

Adaptive Management

A Decision-Making Framework for a Complex World

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Ecosystems are not only more complex than we think, they're more complex than we can think.

Frank Egler, ecologist

Every management action is an experiment



Environmental Research Needs

- Participants affirmed that interdisciplinary environmental research represents one of the most compelling intellectual frontiers for scientific inquiry.
- Participants unanimously agreed that increased support for interdisciplinary environmental research is required to meet the pressing national and international environmental challenges of the coming century.

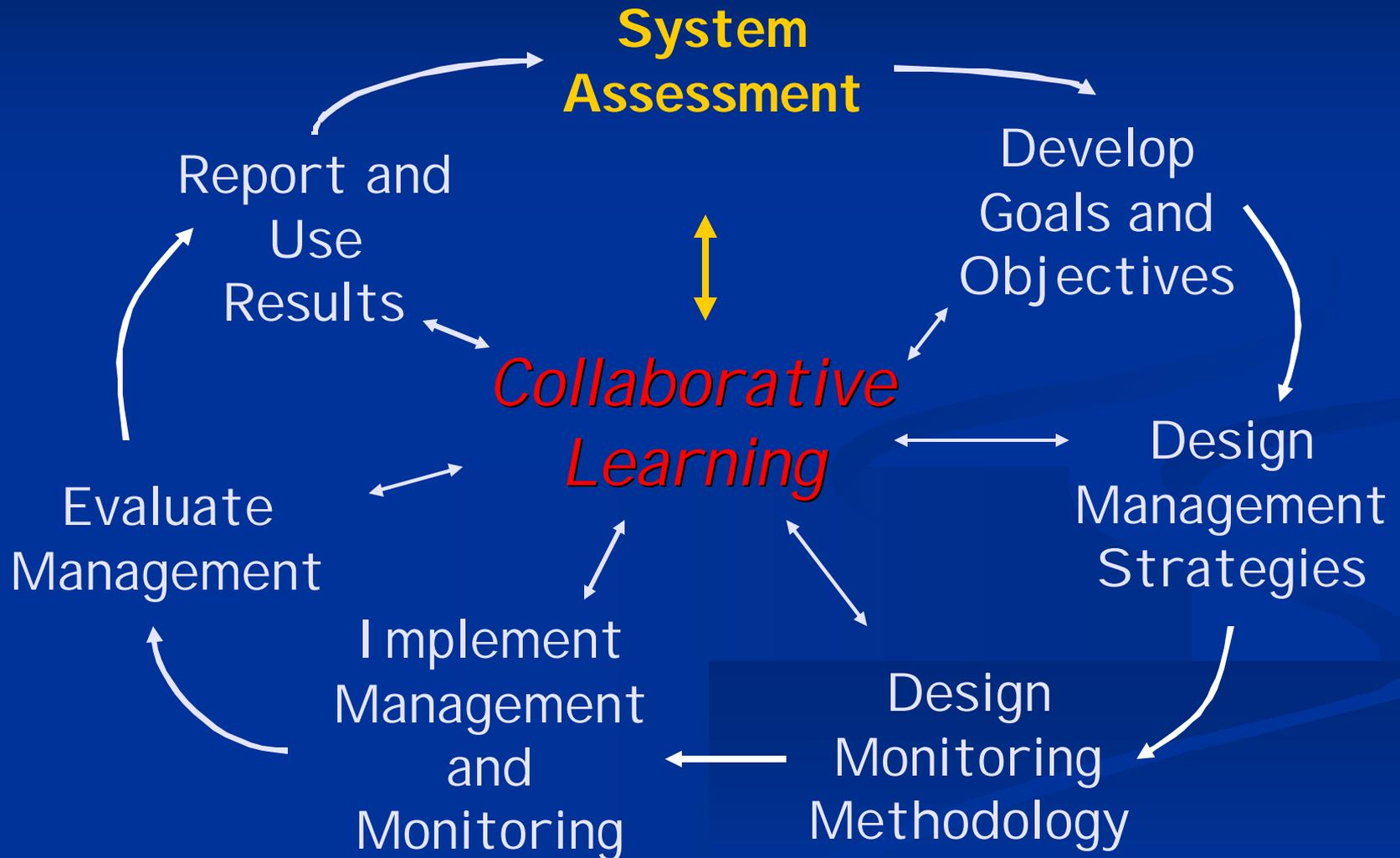
~ Kinzig et al. 2000

Five Natural Resource Decision-Making Approaches

- Political/Social
- Conventional Wisdom
- Trial and Error
- Best Current Data
- Monitor and Modify
- And . . .

