Integrating Natural and Social Science for Regional Assessment of Climate Impacts on the Pacific Northwest

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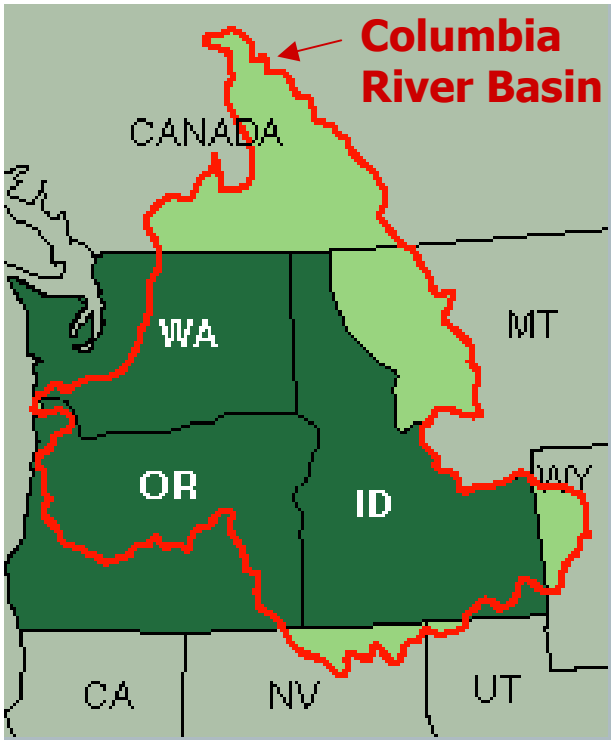
The Climate Impacts Group



Areas of study:

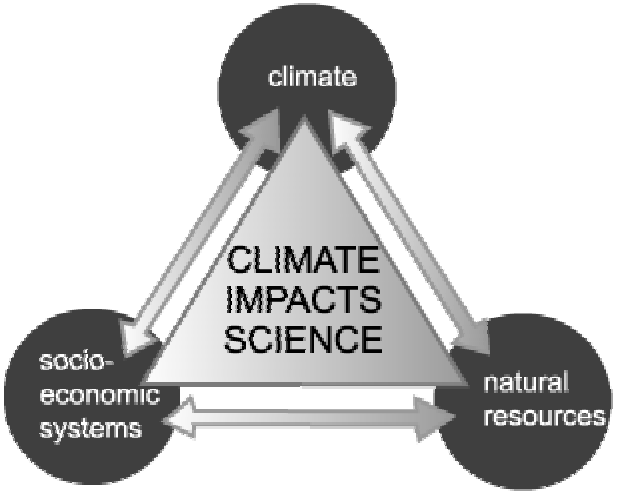
- Water resources
- Forests
- Salmon
- Coasts

Motivation:

- Increase regional resilience to climate variability and change
- Produce science useful to the decision making community

→ Requires integration of physical and social science research & incorporation of stakeholders' perspective

Conceptual approach to assessment

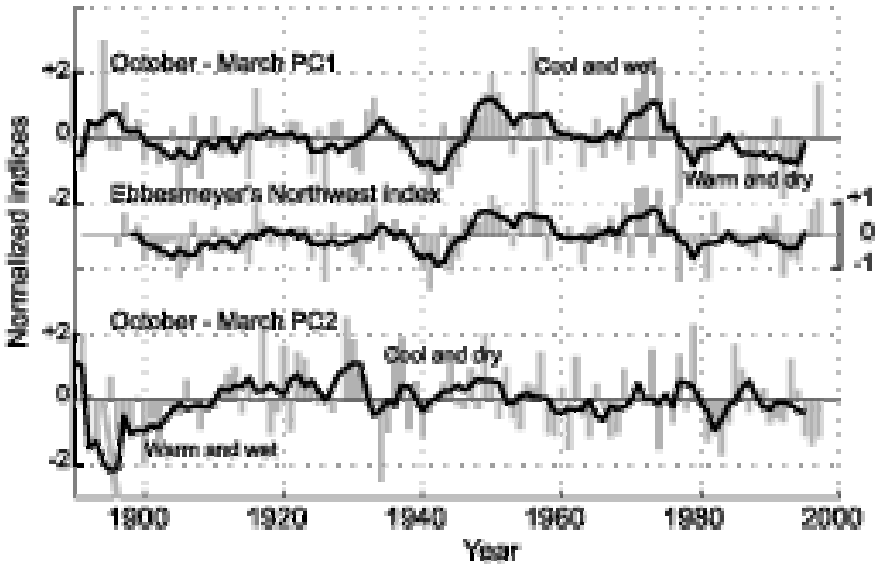


Integrated assessment of regional climate impacts:

