

USGS Science and Decisions Center

Joint USGS – USACE Headquarters Meeting

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Outline of the Presentation

- Describe the USGS Science and Decisions Center
- Discuss the dominant themes in SDC
- Offer a few closing remarks on science integration



USGS Science and Decisions Center

- Announced by USGS Director in spring 2010
- Currently resides at the interface of two USGS mission areas
- Led by Co-directors in the two mission areas
- Co-championed by USGS senior executives in each mission area
- Open and interdisciplinary organizational architecture

SDC Mission

To advance the use of science in decision making in three fast-growing areas:

- decision science/analysis (e.g., AM, SDM)
- production and valuation of ecosystem services
- resilience/sustainability

These themes are interconnected in a framework for science-based decision making



SDC Roles in USGS

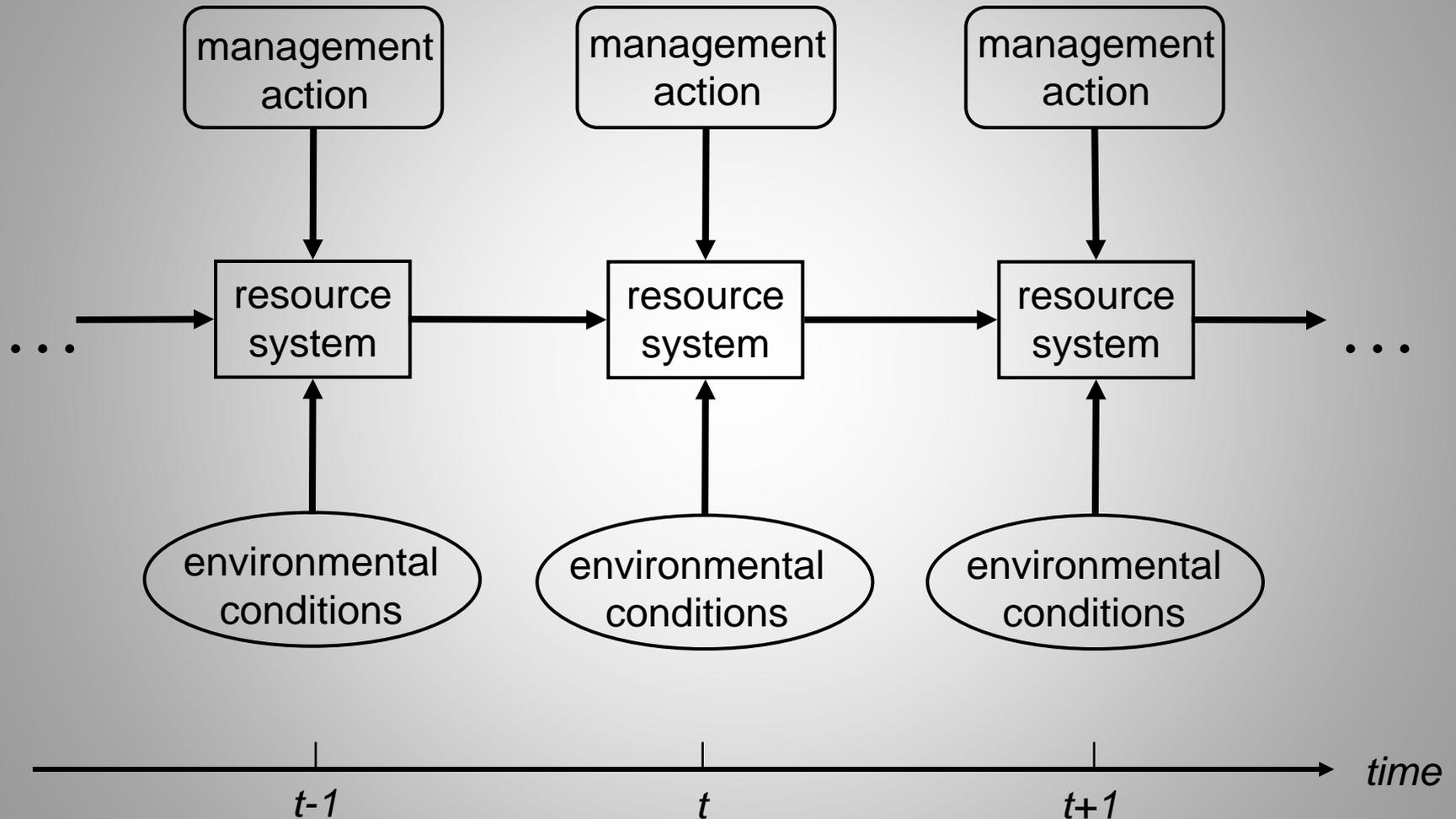
- Provide an institutional voice in USGS for thematic issues
- Represent USGS in forums about these issues
- Coordinate with internal and external communities of interest and practice in the thematic areas
- Support and conduct research on decision science and its application to natural resources
- Help build capacity for decision science/support in the field