(modified from Johnson 1999)

Adaptive Management



Adaptive Management

- Considers ecological, social, economic, and institutional factors
- Actively involves representative stakeholders in decision-making
- Clearly articulates desired conditions and management strategies
- Feeds management information into future decisions

Adaptive Management *cont.*

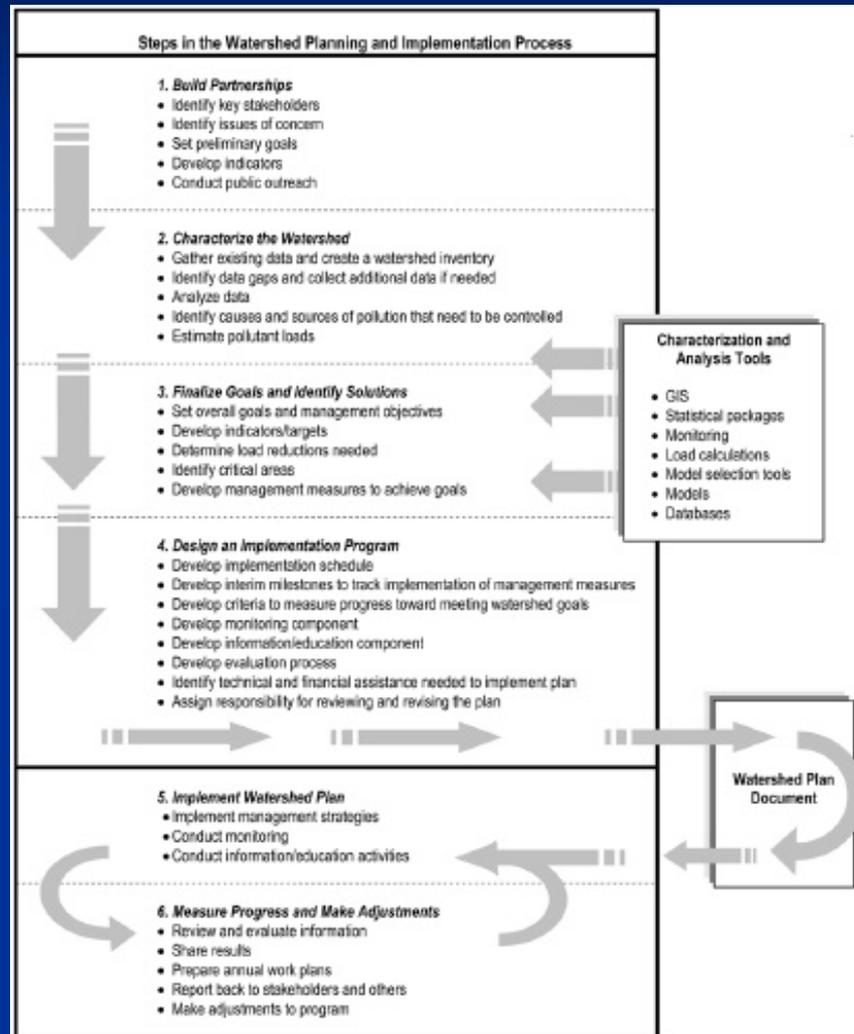
- Learning as important as meeting management objectives
- Reliance on shared models, particularly those that span the range of system variability
- Management policies are experiments, not fixed sets of actions
- Incorporates science into the decision-making process
- Embraces uncertainty

Types of Adaptive Management

- Passive - Statistically sound and scientifically credible monitoring is incorporated into decision-making
- Active – Management strategies are designed to facilitate scientific experiments

