

Resource Management Decision Support: The CCSP Plan

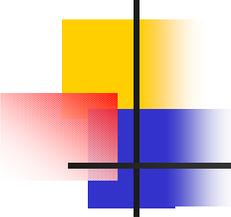
Susan K. Avery

University of Colorado (on leave)

Climate Change Science Program Office

Climate Change Science Program Workshop

December, 2002

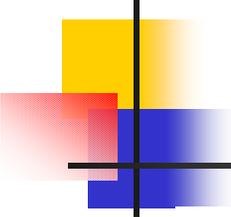


Overview of Breakout Session

- ✍ Present overview of Chapter 4 in draft Plan
- ✍ Opportunity for prepared comments by invited reviewers of the draft Plan
- ✍ Opportunity for verbal questions, comments, and discussion from workshop attendees

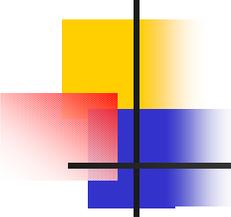
IMPORTANT Reminder!

- ✍ To be effective in improving the Strategic Plan, comments should be submitted electronically according to instructions on the website (www.climate-science.gov; follow links to Strategic Plan)



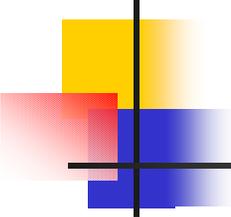
Chapter 4: Lead Authors

- ✍ Susan K. Avery
- ✍ Tom Baerwald
- ✍ Jae Edmonds
- ✍ Jay Fein
- ✍ David Goodrich
- ✍ John Houghton
- ✍ David Legler
- ✍ Richard Moss
- ✍ Claudia Nierenberg
- ✍ Joel Scheraga
- ✍ CIRES and CCSP
- ✍ NSF
- ✍ PNL
- ✍ NSF
- ✍ NOAA
- ✍ DOE
- ✍ CLIVAR
- ✍ CCSP
- ✍ NOAA
- ✍ EPA



The CCSP Commitment...

- ✍ Syntheses of scientific results and production of decision support resources responsive to national and regional needs
 - ✍ Mechanisms for creating and supporting on-going dialogs between scientists and decision makers
 - ✍ Analytical techniques
 - ✍ Historical data analysis
 - ✍ Scenarios
 - ✍ Climate modeling
 - ✍ Product development – serves decision makers and results from strong interactions between the communities



What is Decision Support?

