

Indicators for Climate Adaptation

Lessons from Ecological and Conservation Efforts

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What are Indicators Anyway?

- Monitoring

- Repeated measurement of an environmental variable, either at regular intervals, or before and after an intervention

- Evaluation

- A study designed to determine whether a particular management intervention achieved the desired effect

- Indicators

- Aspects of the environment that are measured as part of a monitoring or evaluation effort, providing managers with the information they need for decisions.
- Can be *leading* indicators (predictive), or *trailing* indicators

- Metrics

- the specific way by which an indicator is measured.

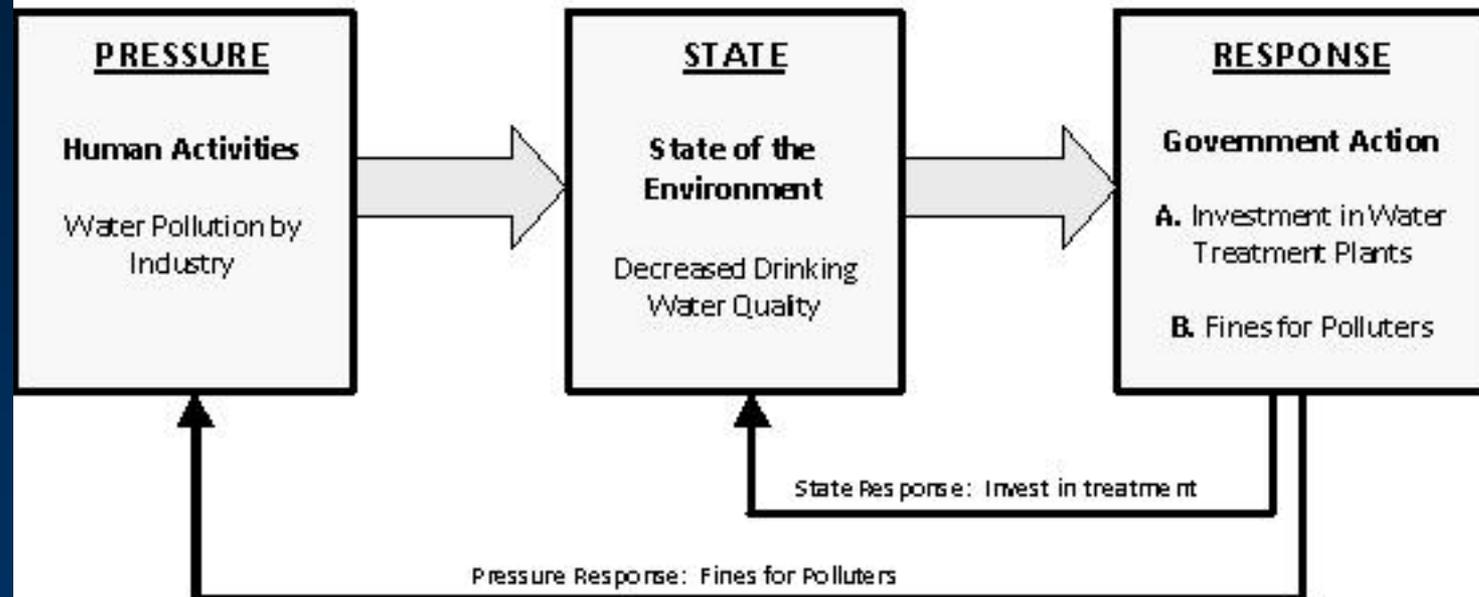
But in practice,
indicators and metrics often used interchangeably