Passive Adaptive Management

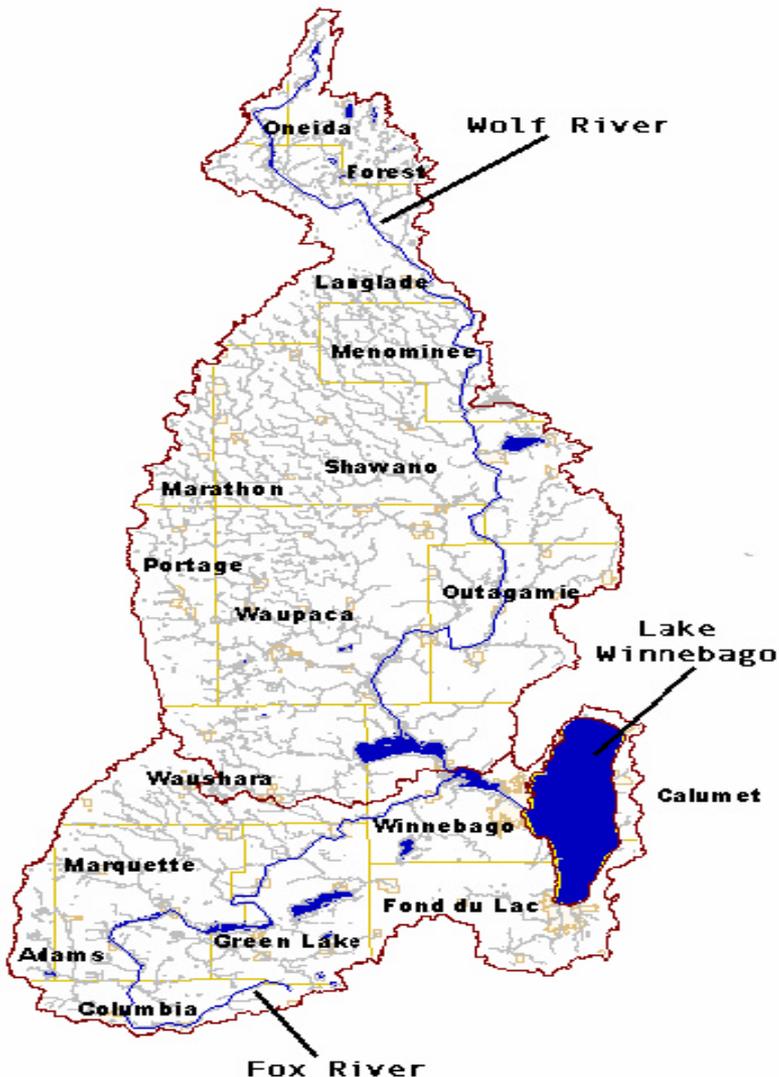
■ US EPA's Watershed Handbook



Key Elements of Adaptive Management

- Systems focus
- Transdisciplinary
- Reliance on shared models, particularly those that span the range of system variability
- Management as experiment
- Decision-making formally incorporates science and representative stakeholders
- Typically used in problem domains with high levels of risk and uncertainty

Winnebago Pool Background



- A flooded series of riverine marshes, where the Upper Fox and Wolf Rivers meet
- 17% of Wisconsin's surface water acreage (draining 6000 sq. miles of watershed)
- Includes Lakes Winnebago, Butte des Morts, Winneconne, and Poygan

Ecological Issues

- Significant declines in northern pike, largemouth bass, and muskellunge populations
- Increases in algae blooms
- Decrease in submergent aquatic plants and common reed – important habitat components



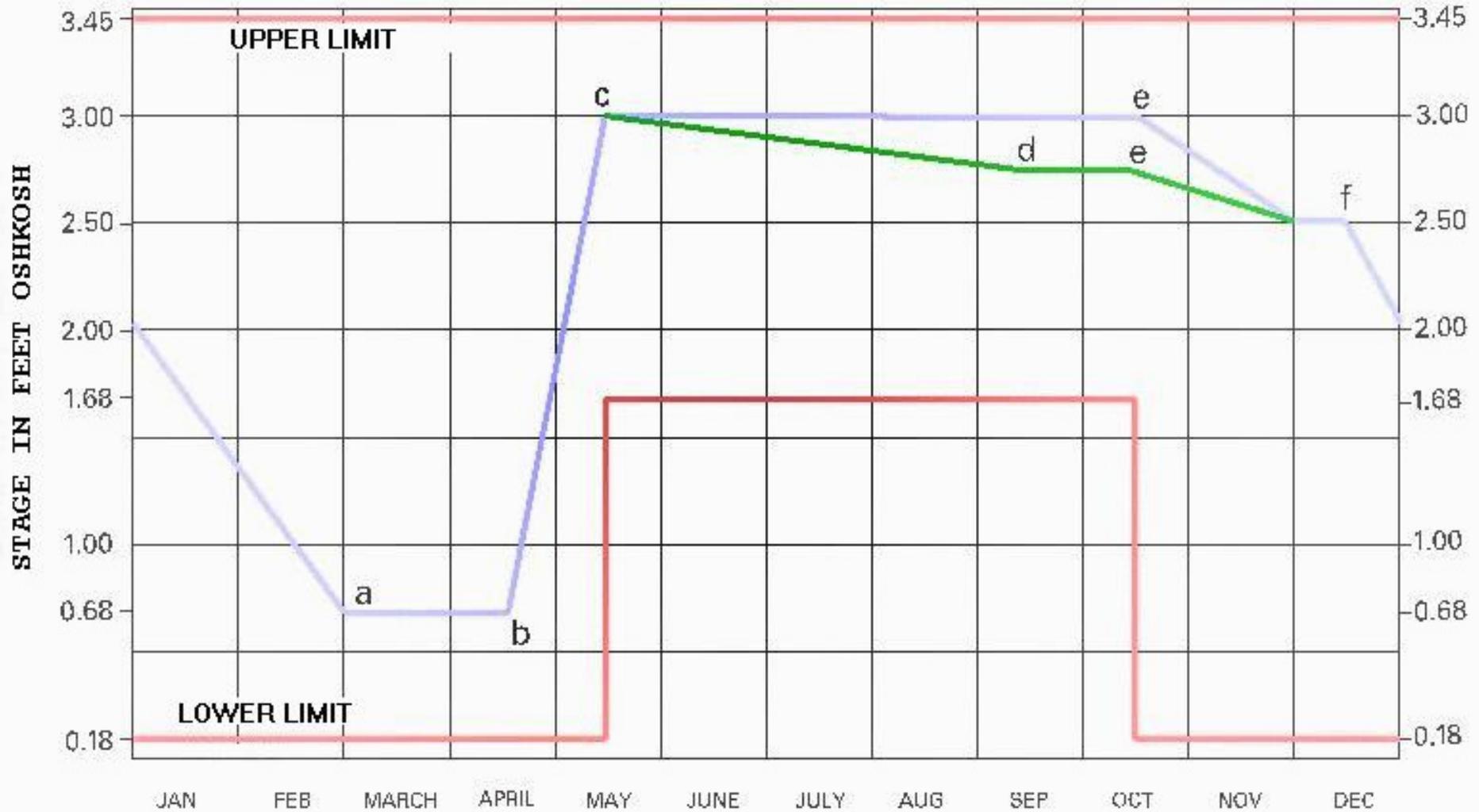
Ecological Issues

- Ecological stressors
 - Water level management
 - Large populations of common carp
 - Nutrient and sediment inputs from rural and urban sources