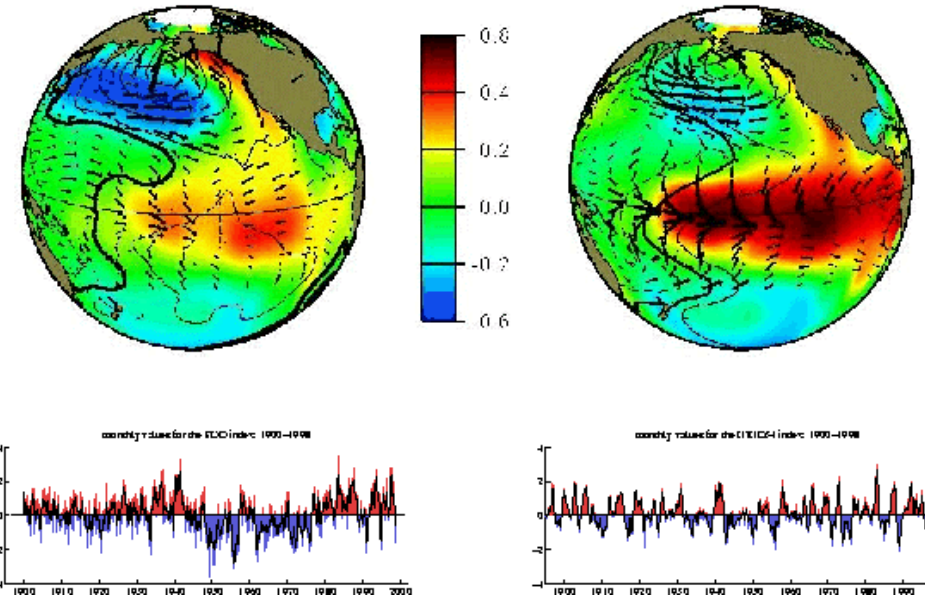
The study of how climate, natural resources, and human socio-economic systems affect each other

The climate system

1. Characterize regional climate variations from historical/paleo records
   - spatial consistency
   - cool/wet vs. warm/dry



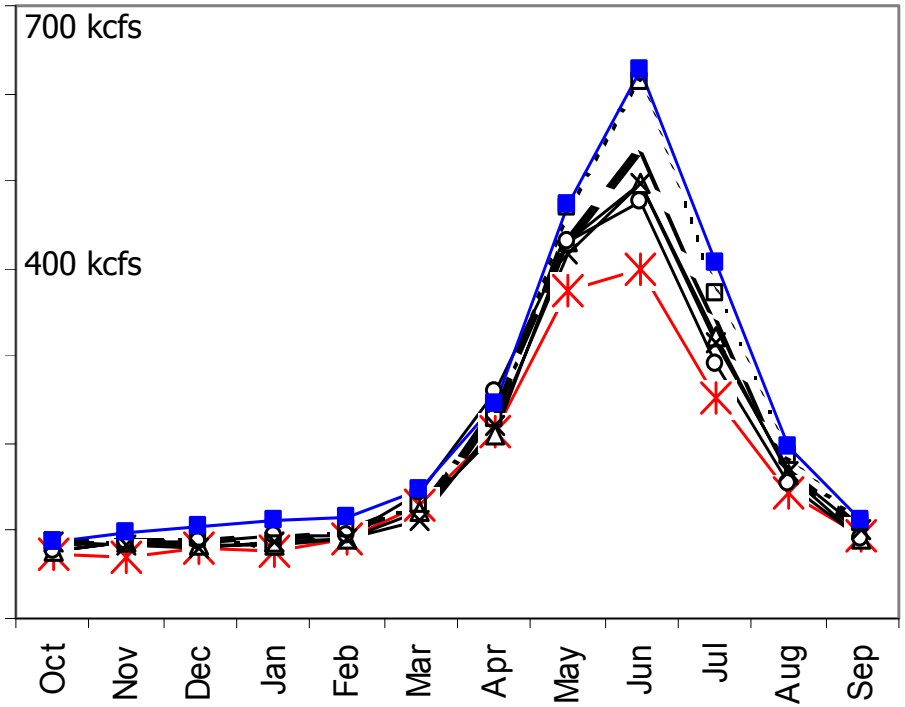
2. Link to large-scale climate variability
   - ENSO/PDO
   - predictability?



