Ecosystem Based Management

- Place based
- Focused on sustaining valued ecosystem services by protecting ecosystem structure and function,
- Recognizes internal and external linkages of the whole system, and
- Specifically considers economic, social and institutional aspects of the system

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EBM - Landscape Scale Focus

Optimistic model

- Integrative science leads to developing comprehensive plans
- Coordination among agencies leads to consistent actions

Pessimistic model

- Development interests dominate leading to reluctance to impose costs
- Institutional barriers result in failure to cooperate

Adapted from: Judith Layzer. 2008. Natural Experiments: Ecosystem-based management and the envrionment. The MIT Press. Cambridge, MA.

EBM - Stakeholder Collaboration

Optimistic model

- Trust transforms interests and leads to innovation
- Agreement on science basis leads to feasible, well-founded plan
- Involvement reduces challenges

Pessimistic model

- Consensus seeking leads to lowest common denominator
- Socio-economic interests dilute precaution
- Special interests resurface impeding implementation

Adapted from: Judith Layzer. 2008. Natural Experiments: Ecosystem-based management and the environment. The MIT Press. Cambridge, MA.

EBM - Adaptive Management

Optimistic model

- Emphasis on flexibility promotes ‘better-than-minimum’ performance
- Monitoring informs practice ensuring use of best available understanding

Pessimistic model

- Flexibility facilitates evasion by laggards
- Managers resist adjustments and development interests prevail

Adapted from: Judith Layzer. 2008. Natural Experiments: Ecosystem-based management and the envrionment. The MIT Press. Cambridge, MA.

Essential conditions if an ecosystem-based initiative is to succeed

United Nations Environment Program. 2006. *Ecosystem-based management: Markers for assessing progress.* 58pp. unep/gpa, The Hague

1. Unambiguous goals
2. Well-informed stakeholders
3. Delegation of authority and financial resources to sustain implementation
4. Capacity within implementing institutions

“ecosystem-based”

is

a program *characteristic*

NOT

a program *structure*

essential elements of EBM

holistic vision / plan

comprehensive description of system, articulation of multiple management objectives

community

effective engagement of policy makers, managers, stakeholders, scientists

process

effective adaptive management

foundation

legal framework, management institutions, financial resources, effective communications

program framework

1. Articulate program goals
2. Develop system level model for goal attainment
3. Assess current management efforts – identify gaps
4. Develop management strategy
5. Develop monitoring program
6. Assess performance
7. Manage adaptively

APNEP goals

1. **Protected and restored habitats**
   - Water for people, fish, and wildlife
   - Clean waters
2. Healthy human communities
   - Manage resource consumption
   - Manage use conflict
3. Healthy native species
   - Manage harvest pressures

APNEP goals

1. Protected and restored habitats
2. Healthy human communities
3. Healthy native species

In a system that is changing due to both natural and anthropogenic drivers, how do you define these conditions?

“healthy”

- Meeting defined conditions
- Sustaining desired uses
- Having biological integrity
  - Exhibiting resilience/resistance
- Possessing diversity

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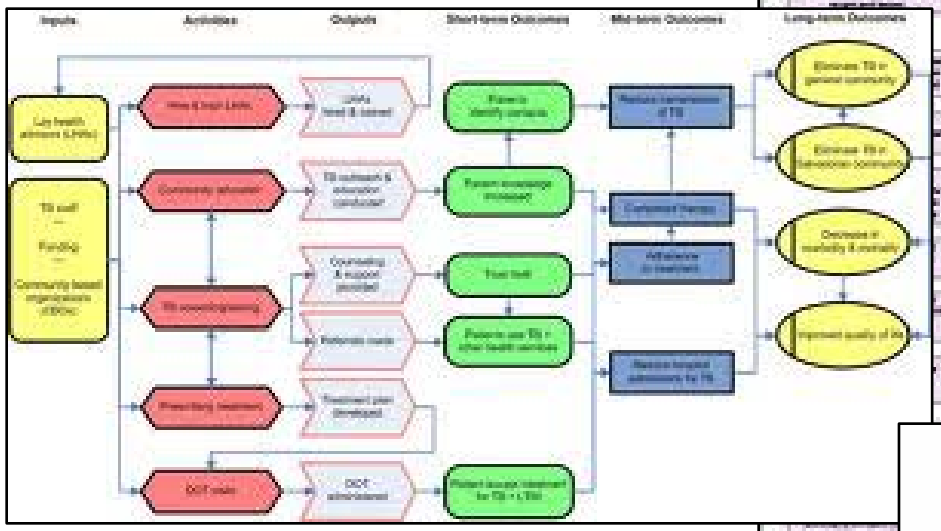
Success implementing EBM requires a **theory of change**