Social Issues

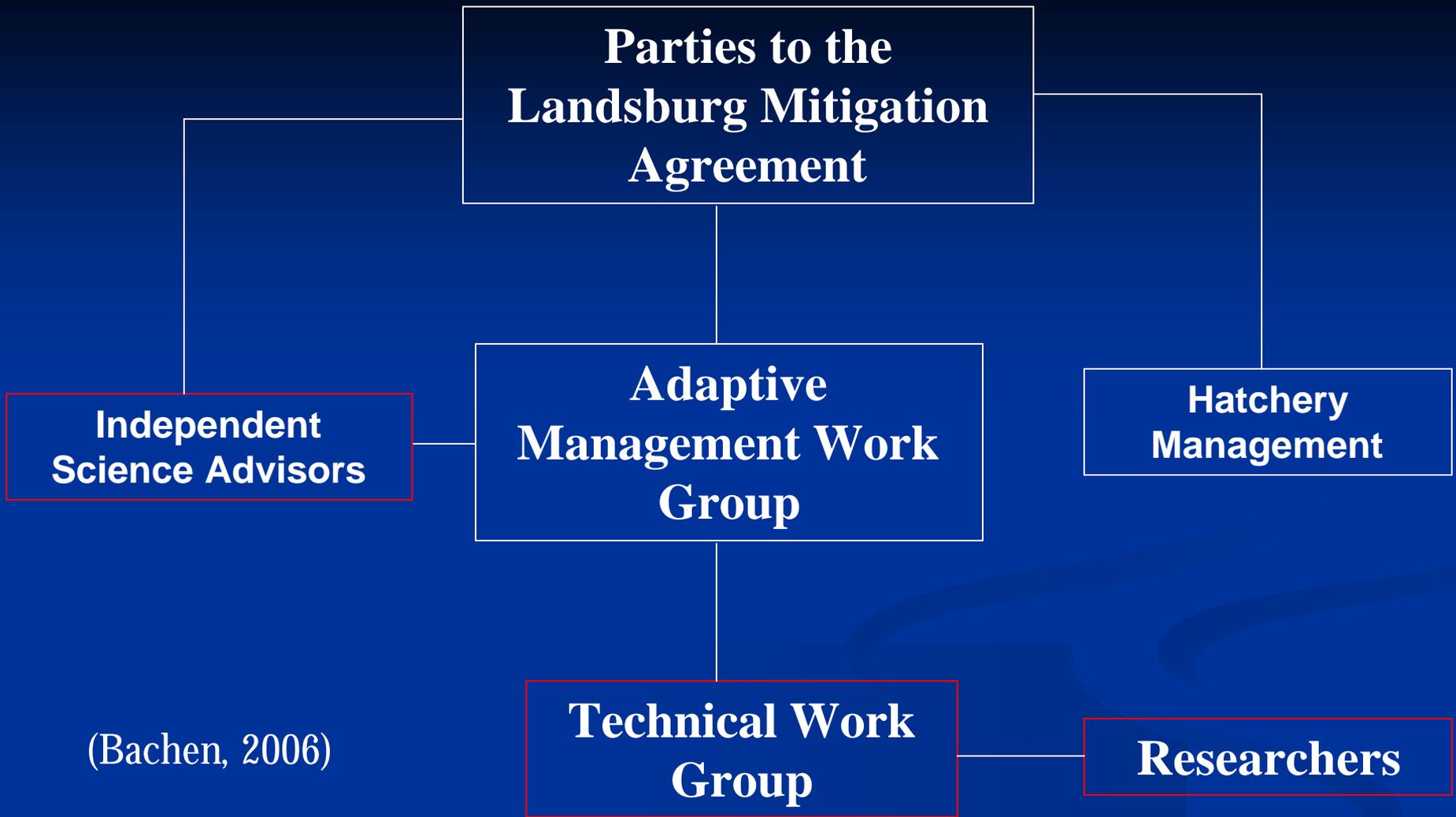
- Widespread reliance on water for boating, fishing, and nature watching
- Widely divergent views on water level management
- Management style of Army Corps of Engineers seen as conservative by local DNR staff and some conservation clubs
- Power generation interests adverse to changes in water level management