SDC Theme: Adaptive Management

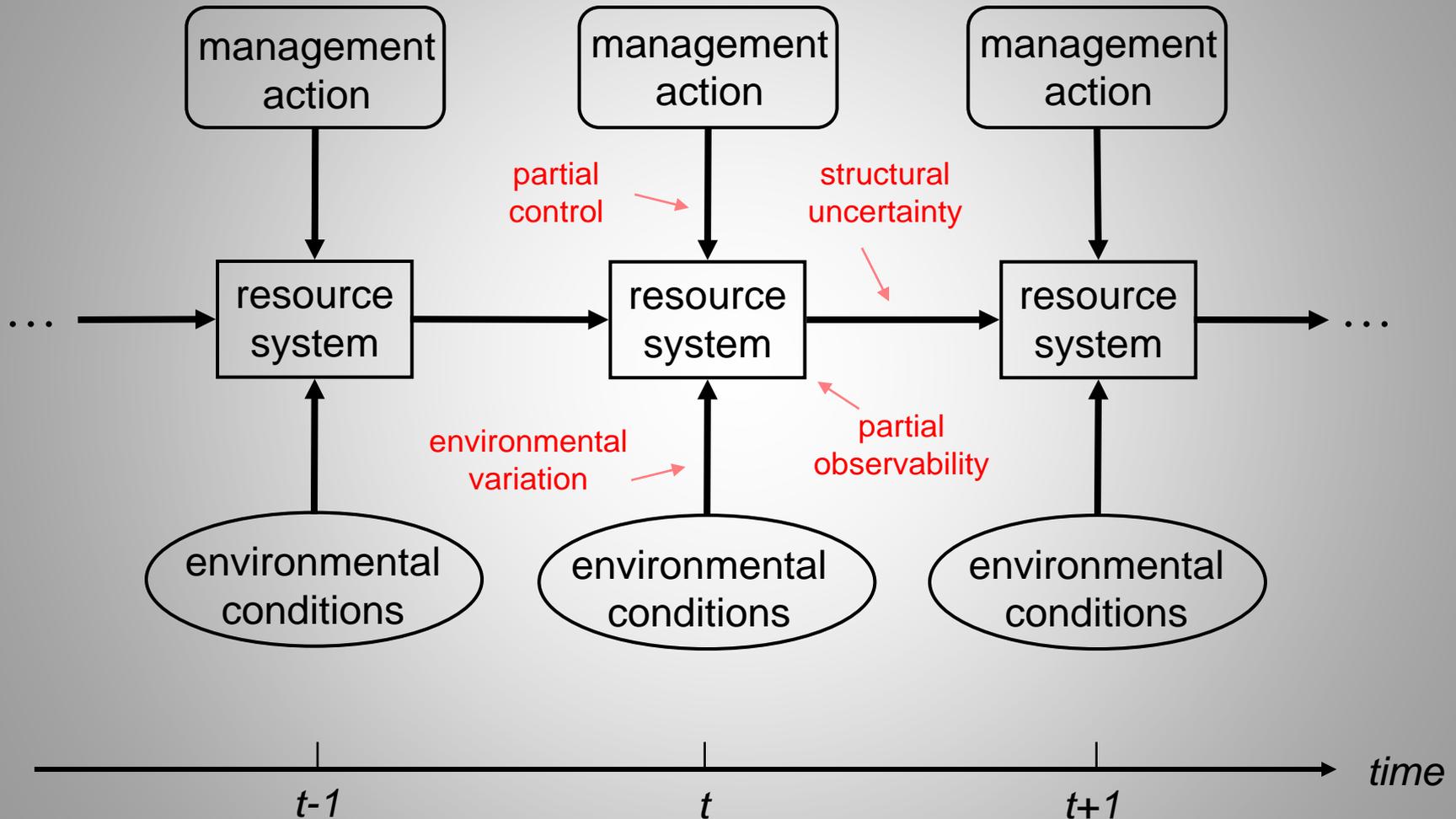
Learning by doing, and adapting based on what is learned

- Accounts for future consequences of present actions
- General approach: structured decision making through time
- General goal: to reduce uncertainty and thereby improve management

