

Adaptive Management: Its Use in the Columbia Basin for Ecosystem Management

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Definition

- Adaptive management is an explicit and analytical process for adjusting management and research decisions to better achieve management objectives; and this process should be quantitative wherever feasible.
- Adaptive management recognizes that knowledge about natural resource systems is uncertain. Therefore, some management actions are best conducted as experiments in a continuing attempt to reduce the risk arising from that uncertainty.

Definition

- Adaptive environmental assessment and management' was the original name given to this approach which was developed by the ecologists C.S. Holling and Carl J. Walters in the 1970s.
- AM seeks to aggressively use management intervention as a tool to strategically probe the functioning of an ecosystem. Interventions are designed to test key hypotheses about the functioning of the ecosystem.

Definition

- AM identifies uncertainties, and then establishes methodologies to test hypotheses concerning those uncertainties.
- It uses management as a tool not only to change the system, but as a tool to learn about the system.
- It is concerned with the need to learn and the cost of ignorance, while traditional management is focused on the need to preserve and the cost of knowledge.

Adaptive Management entails a multi-step process:

- **1. Considering various actions to meet management objectives;**
- **2. Predicting the outcomes of these management actions based on what is currently known;**
- **3. Implementing management actions;**
- **4. Monitoring to observe the results of those actions; and**
- **5. Using the results to update knowledge and adjust future management actions accordingly.**

There are several processes both scientific and social which are vital components of adaptive management:

- *management is linked to appropriate temporal and spatial scales*
- *management retains a focus on statistical power and controls*
- *use of computer models to build synthesis and an embodied ecological consensus*
- *use of embodied ecological consensus to evaluate strategic alternatives*
- *communicate alternatives to political arena for negotiation of a selection*

Steps in the Process of Adaptive Management

- **START:** *Establish a Clear and Common Purpose and Scientific Framework*
- **STEP A:** *Design an Explicit Model (s) of Your System*
- **STEP B:** *Develop a Management Plan That Maximizes Results and Learning*
- **STEP C:** *Develop a Monitoring Plan to Test Your Assumptions*
- **STEP D:** *Implement Your Management and Monitoring Plans*
- **STEP E:** *Analyze Data and Communicate Results*
- **ITERATE:** *Use Results to Adapt and Learn*

Adaptive management can be considered either passive or active.

- *Passive adaptive management* uses predictive modeling based on present knowledge to inform management decisions. As new knowledge is gained, the models are updated and management decisions adapted accordingly.
- *Active adaptive management*, involves changing management strategies altogether in order to test completely new hypotheses.

Adaptive management can be considered either passive or active.

- **Goal of passive adaptive management is to improve existing management approaches.**
- **Goal of active adaptive management is to learn by experimentation in order to determine the best management strategy.**

Columbia River

- In 1984, the NPCC endorsed the concept of adaptive management
- -- using management initiatives as experimental probes to clarify uncertainties about the effectiveness of mitigation measures.
 - *Explicitly to deal with the mainstem dilemma.*
 - *Called for actions to improve both in river and transported survival.*
 - *Coupled with an experimental program intended to maximize our ability to learn and assist the region in making crucial decisions.*

Columbia River

■ How are we doing:

- *Clear and Common Purpose and Scientific Framework*
 - » *F&W Program*
 - » *BiOp*
- *Models & Modeling*
 - » *Compass*
 - » *Shiraz*
 - » *EDT*
 - » *AHA*
- *Management Plan(s) That Maximizes Results and Learning*
 - » *Subbasin Plans*
 - » *Recovery Plans*

Columbia River

- *Monitoring Plan*
 - » *MERR*
 - » *HLI*
- *Implement Plan(s)*
 - » *Management Entities*
 - » *ISSRP*
 - » *ISAB*
- *Data Management*
 - » *PNAMP*
 - » *NED*

Columbia River

■ Major Uncertainties

- *Hydrosystem*
 - » *Flow/Survival*
 - » *Transportation/Spill*
- *Hatcheries*
- *Habitat*
 - » *Relationship to Productivity*
 - » *Temperature*
- *Harvest*
 - » *Selective gear*

Columbia River Sources of Uncertainty

- **Ecological (Structural) Uncertainty**
- *-nature of system dynamics is not completely known*
- *-competing ideas about system response to management actions*
- **Environmental Variation**
- *-Climate*
- *-Weather*
- *-Volcanoes*

Columbia River Sources of Uncertainty

Partial Controllability

- management decision is applied to system indirectly*
- immediate effects of management actions are characterized by uncertainty*

Partial Observability

the state of nature is rarely seen perfectly (estimation)

Scale

temporal

geographical

Legal/Jurisdictional

ESA

Treaties