LAKE WINNEBAGO SEASONAL TARGET STAGES



Management Experiment Lake Butte des Morts - Wisconsin

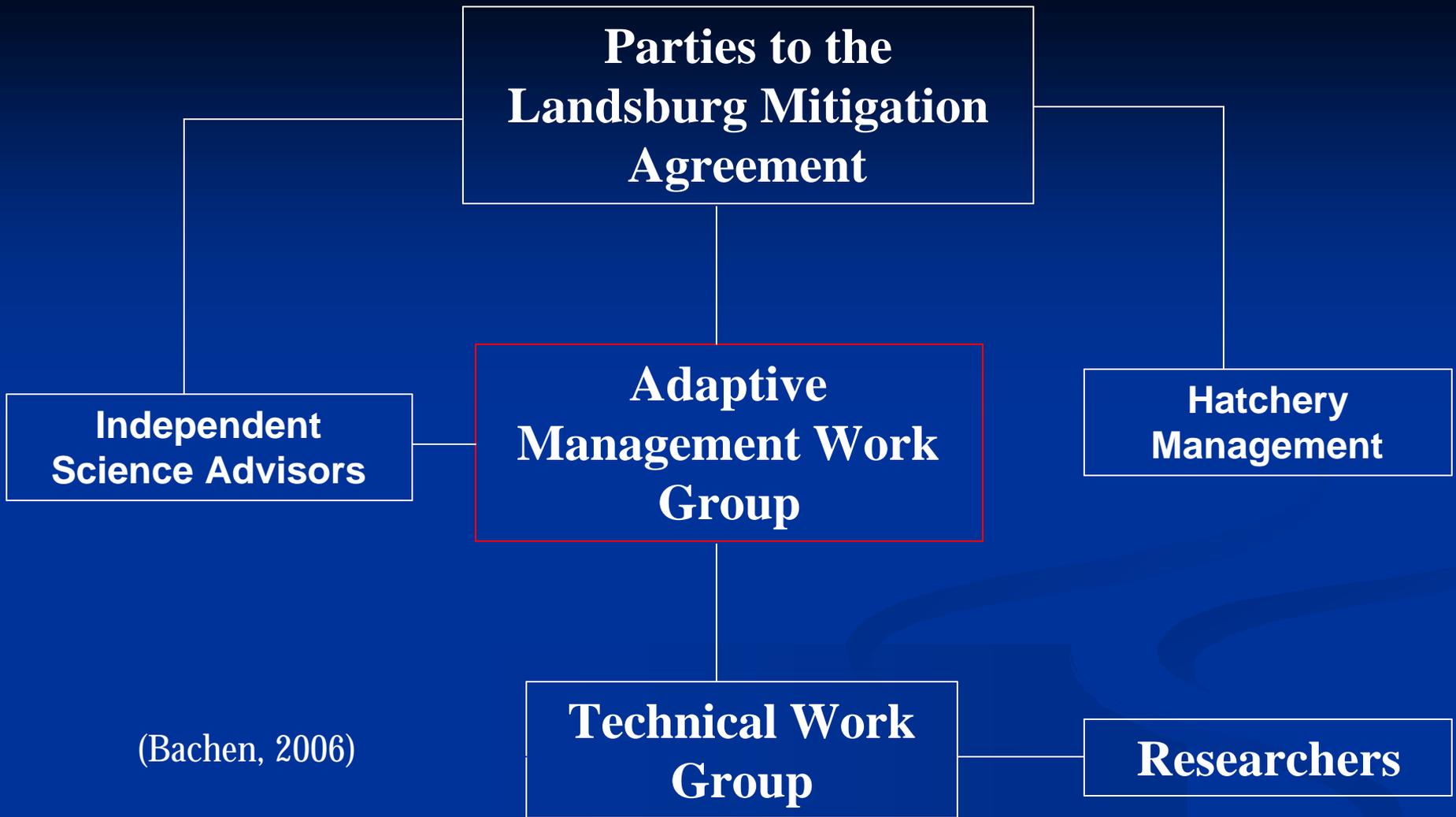




(Bachen, 2006)