Resource Management

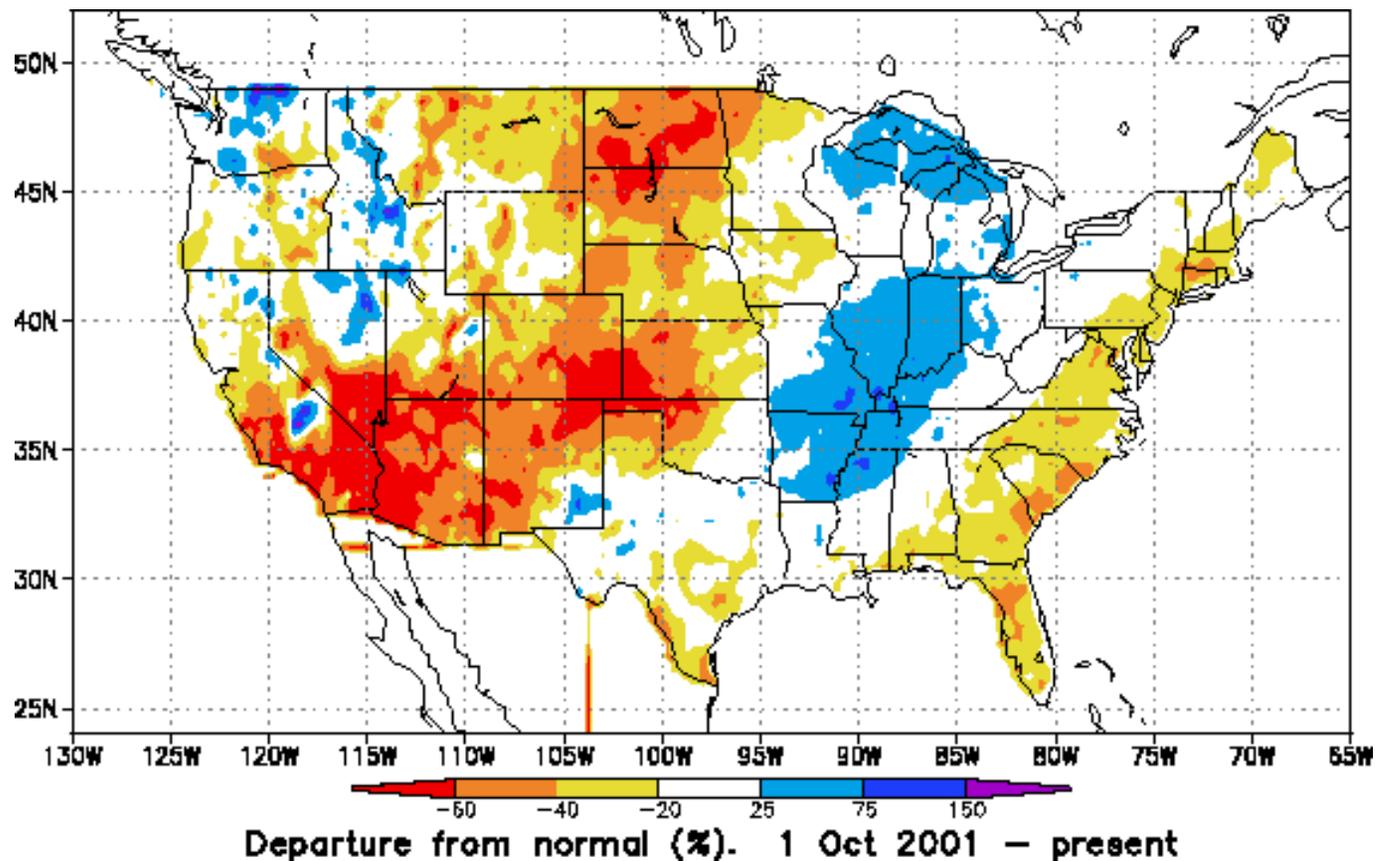
- ✍ "Provision of timely and useful information that addresses specific questions being asked by a decision maker"
 - ✍ Policy development and evaluation
 - ✍ Operational decision processes
 - ✍ Planning/adaptation/mitigation evaluations
- ✍ Includes evaluation of what is known and with what degree of confidence
 - ✍ Context-specific
 - ✍ Systematic approach

Natural Resource Management: Responding to diverse interests for sharing limited resources