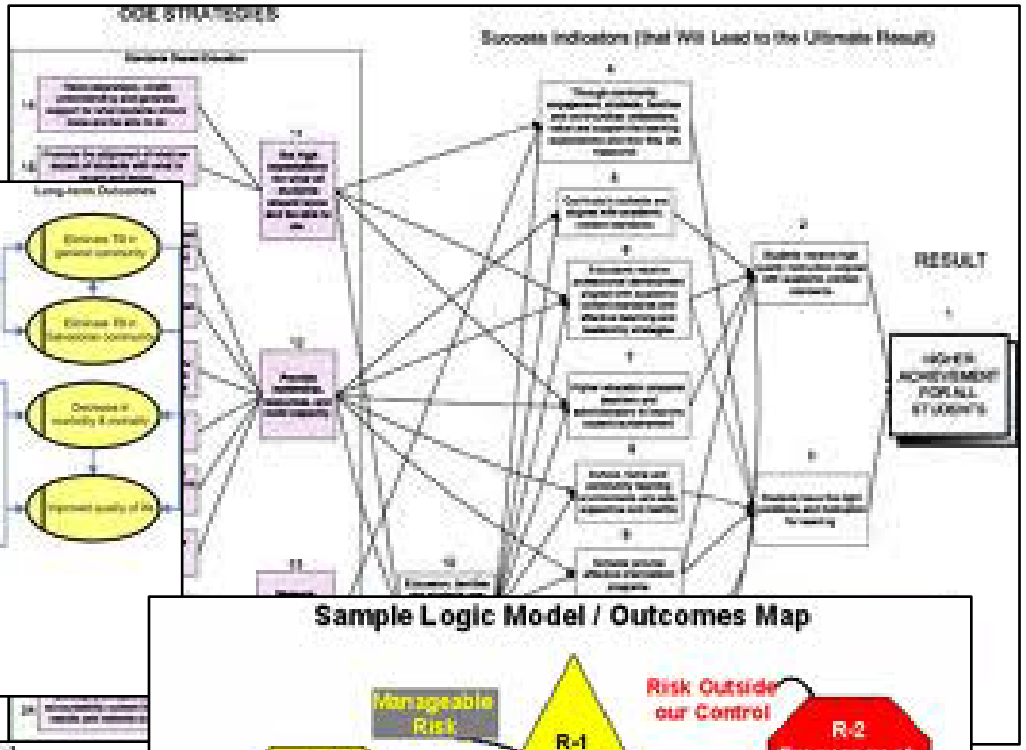
What must be done to produce the necessary and desired outcomes?

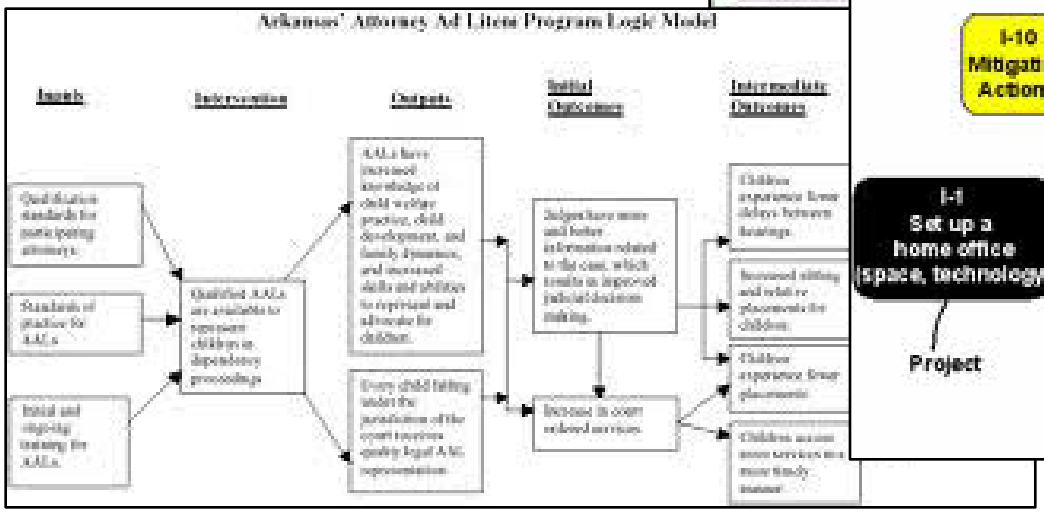
Adequately articulated, the theory of change:

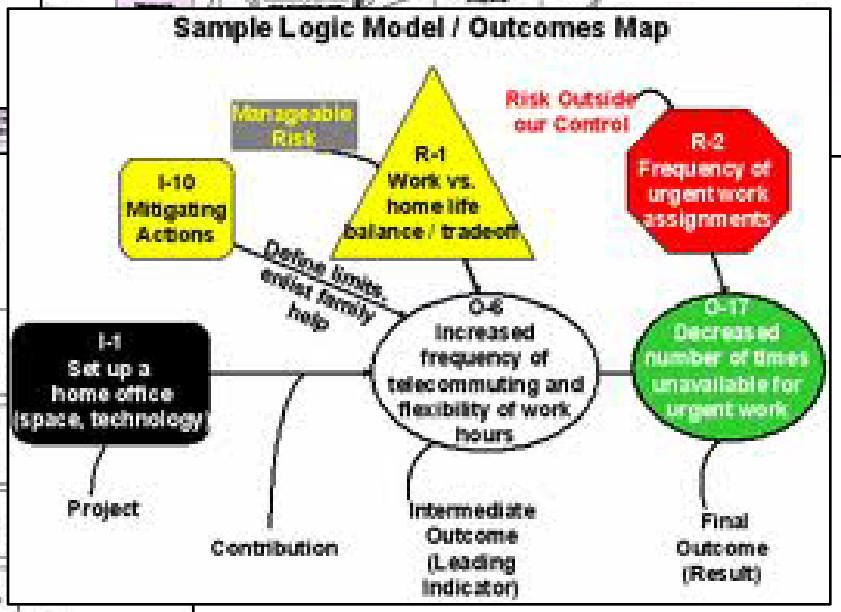
- organizes action
- enables monitoring
- facilitates adaptive management

Logic models









Goal modeling

identification of factors potentially affecting attainment

biological factors

- fauna
- flora
- Microorganisms

chemical factors

- salinity
- pH
- nutrients
- toxics

physical factors

- structure
- hydrology
- temperature

human factors

- use objectives
- modification of system
- knowledge

Protect and Restore Vital Aquatic Habitats - SAV			
		importance	manageable
biological factors			
fauna			
	predator prevalence	1	1
flora			
	physiological tolerance of plants	3	0
	propagation requirements	3	1
microorgs			
physical factors			
structure			
	bathymetry	3	0
	sediment type	2	0
hydrology			
	hydrodynamic conditions	3	0
temperature			
	maxima duration/frequency	3	0
chemical factors			
salinity			
	max-min duration/frequency	3	0
pH			
nutrients			
	N and P loads > eutrophication	3	2
toxics			
human factors			
use objectives			
	physical conflicts (competing uses)	2	3
modification of system			
	eutrophication	3	2
	suspended sediment loads	2	1
	altered bathymetry	1	3
	shading	1	3
knowledge			
	technical understanding of bed dynamics	1	2
	public understanding of protection efforts	3	3
	policy understanding of need for protection	3	3
	policy understanding of need for habitat restoration	3	2

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Develop monitoring program

- Monitoring reflects management priorities
- Monitoring designed to reduce uncertainty in system model
- Indicators link condition and management efforts
- Monitoring data is appropriate to decision thresholds for adaptive management

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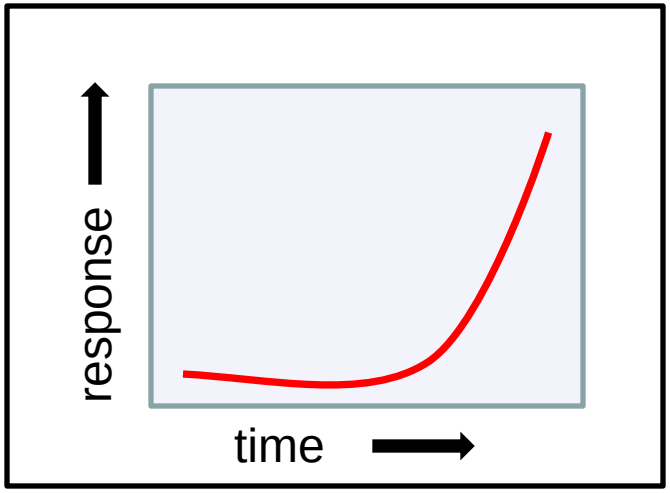
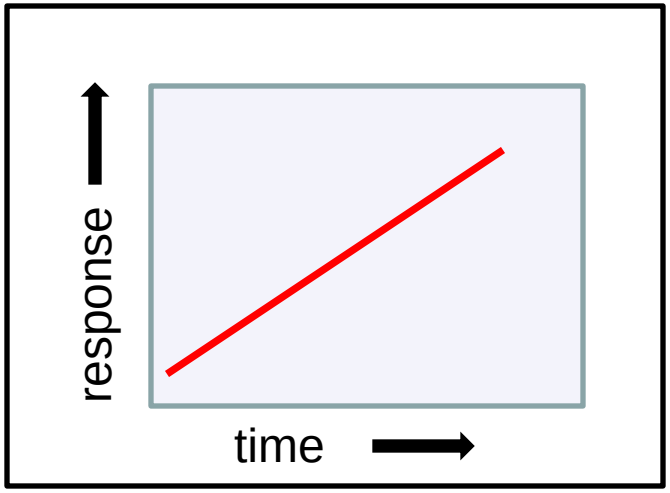
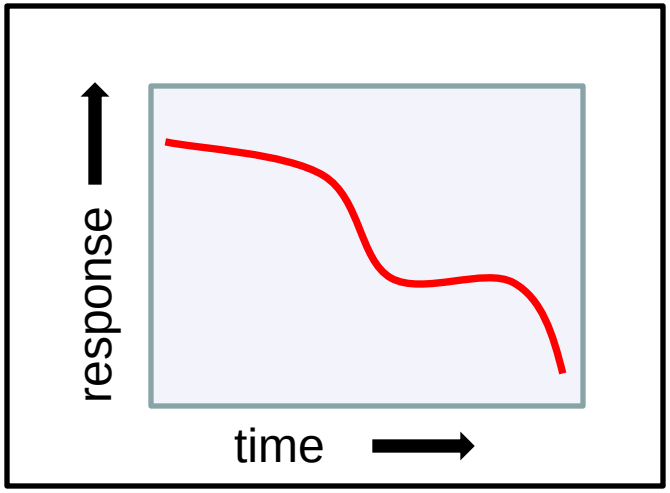
Establishing performance expectations