Framework for Adaptive Management



Framework for Adaptive Management



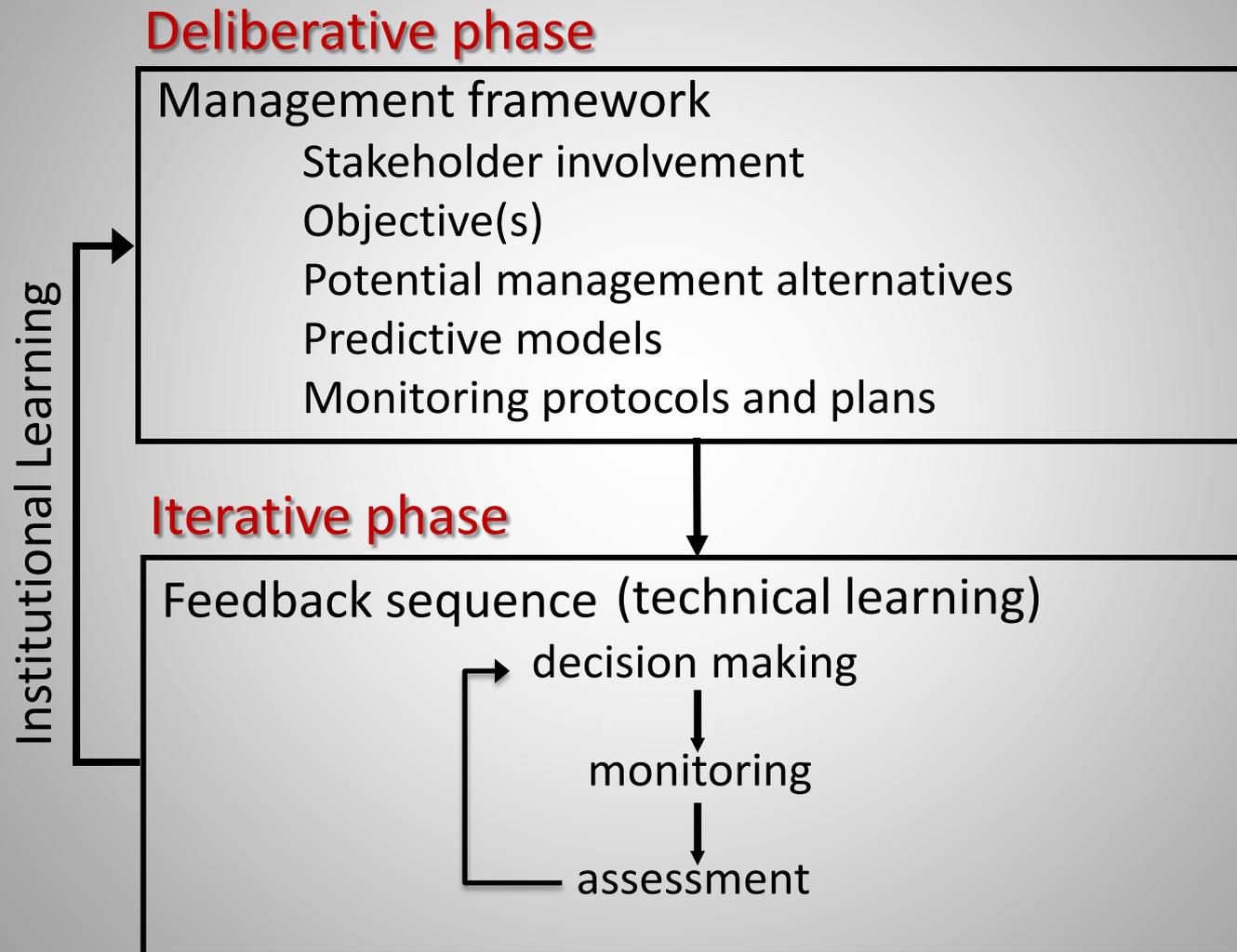
Adaptive Decision Making Process



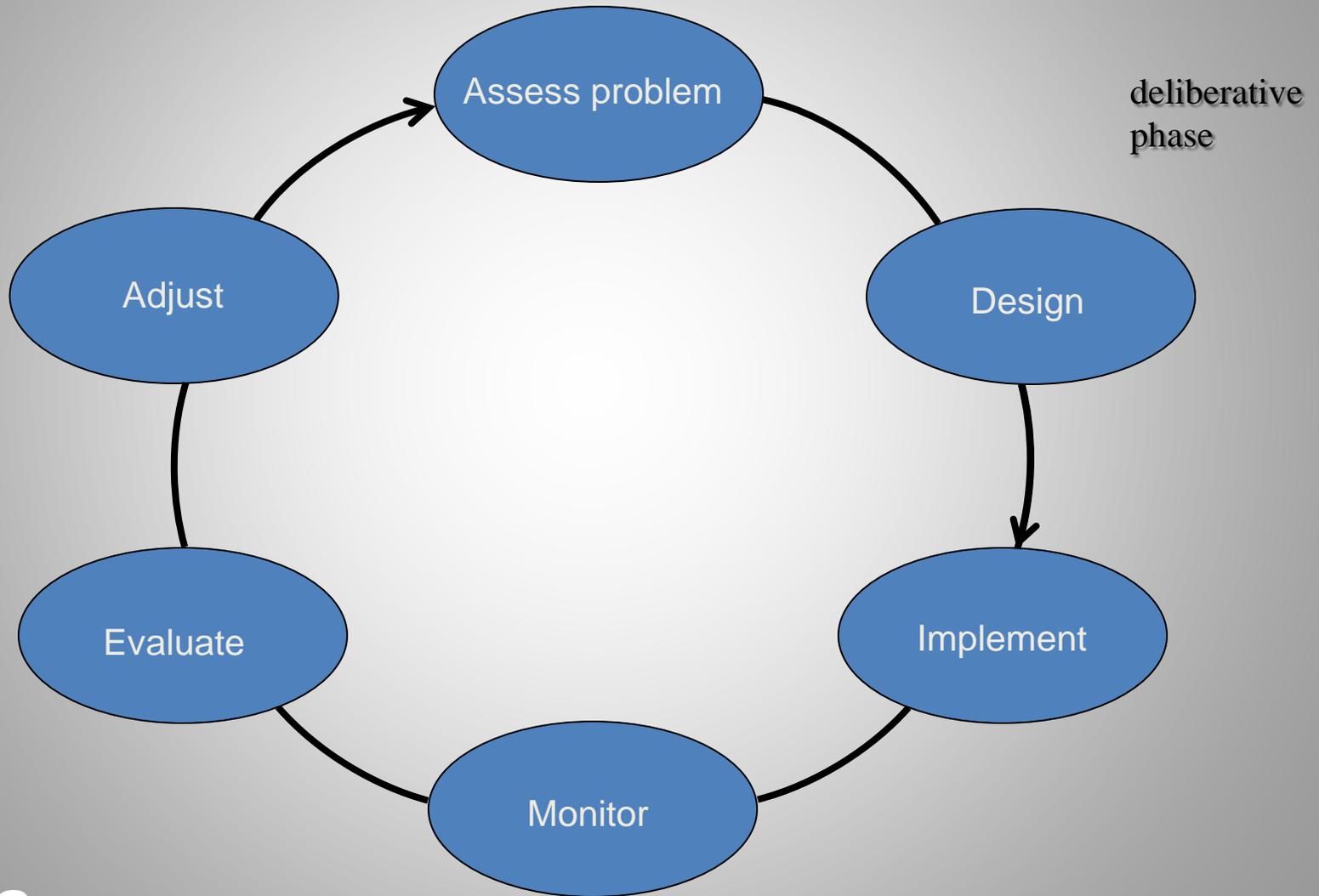
- Decisions are guided by management objectives at each time
- Monitoring is used to track system responses to management
- New information from monitoring is combined with previously collected information to produce improved understanding
- Decisions are adjusted in the next time period based on that improved understanding