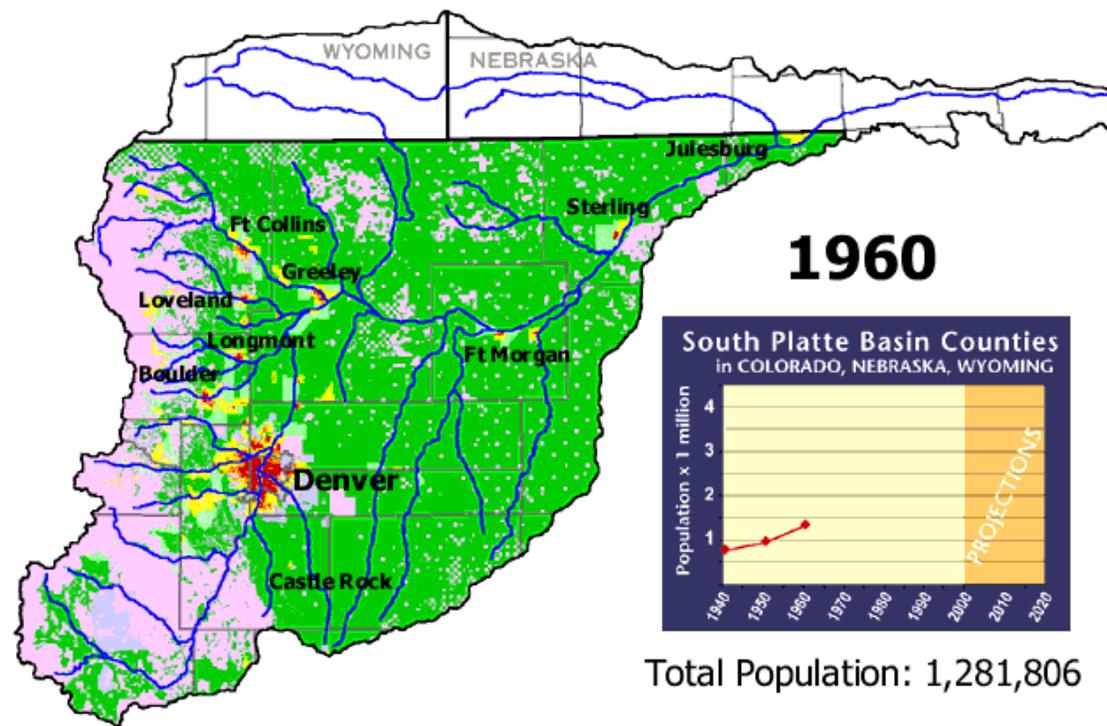


The 2002 "Drought": Accumulated Precipitation: Water Year 2001-2002

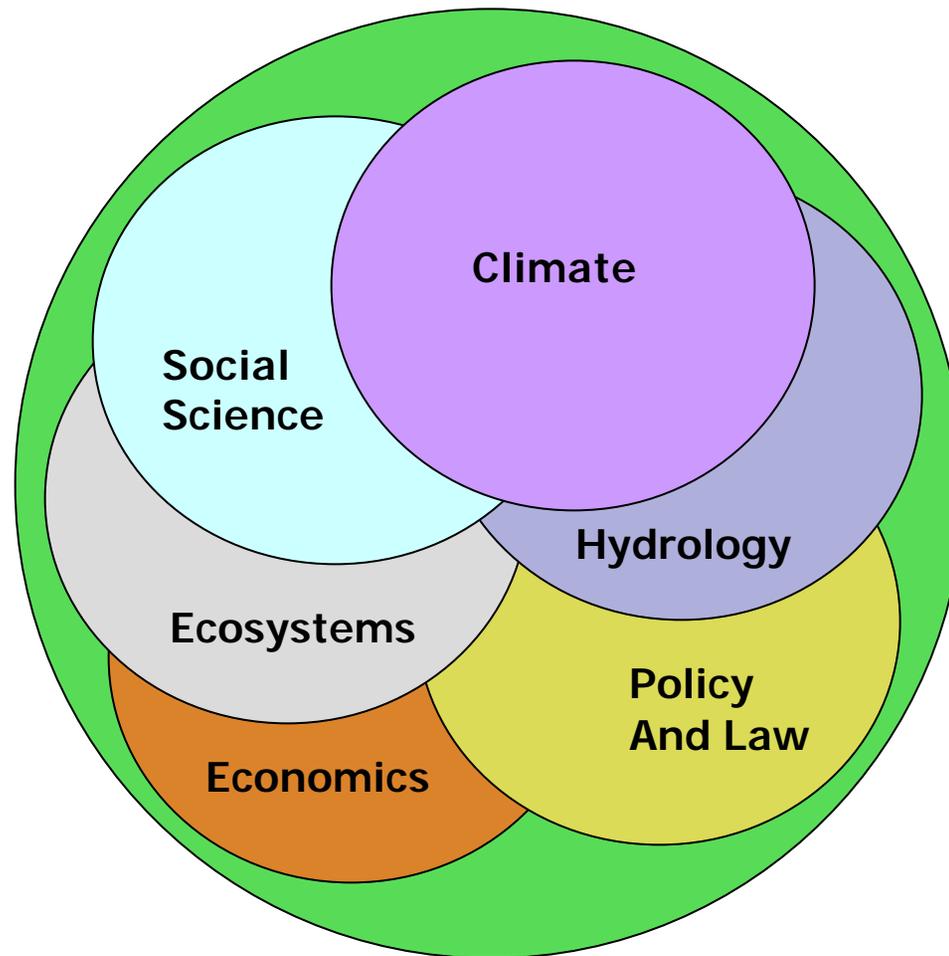
Updated 20th May 2002

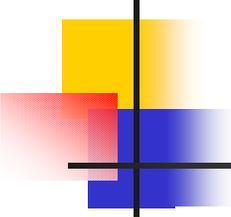


Decision-making: Multiple factors and evolving societal context



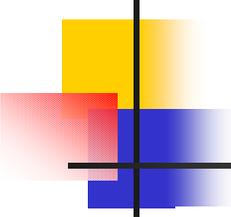
Interdisciplinary Research Program Required





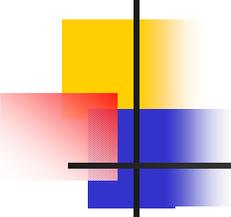
Proposed Framework

- ✍ Promote sustained interactions with stakeholders
- ✍ Identify regions, sectors, decision processes sensitive to climate
- ✍ Develop indicators for assessing vulnerability and opportunities
- ✍ Perform integrated research on regional and global changes
- ✍ Develop data, information, analytic resources, and models to facilitate risk assessment given quantified scientific uncertainties
- ✍ Investigate dissemination process and how to assist users in evaluating options



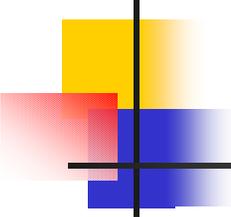
NRC Recommendations

- ✍ Develop research and observational framework that recognizes **multiple stresses** in decisionmaking;
- ✍ Ensure an “**intimate connection**” between research, operational activities and decisionmaking;
- ✍ Engage interdisciplinary and multi-scale research relating **natural and human systems**;
- ✍ Develop sustained and integrated observing networks and information systems **across traditional agency and disciplinary boundaries**;
- ✍ Foster the **timely integration** of scientific research into effective decision support systems, including operations;
- ✍ Link **research and education** more strongly



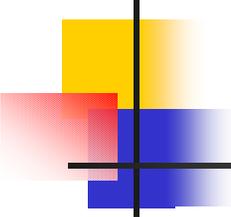
“Experiments” Under Way

- ✍ Decision-Support Activities
 - ✍ EPA Global Change Assessment Program
 - ✍ NOAA Regional Integrated Sciences and Assessments Program
 - ✍ NASA Regional Earth Science Applications Centers
- ✍ Other National “Building Blocks”
 - ✍ NSF Long-Term Ecological Research sites
 - ✍ USGS, USDA projects
 - ✍ Inventories and Remote Sensing Programs
 - ✍ National and Regional Resource Surveys
 - ✍ Intensive Monitoring and Research Sites
- ✍ International Activities (e.g., GECaFS, START)