Pressure-State-Response

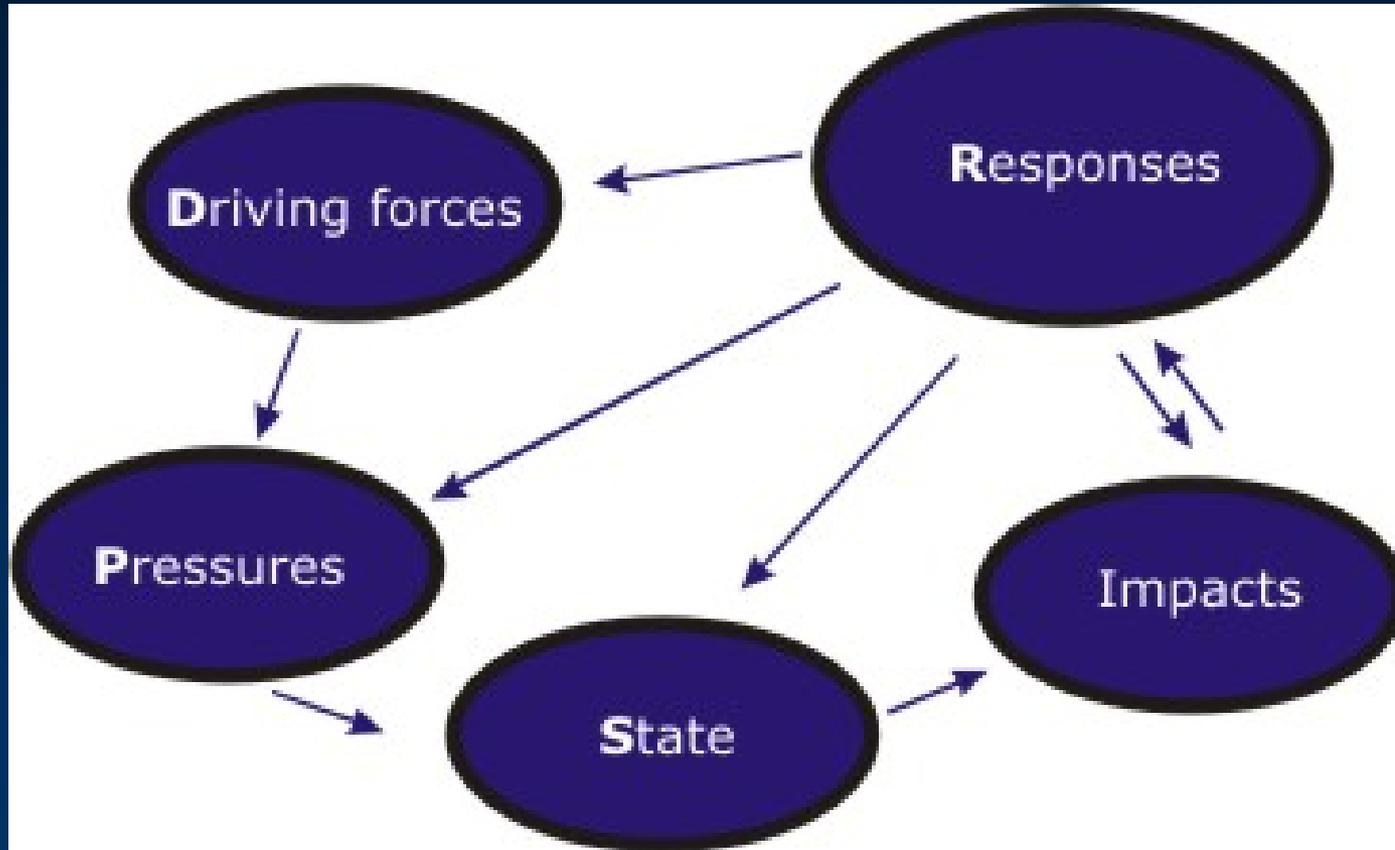
Most Widespread Indicator Framework

Figure 3: A Basic Example of a Pressure-State-Response Framework



Source: adapted from OECD Environment Monographs No. 83. Paris, 1993.