Two key outcomes: improved understanding, and improved management based on that understanding

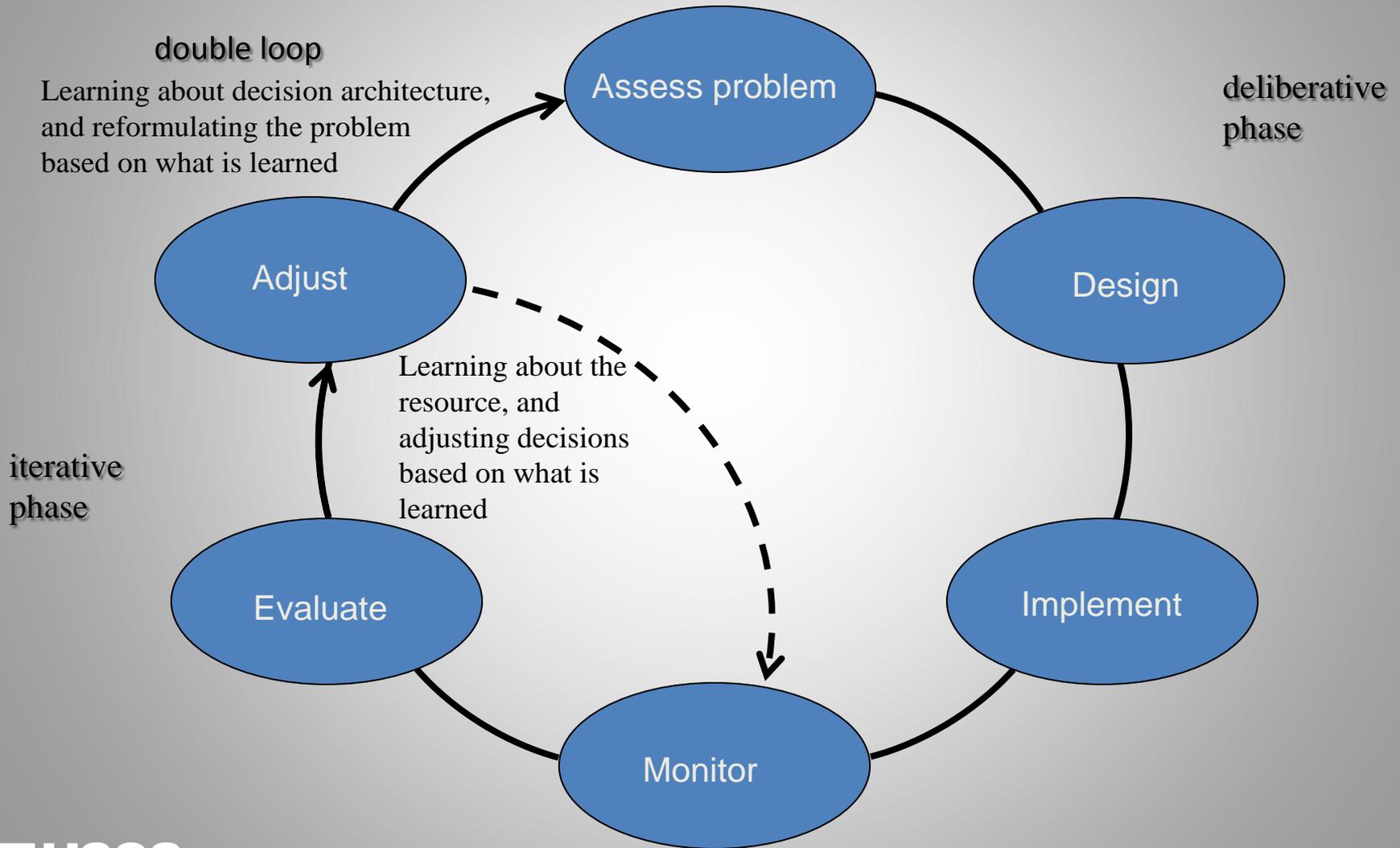
AM Process in Two Phases



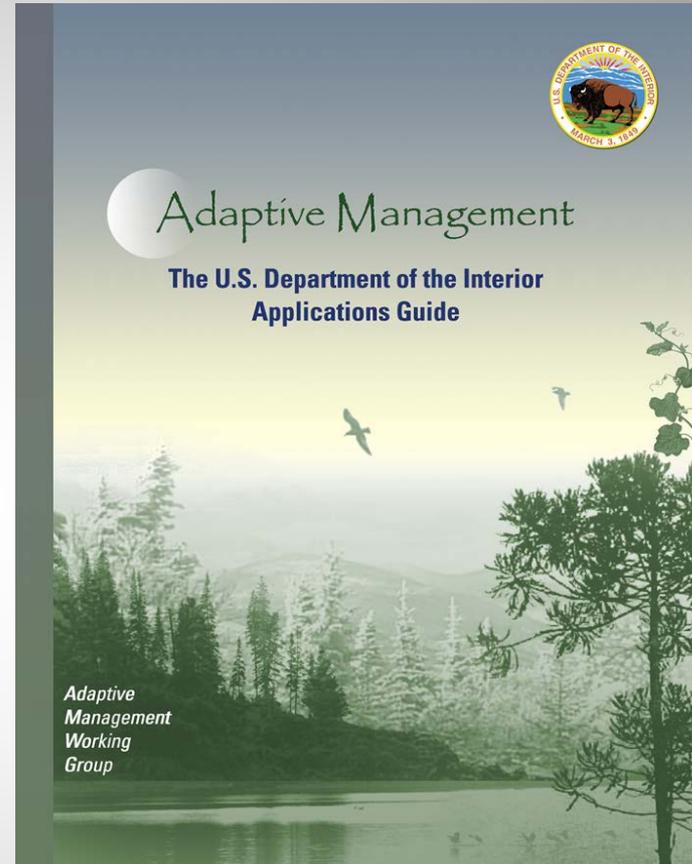
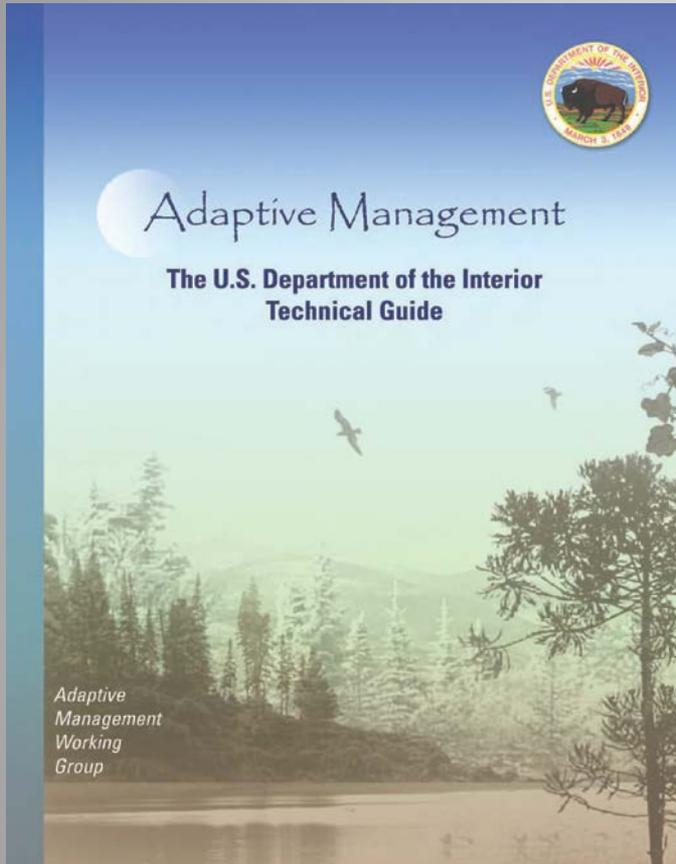
Adaptive Management Cycle



Adaptive Management Cycle



SDC Contribution: DOI AM Guides



Both guides are available on the web at www.doi.gov/ppa
Hard copies can be obtained from byron_ken_williams@usgs.gov

SDC Theme: Ecosystem Services

- Goods and services generated by ecosystems and valued by people
- Ecosystem services are produced by ecosystem functions and processes
- Values of ecosystem services inform objectives used for decision making
- Examples
 - pollination
 - carbon sequestration
 - flood mitigation
 - water purification
 - food provision



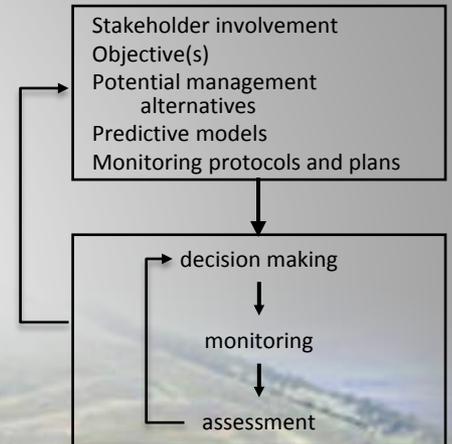
General Approach to Ecosystem Services

- Identify the key ecosystem attributes of a resource management problem
- Assign value metrics to those attributes
- Use the attributes and metrics in developing the elements of structured decision making
 - objectives, alternatives, resource models, etc
- Use those elements in resource management