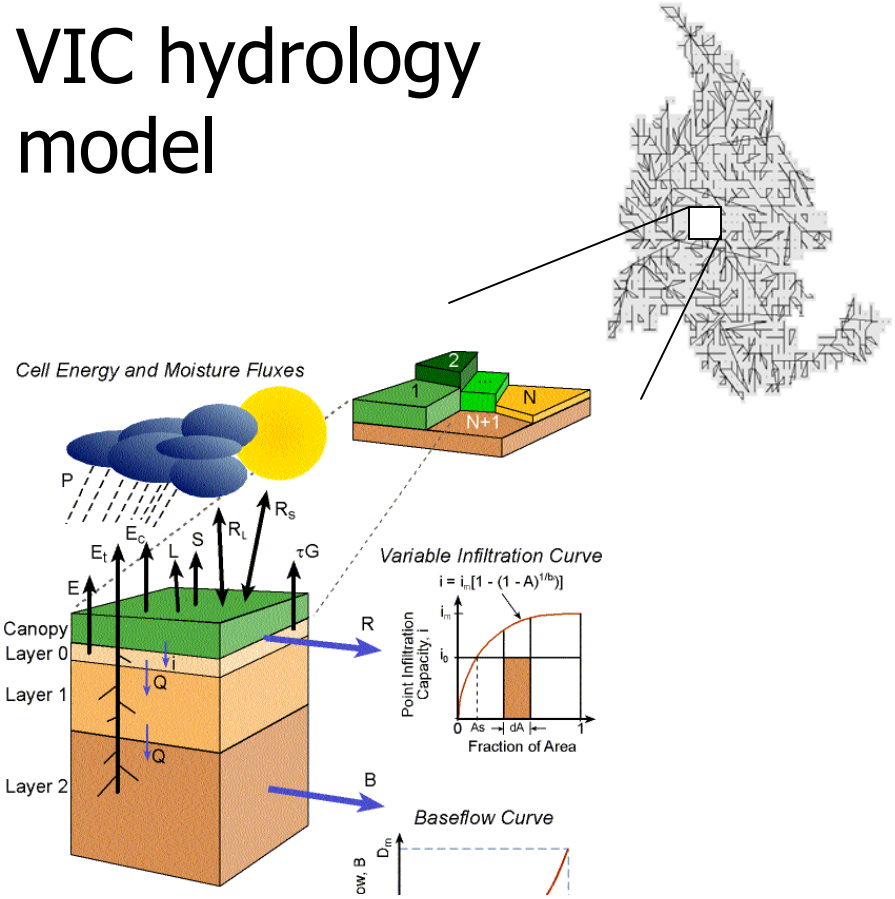
Natural System

Columbia River

- snowmelt dominated
- large response to cool/wet vs. warm/dry winter conditions

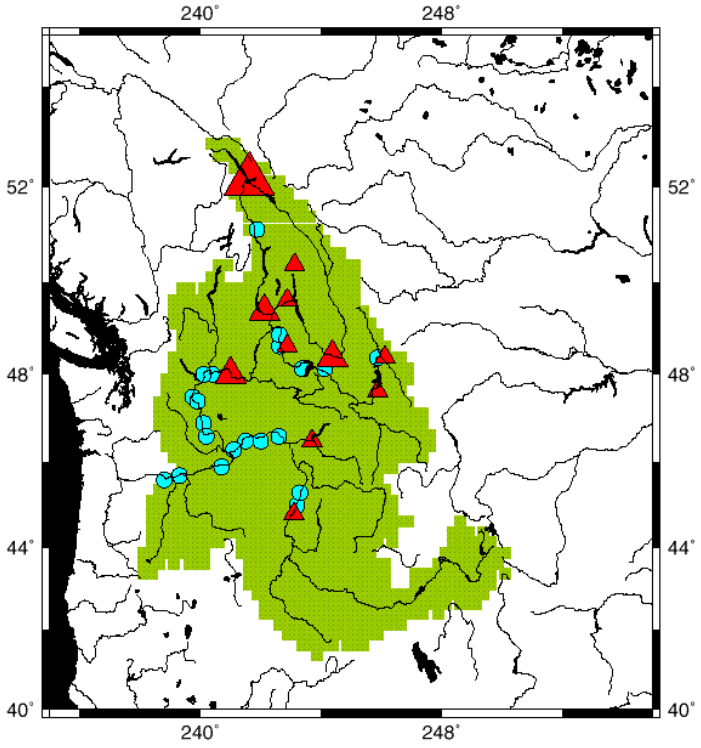


VIC hydrology model

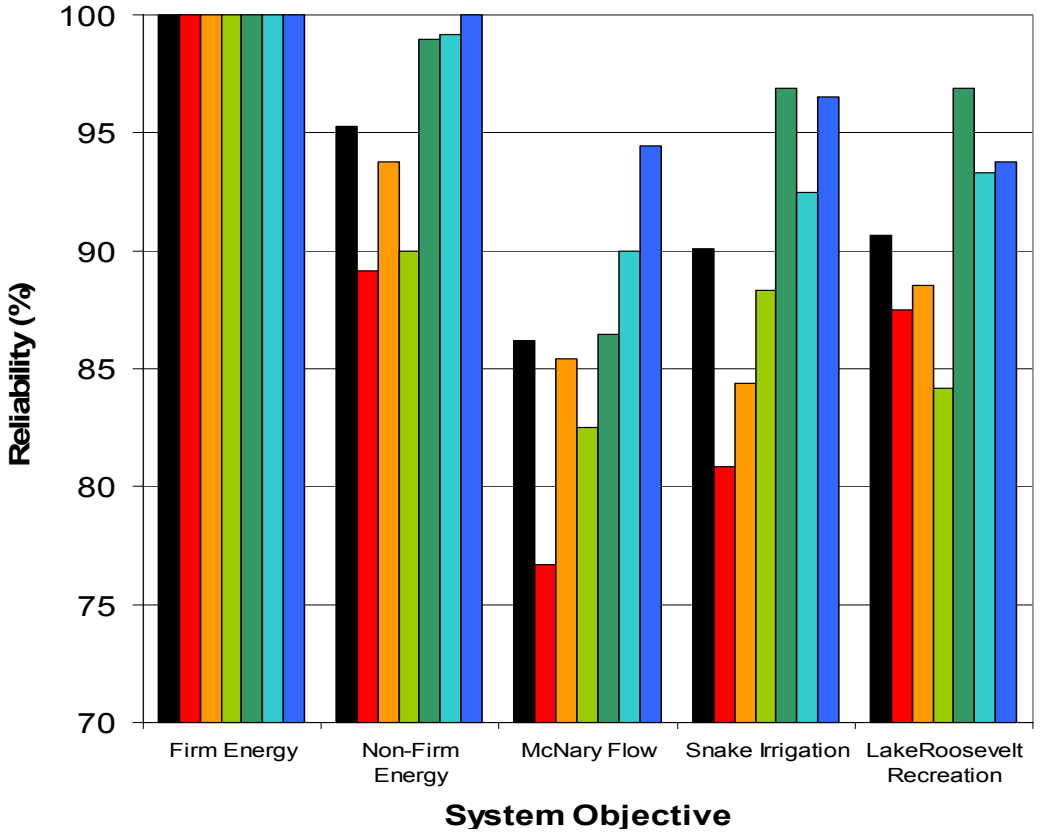