Adaptive Management Participant Relationships

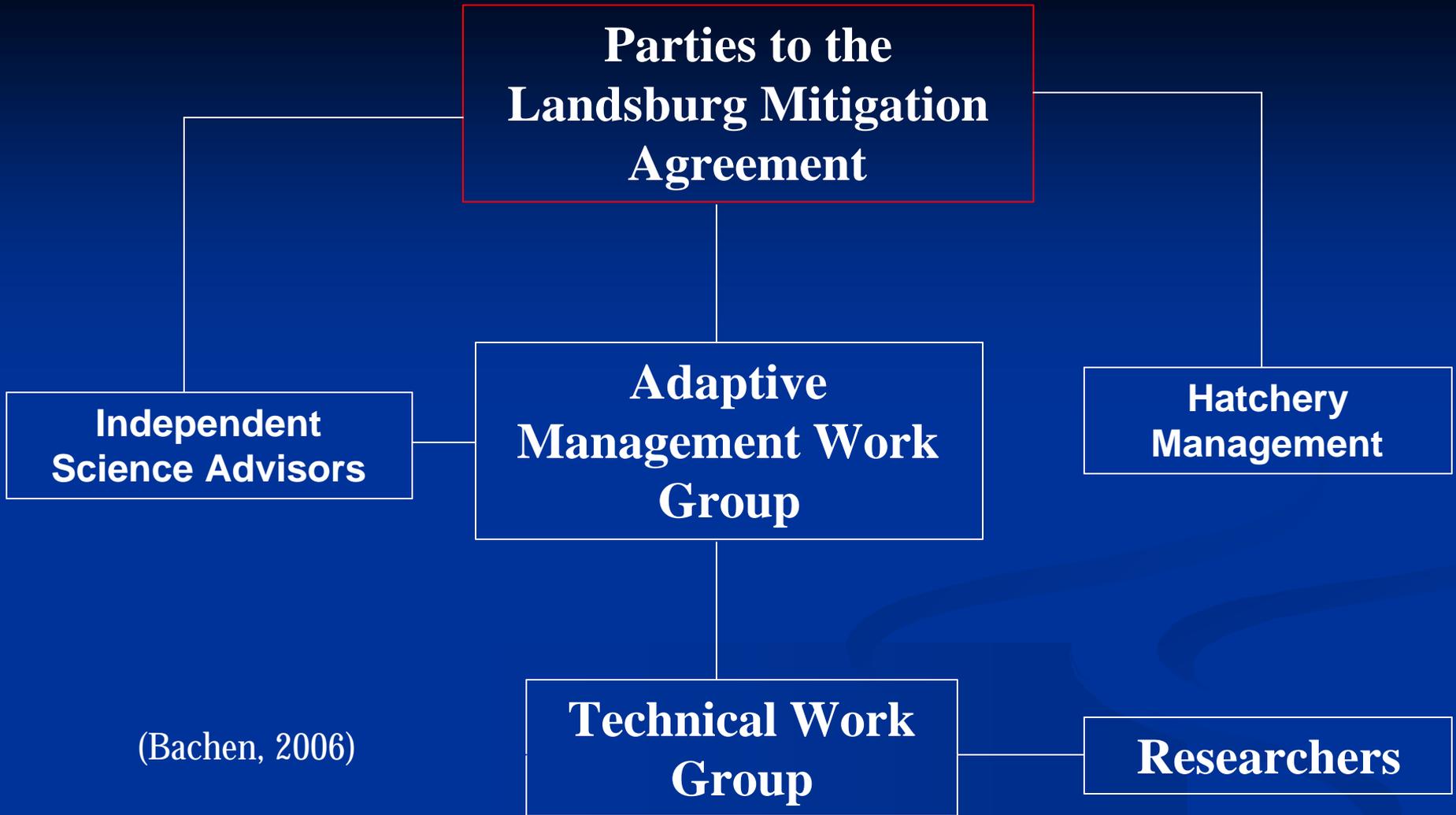
Scientists



(Bachen, 2006)

Adaptive Management Participant Relationships

Stakeholders and agency representatives



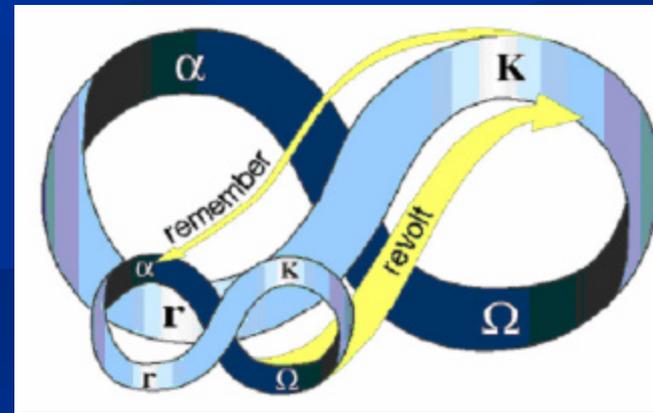
(Bachen, 2006)

Adaptive Management Participant Relationships

Decision-makers

Benefits of Adaptive Management

- Unified system
- Provides a method for moving forward in the face of uncertainty
- Moves toward a culture of flexibility and responsiveness
 - Water rights
 - Energy policy
 - Marine fisheries



(Gunderson and Holling, 2002)