Some lessons learned

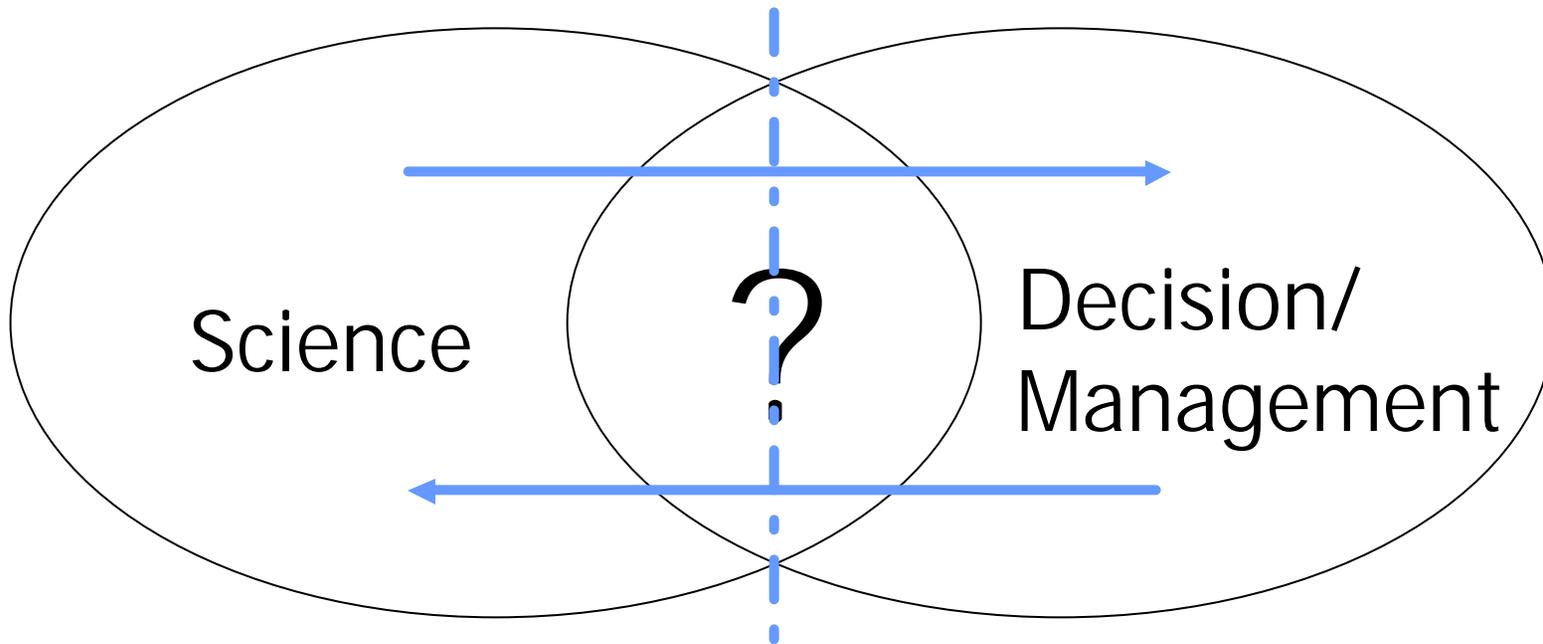
- ✍ Identify critical problems/questions through stakeholder interaction
- ✍ Understand how information will be provided and used
- ✍ Work up and down scales—framing, observations, modeling, and data/information issues
- ✍ Include adaptation and enhancement of resilience
- ✍ Institutional capacity building: how to provide support?



Progress Depends On...

- ✍ Evaluating experience in relevant programs and activities
- ✍ Establishing a framework for an integrated program of pilot activities
- ✍ Building up the level of support and the number of decision-support/regional activities over time using partnerships

Increasing the Permeability of the Barrier Between Research and Decision/Management



- ✍️ Public vs. Private Goods
- ✍️ Objectivity of Science vs. Mobilizing Stakeholders
- ✍️ Level of comfort in the science community

