

(b) Participatory Assessments model

B. Range of scientific knowledge frames: predictive capabilities uncertainty, ignorance/indeterminacy

A. Assessments: Situation Participants Activities Needs Resources/Capacity

C. Policy contexts and decision-making processes

D. Dynamic dialogue between researchers (non-decisive) and practitioners (decisive) on problem-definition: shared understanding of significance and value conflicts

Roger Pulwarty
Reservoir Management Decision Calendar

**Water Year Planning**

<table>
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<tr>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
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- **Provide for late Summer/early Fall irrigation while maintaining target flows**
- **Next water year runoff unknown**, reserve water until February snowpack data
- **Winter season precipitation** forecast for Fall release decisions
- **Winter releases based on Jan/Feb snowpack data**
- **Winter/Spring forecast** for Winter release decisions
- **Peak Flow Augmentation** — fill curve
- **Summer season forecast** for Peak Augmentation planning
- **Week 2 forecasts** for Peak Augmentation
- **Peak Flow Augmentation releases**
- **Plan releases** for **Summer irrigation & hydropower**
- **Week 2 forecasts** for Summer irrigation & hydropower release decisions
- **Provide for Summer irrigation & hydropower needs while maintaining target flows**

**Planning processes** | **Operational issues** | **Climate & weather forecasts**


Photos: US Bureau of Reclamation, NOAA-CIRES Western Water Assessment
Groundwater overdraft in response to drought in Arizona's urban areas 2025

- Phoenix
- Tucson
- Sierra Vista*
- Santa Cruz

Percent overdraft

Baseline
1-yr drought
5-yr drought
10-yr drought

64 Million

45 Million
Forecasts in Historical Context

Which climate variable are you interested in?
- Monthly precipitation
- 3-month seasonal precipitation
- Monthly temperature
- 3-month seasonal temperature

How much of the recent past do you want to see?
23 months

How far into the “future” do you want to see?
10 months

This plot shows seasonal 3-month precipitation for the last 23 months (black line on the left subplot) for the historic tercile categories from 1961-1990.

Recent History | Possible Futures

During some climate regimes, the variation of conditions can be quite different. Select one to highlight what conditions have been in past years under different climate regimes:
- El Nino
- La Nina

Java Applet Window

3 Month Total Precipitation

Probability of Exceedence

JFM Plots
- All Years
- El Nino

JFM Plots
- All Years
- La Nina

Java Applet Window
Starting in 1993, several fish species were listed as endangered (chinook salmon, delta smelt & splittail), precipitating a crisis for water/land decisionmakers in California.

By 1998, 20+ State & Federal agencies combined to form the 30-yr, multibillion-$ CALFED Bay-Delta Restoration Program.
One of many Proposed Management Structures for Regional Climate Services

Conducts integrated research with stakeholders, performs research in regional science, develops prototypes on the basis of research, conducts continual assessment, regional dissemination of climate services knowledge.

Implements workplan, develops budgets, oversees project accountability, facilitates organization.

Develops annual workplans and budgets
 Includes University & NOAA partners, agencies and stakeholders.

Monitoring, archiving, data quality assurance, large modeling activities.

Avery, Overpeck, Pulwarty,
RISA Research Challenges

- Quantify the value of information of current and future research.
- Addressing issues that transcend current regional foci. (water, energy, agricultural markets, etc.)
- Identify methods for incorporating stochastic climate information into risk management and decision systems.
- Explore climate sensitive sectors beyond resource management sectors:
  - transportation, public health, ecosystem/wildlife,
- Refine integrated research methodologies.
  - Between natural and social science disciplines co-producing knowledge with decision-makers.
Thank you