Managed System

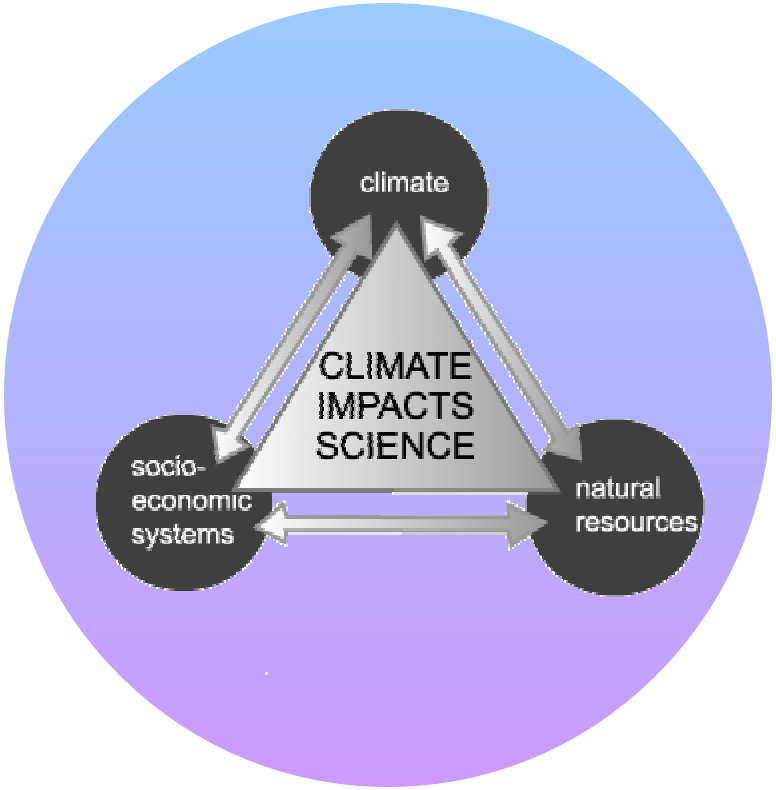
1. ColSim reservoir operations model



2. Operating system reliability



The Institutional Context



Institutions: formalized actions underlying human social activity, including standards of behavior, formal