

A Typology of Adaptive Management

Chapter 4

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Session Objective: **By the end of this session,
participants will be able to:**

- Discuss what Adaptive Management (AM) is and is not
- Discern different schools of thought with regard to AM, and recognize what elements they emphasize

Outline

- Discuss what AM is, what it is not, and what it's claimed to be
- Discuss alternative definitions of AM
- Discuss different flavors of AM
- Distinguish between active and passive AM

What AM is Claimed To Be

- Resource tracking
- Strategic planning
- Sequential decision making
- Assessment of management projects
- Applied science
- Stakeholder collaboration
- Trial and error management
- What I've been doing all along

Typology of Adaptive Management
Adaptive Management: Structured Decision Making for Recurrent Decisions

What AM is Not

- Not just the doing of science, even if management-oriented
- Not just the tracking of activities, or even impacts
- Not just stakeholder collaboration
- Not strategic planning per se
- Not the identification of goals and objectives
- Not a post-hoc assessment of management
- Not trial-and-error management
- Perhaps not what you've been doing all along

What AM is

- Learning through management, and adjusting management actions based on what is learned
- With a focus on
 - reducing uncertainty about the influence of management actions on resources
 - improving management as a result of improved understanding

NRC Definition (2004)

“... flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process.”

CAMnet (2005)

“... a systematic management paradigm that assumes natural resource management policies and actions are not static but are adjusted based on the combination of new scientific and socio-economic information in order to improve management by learning from the ecosystems being affected.”

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B.G. Norton (2005)

“...management according to three key tenets:”

- Experimentalism...taking actions capable of reducing uncertainty in the future
- Multi-scalar analysis... on multiple scales of space and time
- Place sensitivity...management of occupied geographic places

Other Definitions

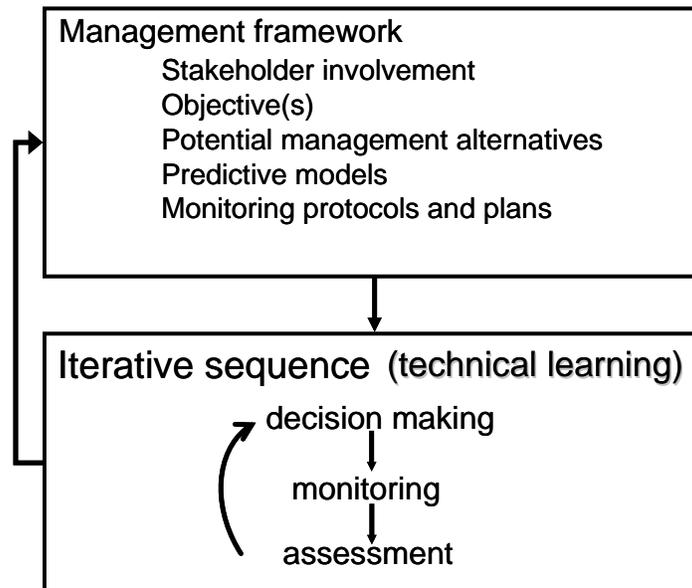
- A systematic process for continually adjusting policies and practices by learning from the outcomes of previously used policies and practices (Resilience Alliance)
- Management in the face of uncertainty, with a focus on the reduction of uncertainty (FWS)
- Learning by doing, and adapting based on what’s learned (Williams et al. 2007)
- Iterative structured decision making, with a goal of reducing uncertainty and thereby improving management (this class)

Common Features of AM Definitions

- A management framework
- Uncertainty about management consequences
- Iterative decision making
- Learning through the process of management itself
- Improvement of management based on learning

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Overall AM Process



DOI AM Technical Guide
available on www.doi.gov

Flavors of AM

- Focus on technical learning (“Decision-Theoretic School”)
 - Active adaptive management (active pursuit of learning through management)
 - Passive adaptive management (with learning a useful but undirected bi-product of management)
- Focus on institutional learning (“Resilience-Experimentalist School”)
 - Double-loop learning (e.g., learning about objectives by observing responses to objective-driven actions)
- See: McFadden et al. (2011) for the distinction between the Decision-Theoretic and Resilience-Experimentalist Schools

Passive and Active AM

- Generic approaches to AM
- Large variation in the descriptions of active/passive in the literature
- Covered in around 50% of the articles in the bibliography

Passive vs. Active AM: Definitions

- Walters 1986
 - Passive AM: Policies that rely on a parameter revision to provide informative contrast
 - Active AM: Policies that include probing for information, seeking a balance between learning and management performance

- Walters and Holling 1990
 - Passive AM: Use of a single best estimate or model that is assumed to be correct
 - Active AM: Use of a range of response models, with policy choice reflecting the tradeoff between short-term performance and long-term learning

- Aldridge, Boyce & Baydack 2004
 - Passive AM: Long-term monitoring and learning from evolving strategy that lacks scientific rigor (no RRC)
 - Active AM: Management policies identified with controlled experiments that are designed, replicated, and tested against each other