Ecosystem Services and AM

Ecosystem Services fold naturally into the AM framework

- What resource attributes to recognize
- How to identify management objectives
- What resources to monitor for evaluation
- How to focus stakeholder involvement



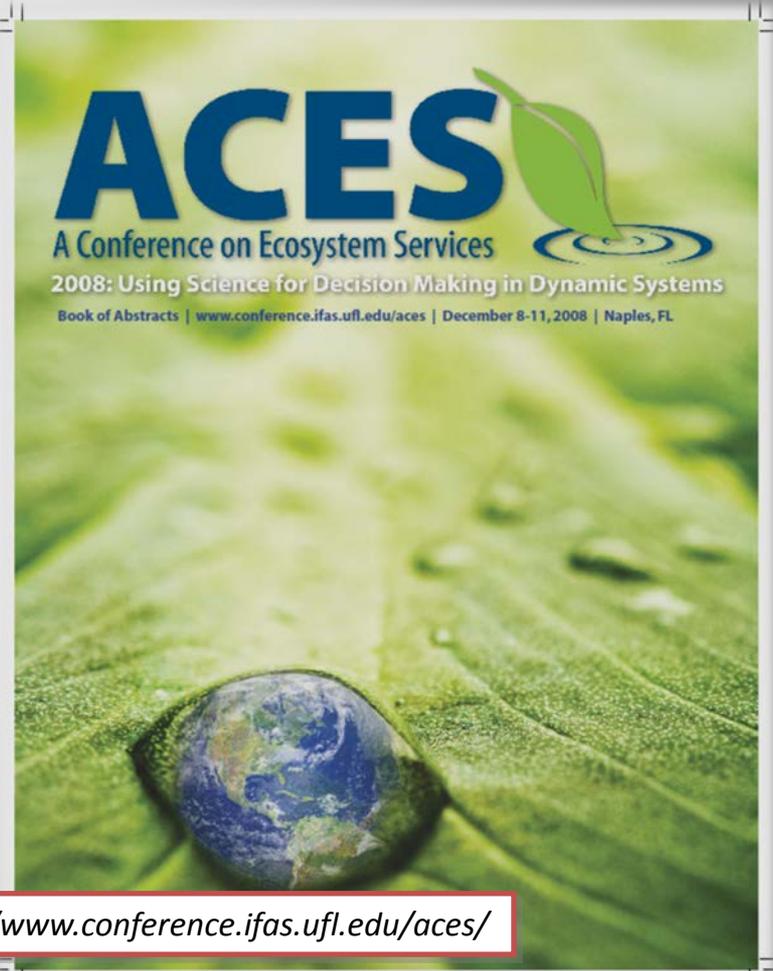
SDC Contribution: A Community on Ecosystem Services

ACES – A Community on Ecosystem Services

2008 ACES Conference – “Using Science for Decision Making in Dynamic Systems” Coral Gables, FL

2010 ACES Conference – “Incorporating Ecosystem Services into Resource Management Decisions” Phoenix, AZ

2012 Joint Conference of ACES, the Ecosystem Markets Community and the Ecosystem Services Partnership – “Ecosystems Markets: Making them work”



<http://www.conference.ifas.ufl.edu/aces/>

Resilience/Sustainability Theme

- Key element in defining and describing sustainable natural and social systems
- Important in forecasting and evaluating the consequences of management
- Contributes to long-term resource decision making



Resilience

The capacity of a resource system to withstand perturbation and retain its structure and function

Closely tied to the concept of sustainability

- Sustaining ecological patterns and processes in the future
- Sustaining management capacity and flexibility that is necessary for ecological sustainability
- Sustaining the associated social and institutional structures