Extensions to Basic PSR Framework

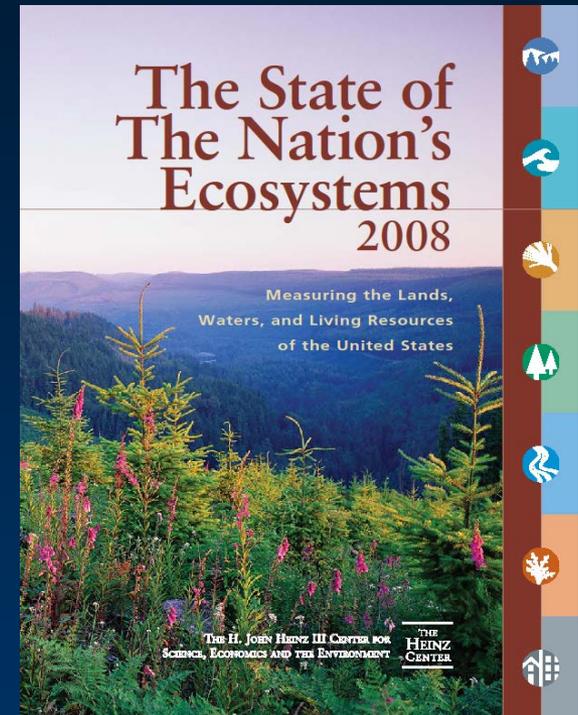


e.g., “DPSIR” Framework

Heinz Center

State of the Nation's Ecosystems Indicators

- Focused on “state” indicators (condition and trends)
- Small set of national indicators
- Six major “ecosystem” types
- Identified indicators whether they could be produced or not
- Reports in 2002 and 2008



Core National Indicators

- Ecosystem extent
- Pattern of natural landscape
- Movement of nitrogen
- Carbon storage
- Chemical contamination
- Change in stream flows
- At-risk native species
- Established non-native species
- Native species composition
- Plant growth index
- Production of food and fiber and water withdrawals
- Outdoor recreation
- Natural ecosystem services

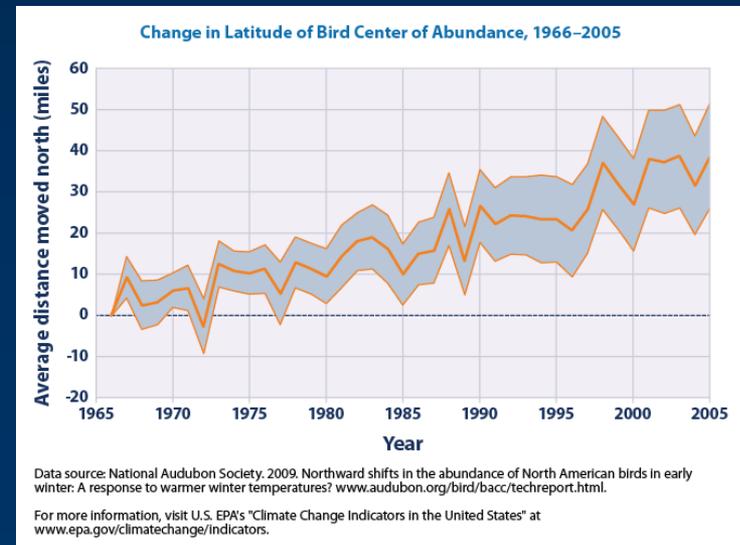
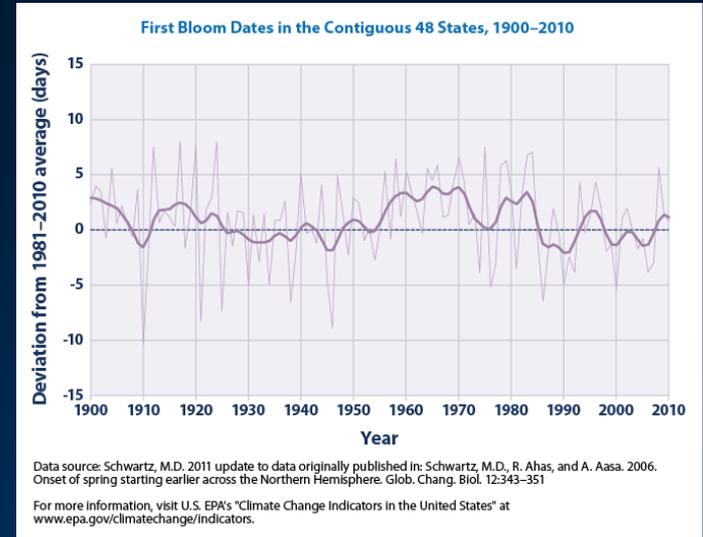
EPA 2012 Climate Indicators