Reservoir Management Decision Calendar

Water Year Planning

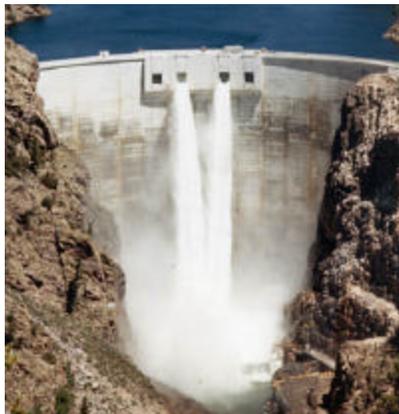
Next Water Year Planning

Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct

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

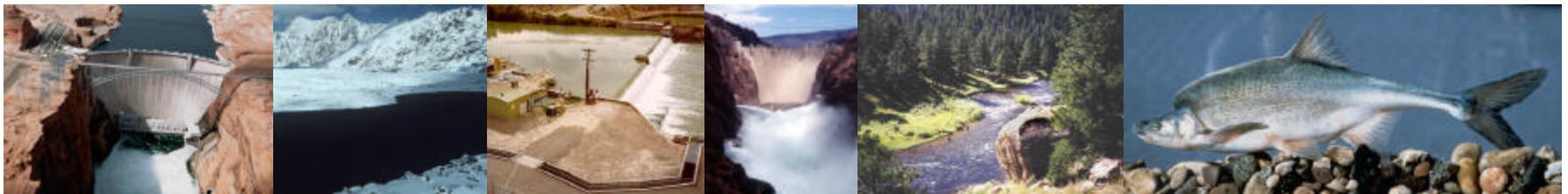
Week 2 forecasts for Summer irrigation & hydropower release decisions

Provide for Summer irrigation & hydropower needs while maintaining target flows

Planning processes

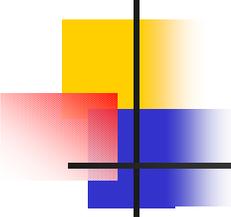
Operational issues

Climate & weather forecasts



Andrea J. Ray, Robert S. Webb, John D. Wiener, 2001

Photos: US Bureau of Reclamation, NOAA-CIRES Western Water Assessment



*DEEPENING THE ROLE OF SCIENCE IN THE
MANAGEMENT OF NATURAL RESOURCES*
Some Examples

- ✍ Effects of pollution from remote locations through long-range transport
- ✍ Watershed scale hydrologic models with agricultural and economic models to assess tradeoffs
- ✍ Sensitivity of forest growth to altered temperature and precipitation
- ✍ Managing energy supply/demand

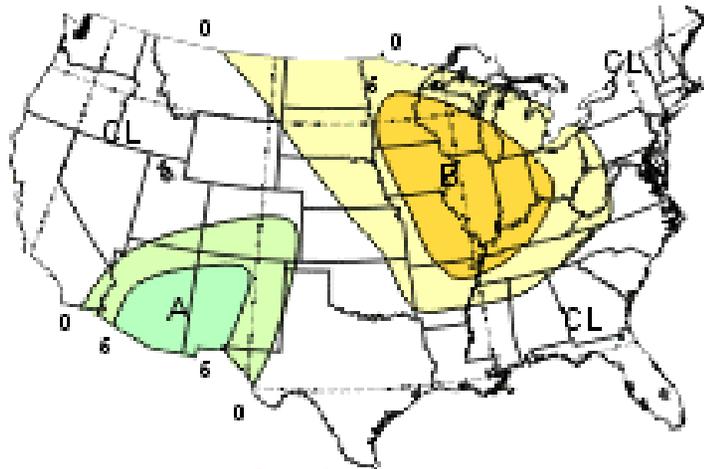
Forecast Spatial Resolution

another illustration of needed science

Regional-scale climate research seeks to improve resolution and performance of regional forecasts.