- Schreiber, Bearlin, Nicol, & Todd 2004
 - Passive AM: One practice at a time; different strategies applied sequentially over time
 - Active AM: Comparison of several management approaches simultaneously

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- Gregory, Olsen & Arvai 2006
 - Passive AM: Uses historical data to ID a best guess course of action, with monitoring used to update dataset, hypotheses, and management actions
 - Active AM: Uses management experiments to test competing hypotheses about management impacts (temporal or spatial replication)

- Bormann, Lee, Keister, Busch, Martin, & Haynes 2006:
 - Passive AM: “Reactive” management plus monitoring and evaluation to improve subsequent policies
 - Active AM: Designed experiments involving simultaneous implementation of multiple policies

- Kai Lee 1999
 - Passive AM: Analysis of responses to non-experimental policies
 - Active AM: Experimental management with policies based on hypothesized ecosystem responses, controls and replication

Passive and Active AM (This Class)

- Are distinguished by the emphasis placed on learning in guiding decision making
 - Active AM focuses on learning
 - Passive AM focuses on resources (but not learning)

Passive Adaptive Management

- Decision making focuses on resource responses but not learning
- Targets the effect of management on resource conditions, but not the effect on learning
- Learning is a useful but unintended consequence of management
- Example: use of the “best” model to guide decision making, with model updating based on what’s learned
 - N.B. Not the only way to do passive AM

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Active Adaptive Management

- Decision making focuses on learning
- Targets the effect of management on learning, and may or may not target the immediate effect on resource status
- Learning is seen as a key attribute that drives decision making
- Example: experimental management, with decision making adjusted based on what's learned
 - N.B. Not the only way to do active AM

Similarities/Differences between Active and Passive AM

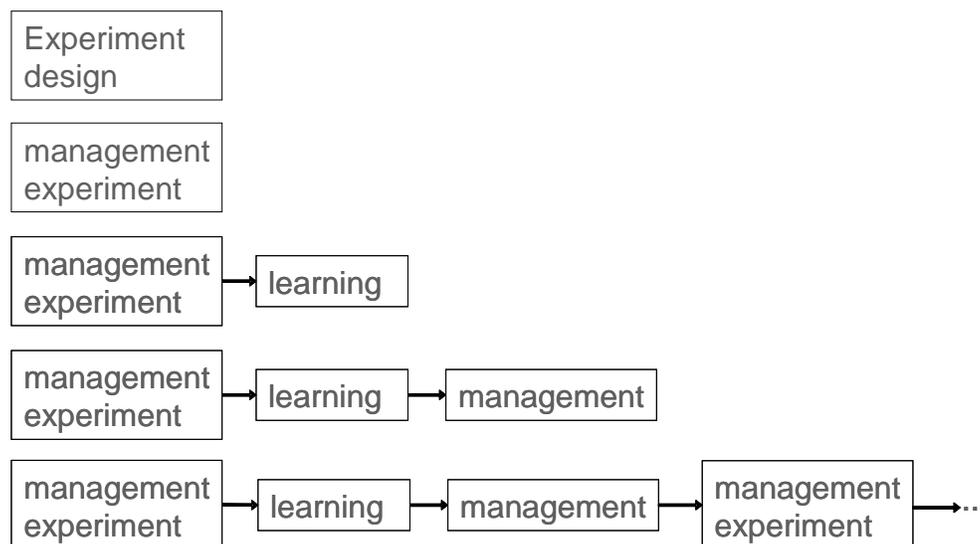
Similarities

- Both use the same uncertainty indicators to characterize structural uncertainty
- Both use the same general approach to learning, by comparing observations against model predictions

Key difference

- The emphasis placed on learning as a guide to decision making

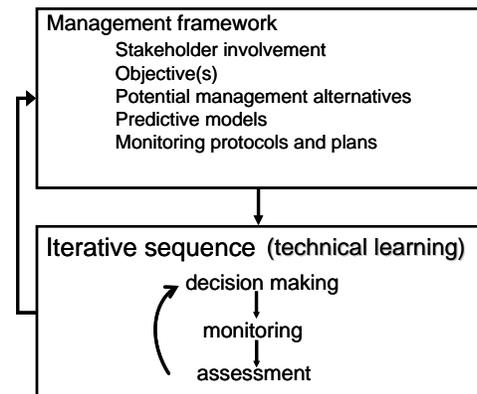
“Experimental Management”



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Institutional Learning

- Learning about the adequacy of objectives, alternatives, etc
- Contrasted with learning about mortality, reproduction, etc
- Revisitation of the setup elements in AM is a “second loop” of learning
- Occurs less frequently than the technical loop
- Often as important as technical learning
- Many think of AM exclusively in terms of double-loop learning



Final Points

- There are different flavors of AM, depending on the emphasis placed on its attributes
- Some think AM is too costly and time-consuming to be useful
- But in fact, AM in some form is used all the time – just not very well
- The trick (and a goal of this course) is to make adaptive decision making more effective