Society & Ecosystems Indicators

- Streamflow
- Ragweed pollen season
- Length of growing season
- Leaf and bloom dates
- Bird winter ranges
- Heat-related deaths

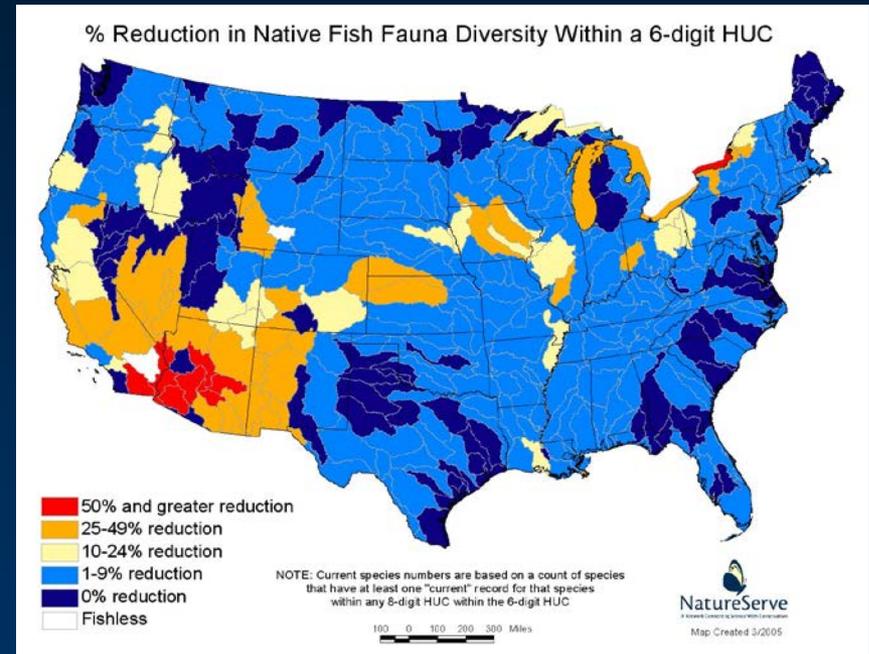
Mostly “state” indicators

No adaptation indicators



NRC Ecological Indicators Report (2000)

- One approach advocated for biodiversity was measuring observed/expected
- Example of this approach developed for EPA Report on the Environment (right)



Open Standards for Practice of Conservation

- Developed by Conservation Measures Partnership
- Focus on development of “results chain” with indicators at various points
- Indicators should be:
 - Measureable
 - Precise
 - Consistent
 - Sensitive



Application to Wildlife Action Plans

(From Heinz Wildlife Indicators report)

- Identify conservation targets
- Develop conceptual model that relates targets to stressors and conservation activities
- Select potential indicators of target status and conservation effectiveness based on model
- Develop monitoring program to measure and track indicators
- Implement conservation activities, measure indicators to track progress
- Use indicators to modify activities and adjust conceptual models