decision rules and decision-making procedures, and grants of authority to prescribe policy.

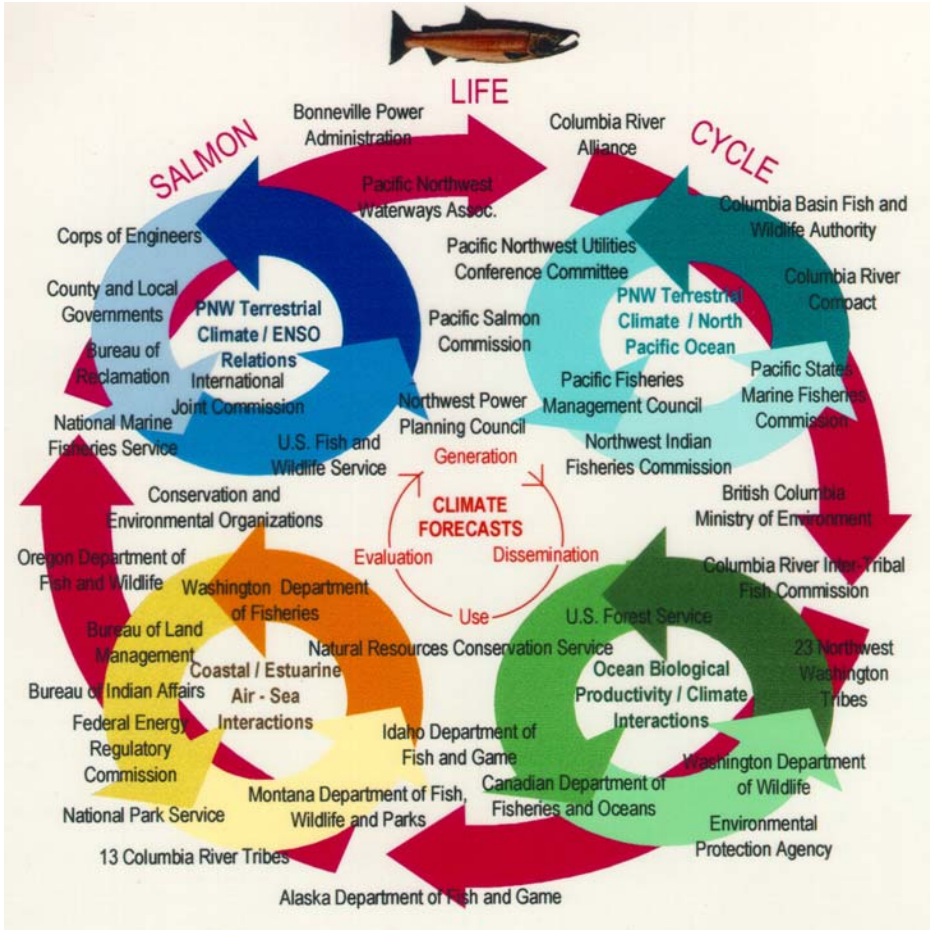
The **institutional context** creates the "rules" that shape social practices relevant to the system under examination.