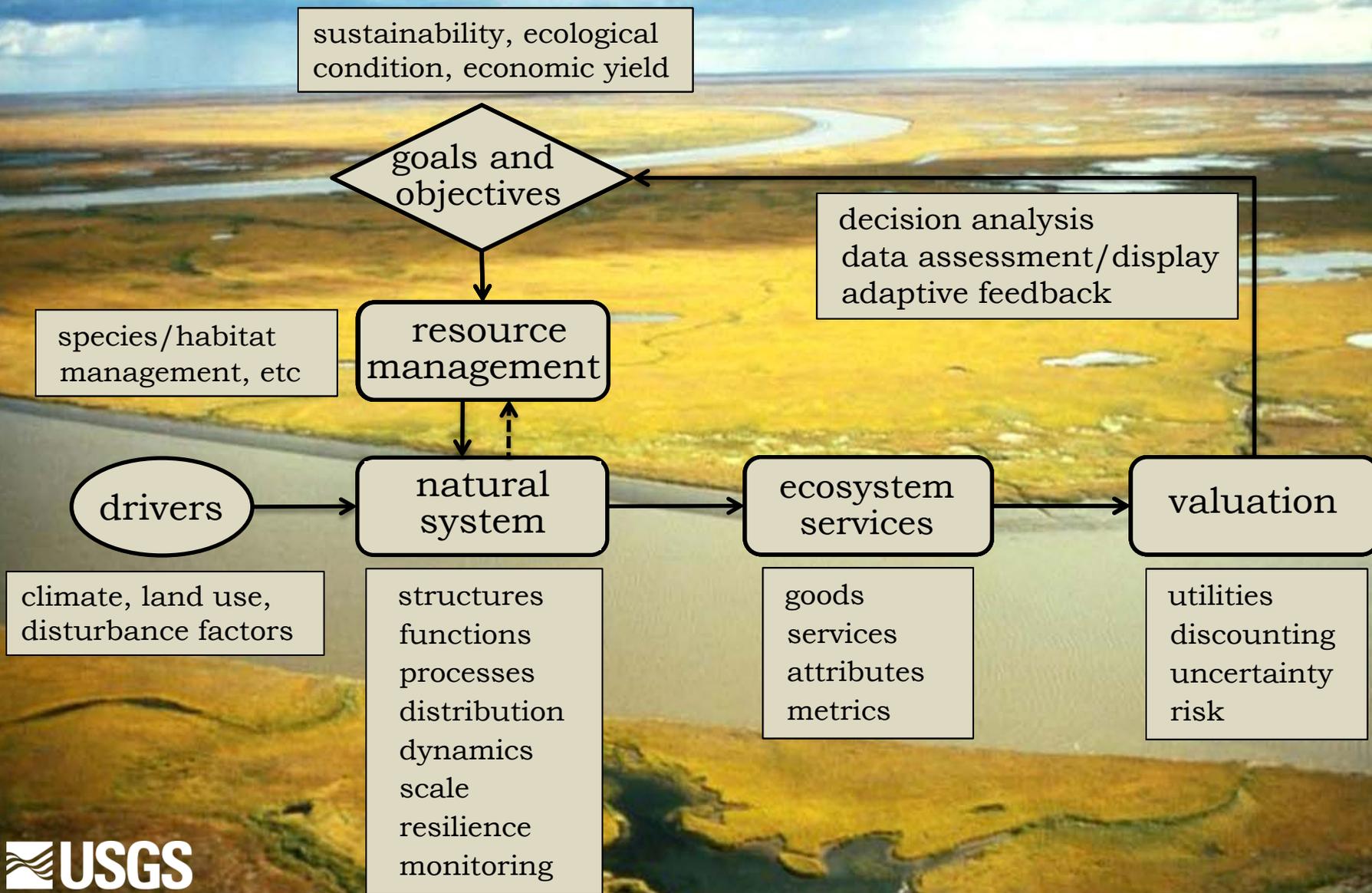
Resilience

Folds naturally into decision making

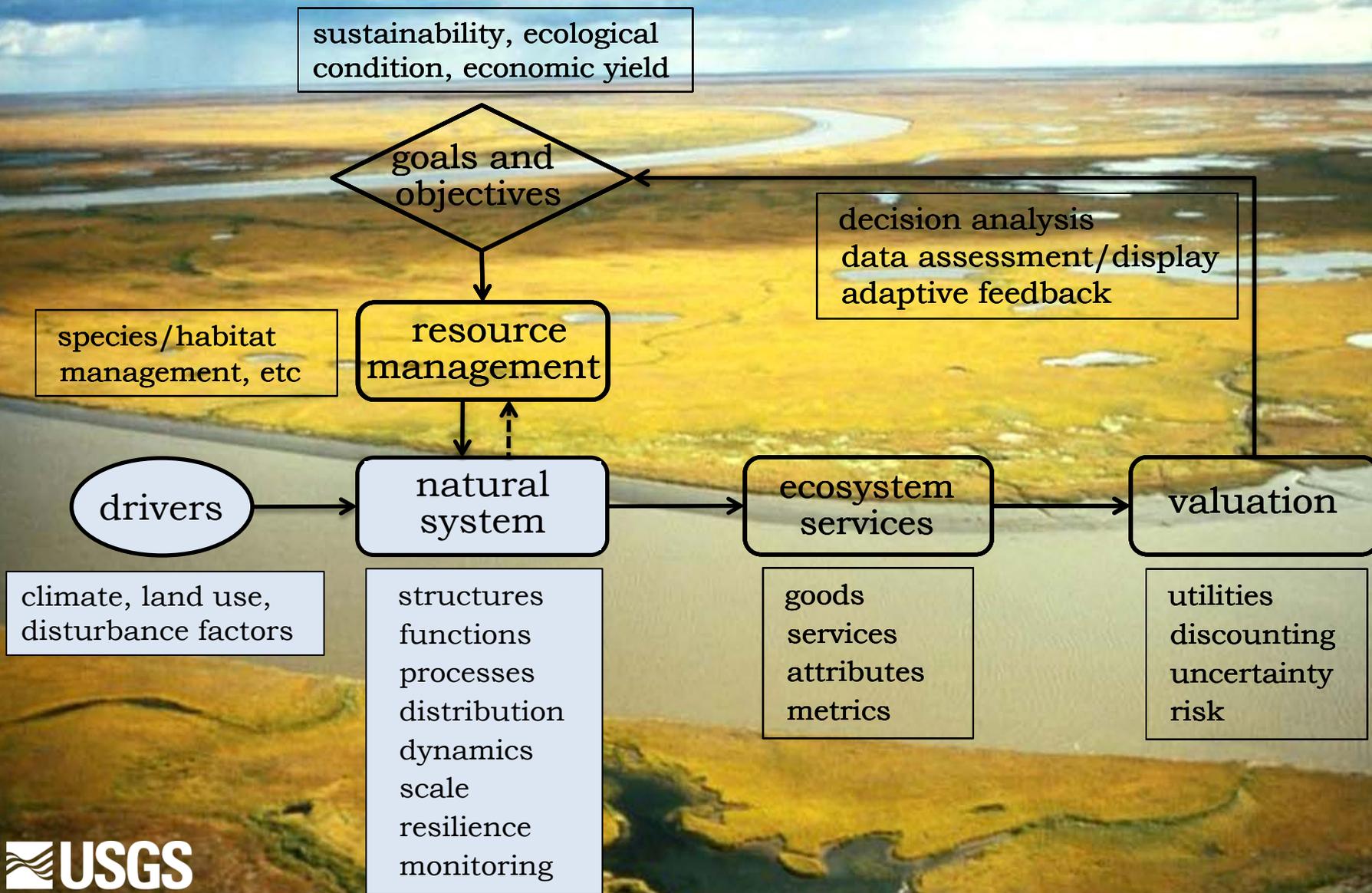
- Ties future resource conditions to near-term actions
- Can be incorporated into the key elements of decision making (especially resource objectives and management alternatives)
- Connects long-term social and institutional concerns to natural resource conservation and management