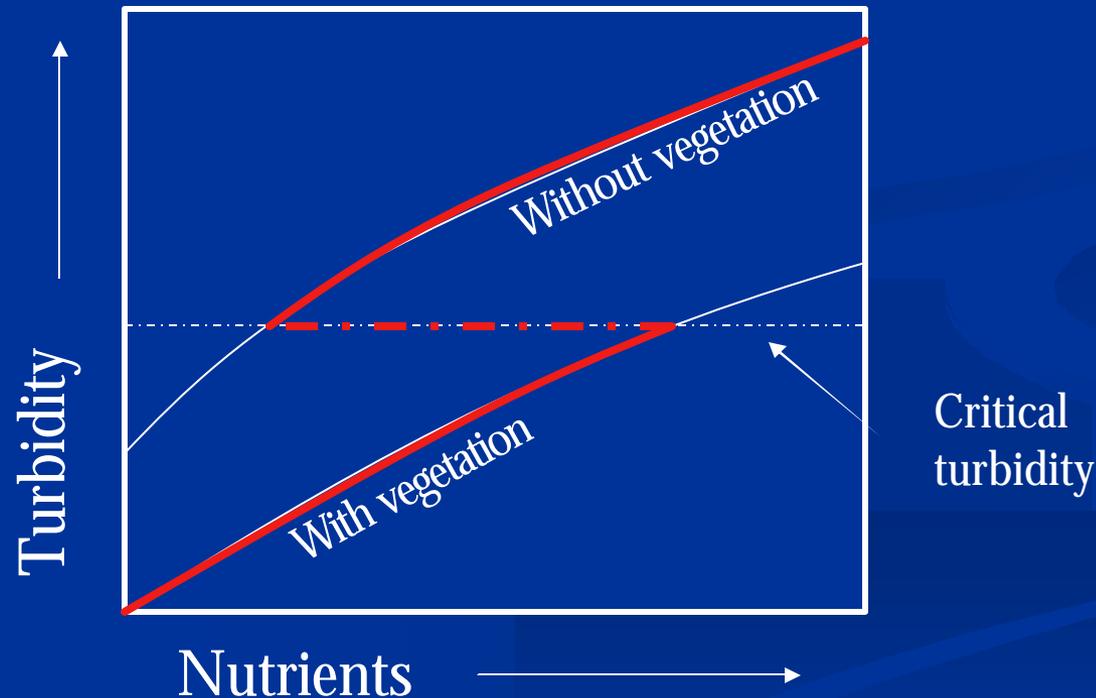
Benefits of Adaptive Management

- Can help communities focus on important leverage points
 - 4. The power to add, change, evolve, or self-organize system structure
 - 3. The goals of the system
 - 2. The mindset out of which the system arises
 - 1. The power to transcend paradigms

(Meadows, 1999)

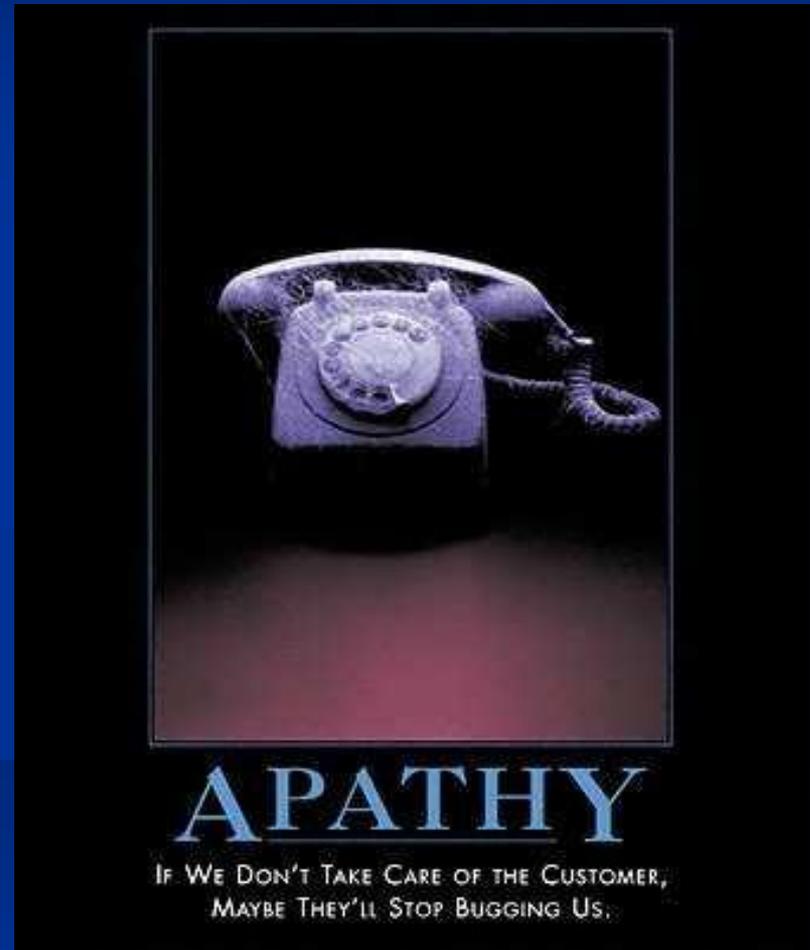
Benefits of Adaptive Management

- Saves time and resources in the long run, particularly in systems with less resilience