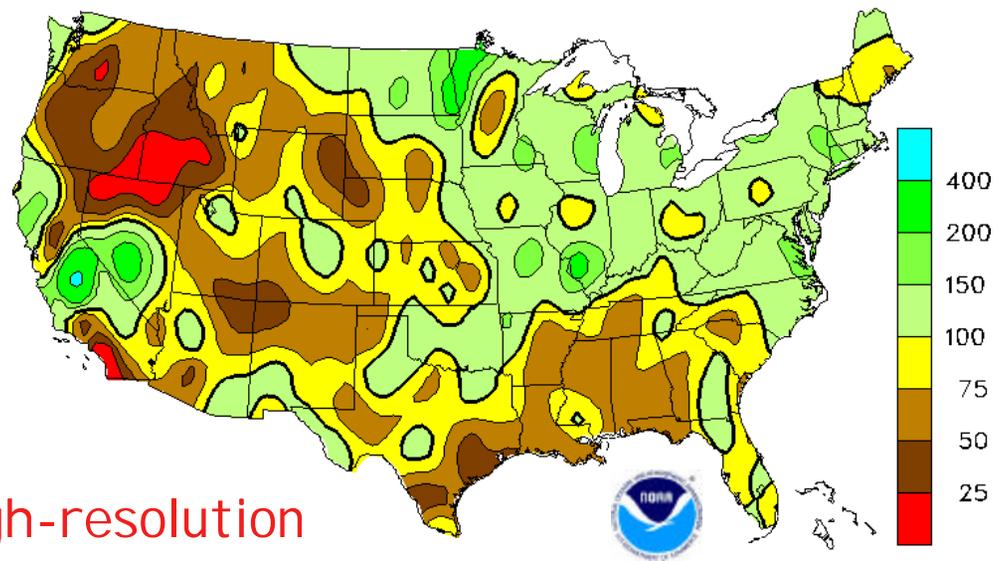


**Climate Outlook: Precipitation
June-August 2000
(issued April 2000)**

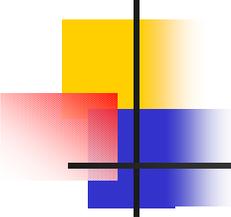


Low-resolution

**Observations: % of Normal Precipitation
June-August 2000**



High-resolution

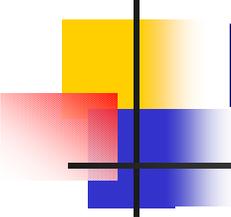


Are Decision-Support and Assessment the Same?

- ✍ Synthesis of the state of *integrated* scientific knowledge in terms of its implications for [society, decisionmaking, policy]
 - ✍ Most effective when not just state of knowledge but oriented to specific users

Milton Russell, circa 1990 (NRC panel on NAPAP)

- ✍ Some assessments are more user-oriented than others



Potential Measures of Success

- ✍ Peer-review papers
- ✍ Effective stakeholder-researcher interaction/collaboration
- ✍ Integrative research framework
- ✍ Useful climate information and products
- ✍ Enhanced institutional capacity and reduced vulnerability
- ✍ Improved planning and preparedness
- ✍ Transition to sustainable operations and practice

Decision Support – An Unfortunate Characterization

Calvin and Hobbes



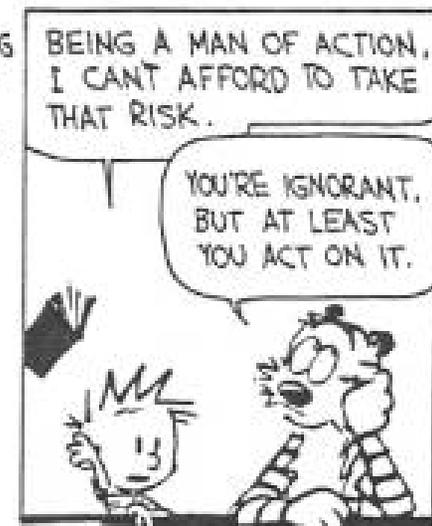
© 1985 Watterson/Out to Lunch/Universal Press Syndicate

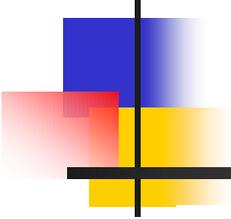
YOU REALIZE THAT NOTHING IS AS CLEAR AND SIMPLE AS IT FIRST APPEARS. ULTIMATELY, KNOWLEDGE IS PARALYZING.



A black and white illustration of Calvin sitting at a table, looking thoughtful with his hands on the table.

By Bill Watterson





The End