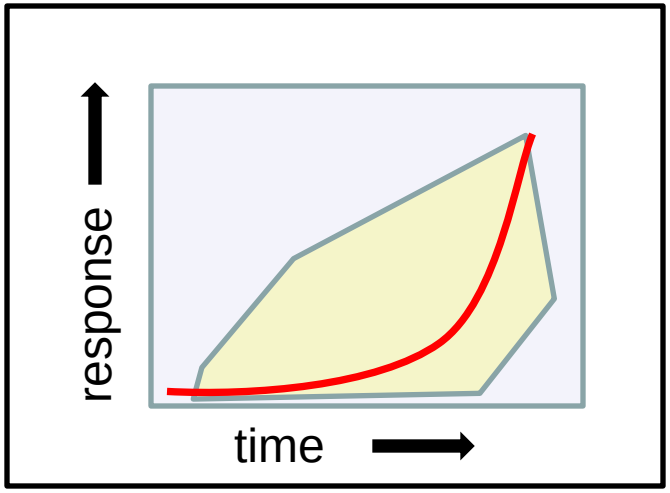


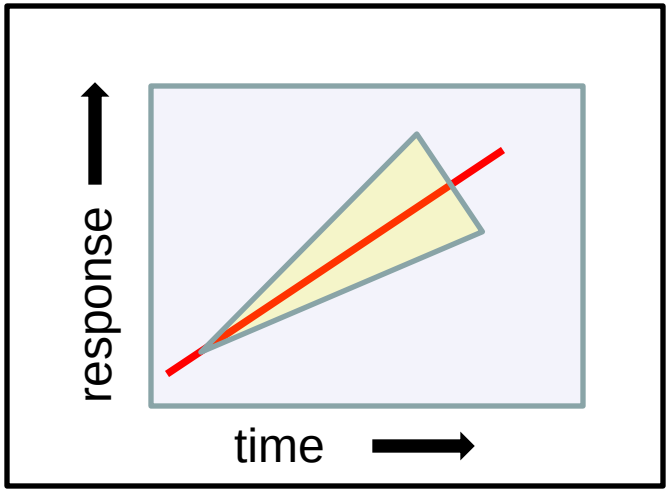


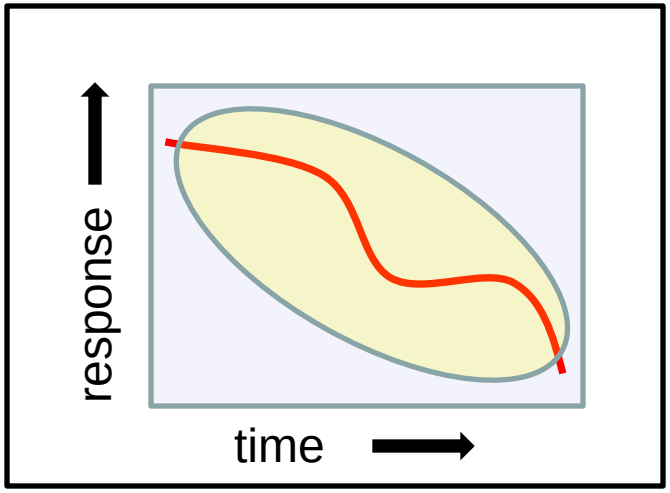


Establishing performance expectations

Identifying uncertainty







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program framework

1. articulate program goals
2. refine system level model for goal attainment
3. re-assess current management efforts – identify gaps
4. revise management strategy
5. adjust monitoring program
6. assess performance
7. manage adaptively