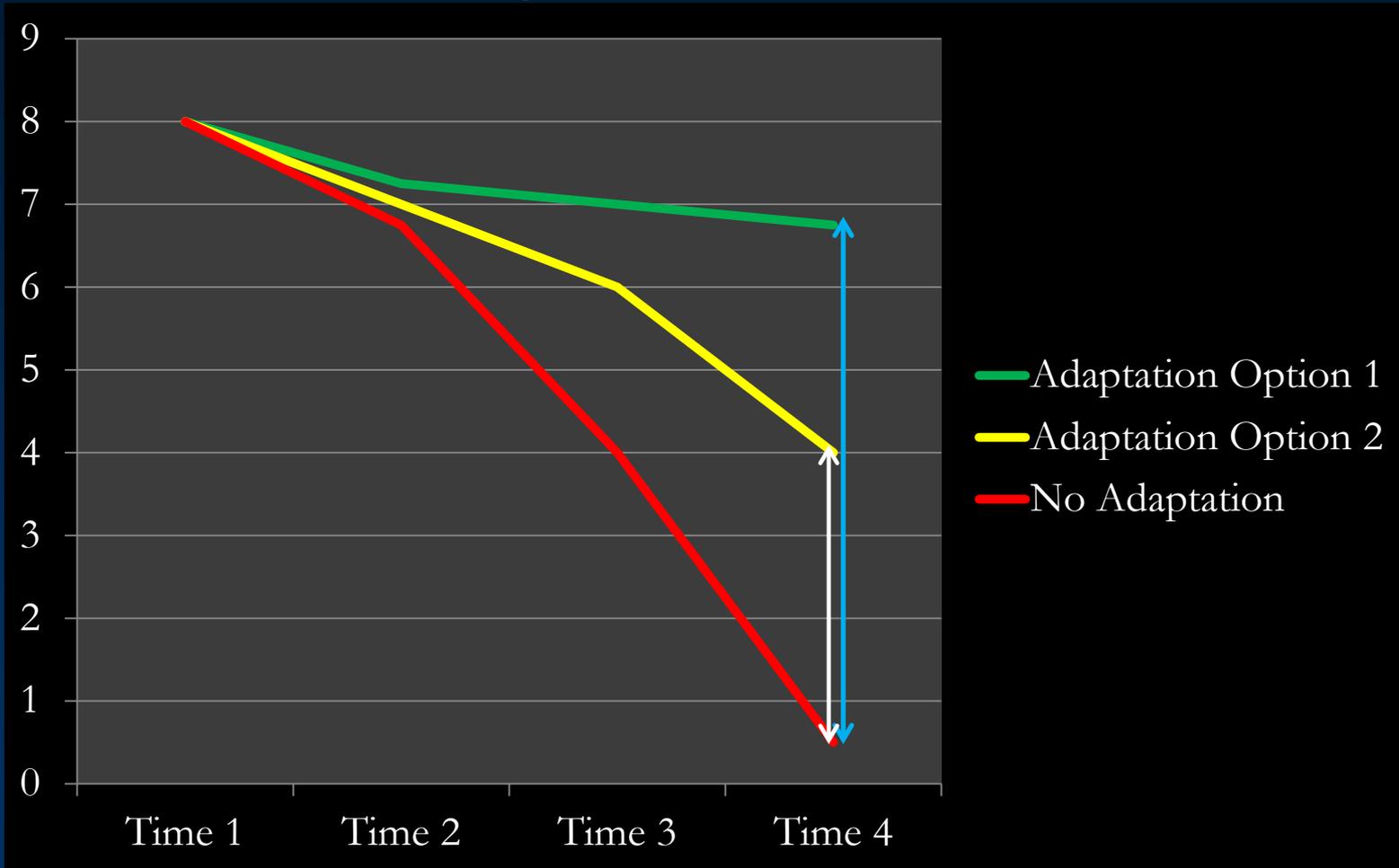
Types of Adaptation Metrics

- Determine the need for adaptation
 - Often with focus on vulnerability
- Measure and track implementation of adaptation
 - Often with focus on process or outputs
- Measure the effectiveness of adaptation
 - Ideally with focus on outcomes
 - Should relate to adaptation goals or intended results

Different Levels of Adaptation

- Macro Scale
 - National or state adaptation plans; landscape or regional-level initiatives
 - Often involves policy actions
- Project Scale
 - Often site level
 - Often involves specific management actions

Conceptual Model for Measuring Adaptation Effectiveness



Effectiveness = difference in indicator value between no adaptation and with adaptation option in place