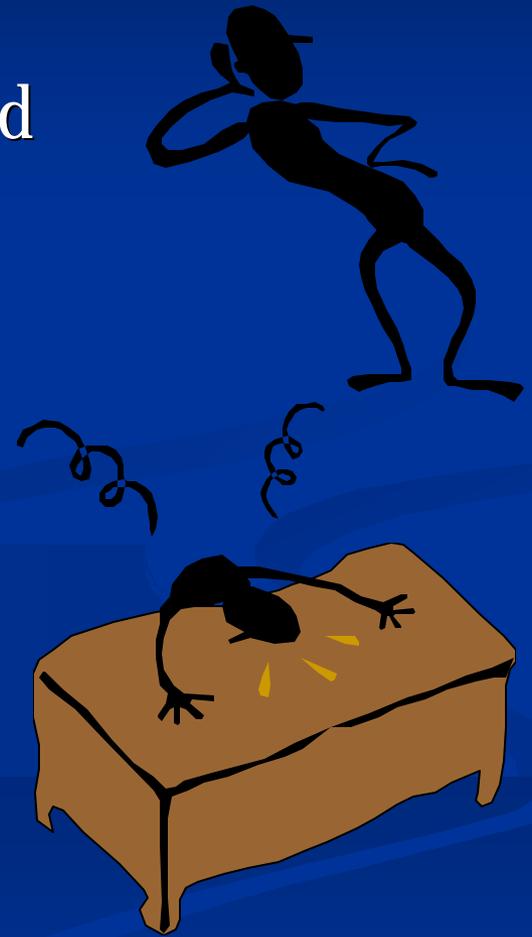
Impediments to Adaptive Management

- “Where do I start??”
- Lack of planning culture
- Stakeholder apathy
- Lack of stakeholder engagement (by managers)



Impediments *cont.*

- Communication Gaps
 - Differences in technical jargon and expertise
 - Paradigm differences and hidden assumptions
 - Poor listening skills
- Personality – pick the right people!



Impediments *cont.*

- The inability to recognize that the “right” answer includes a variety of perspectives
- Belief that “I don’t know” is a weak, unacceptable answer
- Lack of perceived need
 - For research and science
 - For public involvement
 - For changes in management



Impediments *cont.*

- Costs and risks of management experiments
 - Direct costs to economic interests
 - High monitoring costs
 - Short-term vs. long-term costs and benefits
 - Risk to sensitive populations
- Fear of uncertainty



Impediments *cont.*

- Action as the cultural norm for natural resource managers
- Inaction as a rational choice in the political social decision-making model



Impediments *cont.*

- Conflicts in values





RECLAMATION

Upper Colorado Region *Managing Water in the West*

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Management

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Experimental Plan
Adaptive Management

Canyon
Temperature Control

Light In The UC
Region

Hoover Dam
Reservoir

Colorado Grande Fish
Monitoring

San Juan Recovery
Implementation

Wetlands
Bioscience

Glen Canyon Dam Adaptive Management Program

Current Focus

- FY06 Budget & Work Plan
- FY07 Budget (spreadsheet)
- FY07 Budget and Annual Work Plan
- FONSI - Proposed Modifications To Experimental Releases From Glen Canyon
- Final Strategic Plan
- Humpback Chub Ad Hoc Group Information

Meeting Information

- AMWG Meeting: Dec. 5 - 6, 2006
- TWG Meeting: Nov. 8 - 9, 2006

Related Information

- Glen Canyon Dam Long-Term Experimental Plan
- Temperature Control Environmental Assessment Scoping Report
- Grand Canyon Monitoring and Research Center
- Previously Released Environmental Documents



Photo by: Gary Ledd

Inside AMP

- ▶ Background
- ▶ Adaptive Mgmt Work Group
- ▶ Technical Work Group
- ▶ Meeting Minutes
- ▶ Resource Issues
- ▶ Budget Information
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The Adaptive Management Program was developed to provide an organization and process for cooperative integration of dam operations, downstream resource protection and management, and monitoring and research information, as well as to improve the values for which the Glen Canyon National Recreation Area and Grand Canyon National

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General Information

Programs

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EVERGLADES RESTORATION

FACTS & INFO

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The journey to restore America's EVERGLADES

Welcome to the official site of the Comprehensive Everglades Restoration Plan (CERP)

SEARCH:

GO



[View all upcoming Public Meetings](#)

About CERP

Did you know that the Florida Everglades was once a vibrant, free-flowing river of grass that provided clean water from Lake Okechobee to Florida Bay? Today, this extraordinary ecosystem is dying.



To restore and preserve this American treasure, enhance water supplies, and maintain flood protection, the U.S. Army Corps of Engineers in partnership with the South Florida Water Management District and numerous other federal, state, local and tribal partners, has developed a plan to save the Everglades.

[CONTINUED >](#)

CERP News [text version](#)

Assessment Strategy

Dec 22, 2006

Document for Review & Public Meeting: Herbert Hoover Dike Draft Supplement EIS (USACE Jax web site)

Dec 20, 2006

Chief of Engineers Report Signed for the Site 1 Final PIR/EA

Desktop Calendar January 2007



Sign-up for CERP E-mail Updates
Receive [updates by e-mail!](#)



CERP Calendar

View the [complete CERP calendar](#) for upcoming events.

How To Begin???

- Passive adaptive management
- Incorporate social science data
- Increase citizen participation in decision-making
- Retrospective analyses - Deal with existing information in a rigorous way
- Prospective analyses – Use new models and information for preliminary decision analysis
- Experimental management

For More Information

- Adaptive Management Practitioners Network-
<http://www.adaptivemanagement.net/whatis.php>
- Center for International Forestry Research – Adaptive Collaborative Management project -
<http://www.cifor.cgiar.org/acm/>
- Glen Canyon -
<http://www.usbr.gov/uc/rm/amp/background.html>
- Everglades -
<http://www.evergladesplan.org/index.aspx>