Tools for characterizing the institutional context

Mapping institutional frameworks

- Identify players
- Characterize laws, treaties, rules and constraints
- Determine interactions
- Analyze individual institutions

Methods: interviews, institutional analysis



Pulwarty & Redmond 1997

Tools for characterizing the institutional context

Eliciting decision calendars

- When/how are decisions made?
- Where is climate information relevant to decisions?

Method = interviews, analysis of decision processes

Example: Columbia basin operating periods

1. Fixed period (Aug-Dec)

Assume the worst about spring inflow

2. Variable period (Jan-Jul)

Use snowpack measurements to estimate spring inflow

Tools for characterizing the institutional context

Involving stakeholders

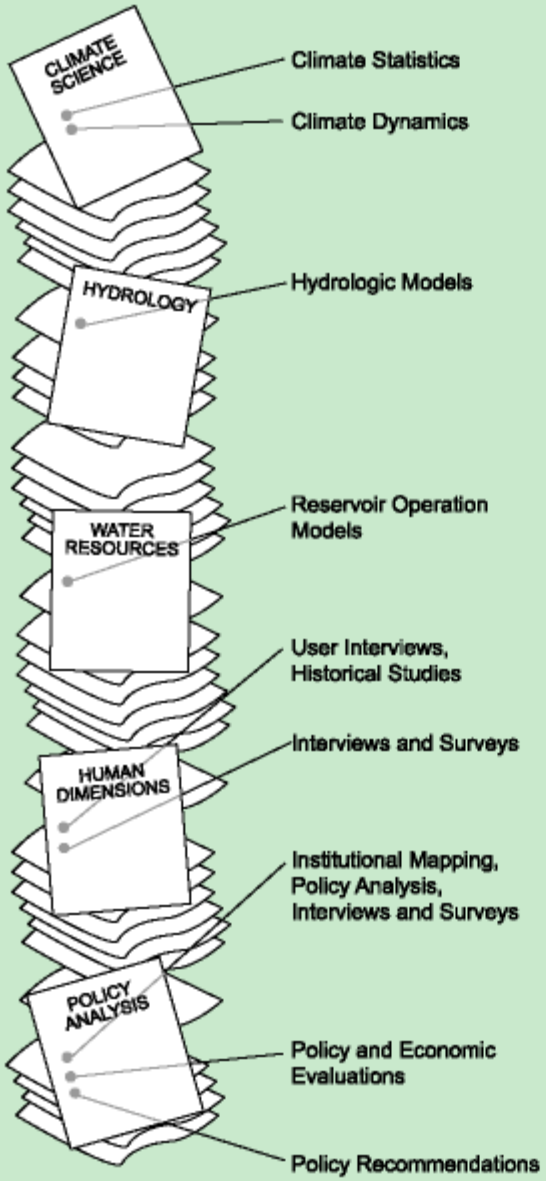
- A salient assessment requires active two-way communication
- Human dimensions research relies on stakeholders' knowledge
- Provides a means of disseminating results

Putting in Practice:

- water workshops
- interviews
- general outreach
- policy-maker workshops

An End-to-End Assessment of Climate Impacts

from CLIMATE....



....to USER

CIG's Process of Integrated Assessment:

- Climate dynamics provides the anchor
- Components of the assessment are undertaken in parallel, rather than in series
- Close communication within the assessment team ensures that methods and assumptions are compatible

Integrated Research

1. Understand the **physical** (hydroclimatic) **system** [predictability, uncertainty]
2. Understand the nature and consequences of human choices and activities (the **managed system**) [decision calendars]
3. Understand the **insititutional context** of these systems [processes, laws, constraints]

Examples of Integrated Assessment

- Integrated assessment of climate impacts on the Columbia River basin (Miles et al. 2000)
- Value of climate forecasts for Columbia basin hydropower production (Hamlet et al. 2001, Huppert et al. 2001)
- Implications of climate change for PNW urban water resources (Palmer and Hahn 2002)
- Analyses of the institutional context of regional water resources management and potential use of climate forecasts in management (Callahan et al. 1999, Gray 1999)