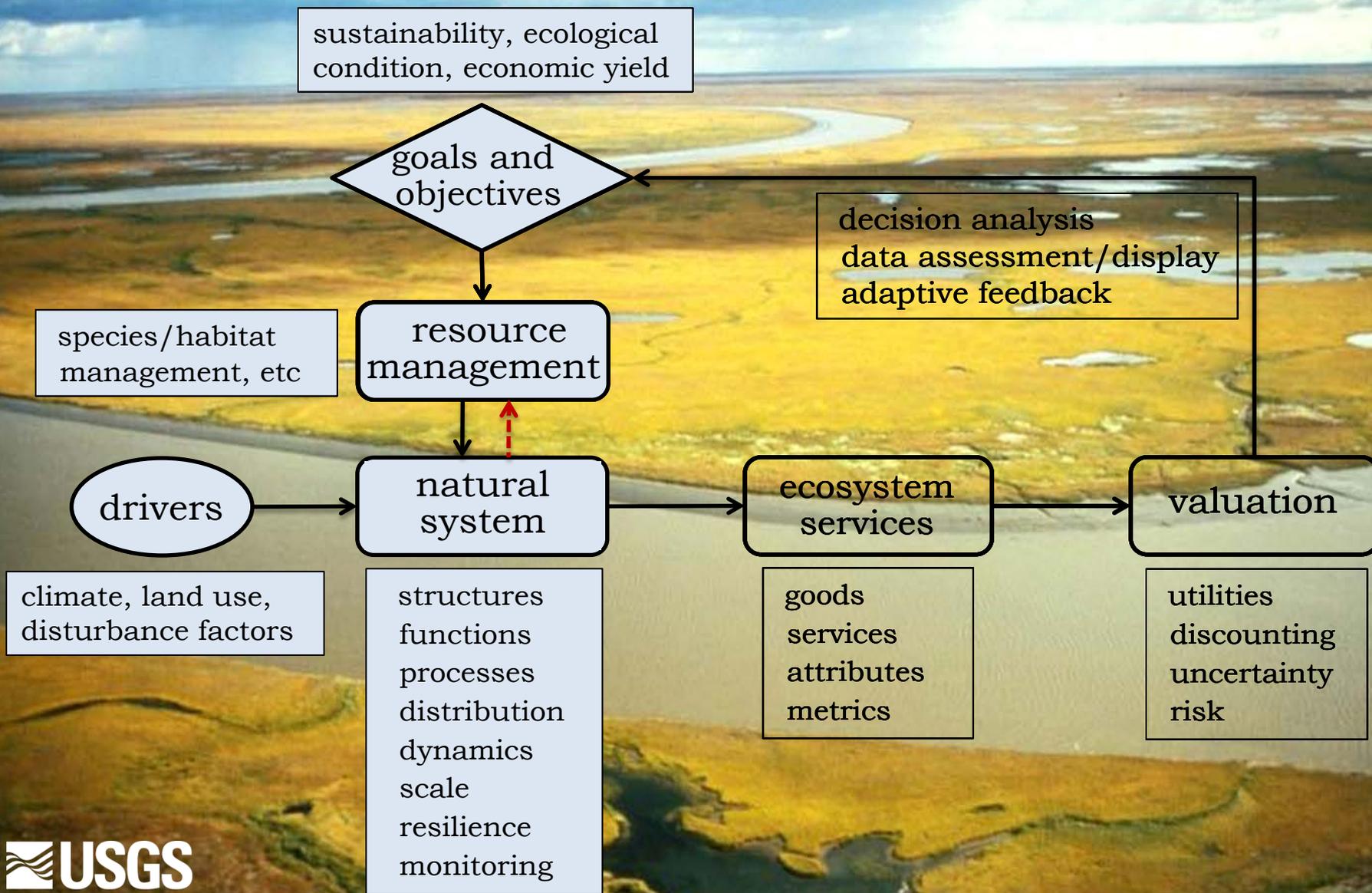
SDC Framework for Science-based Decision Making



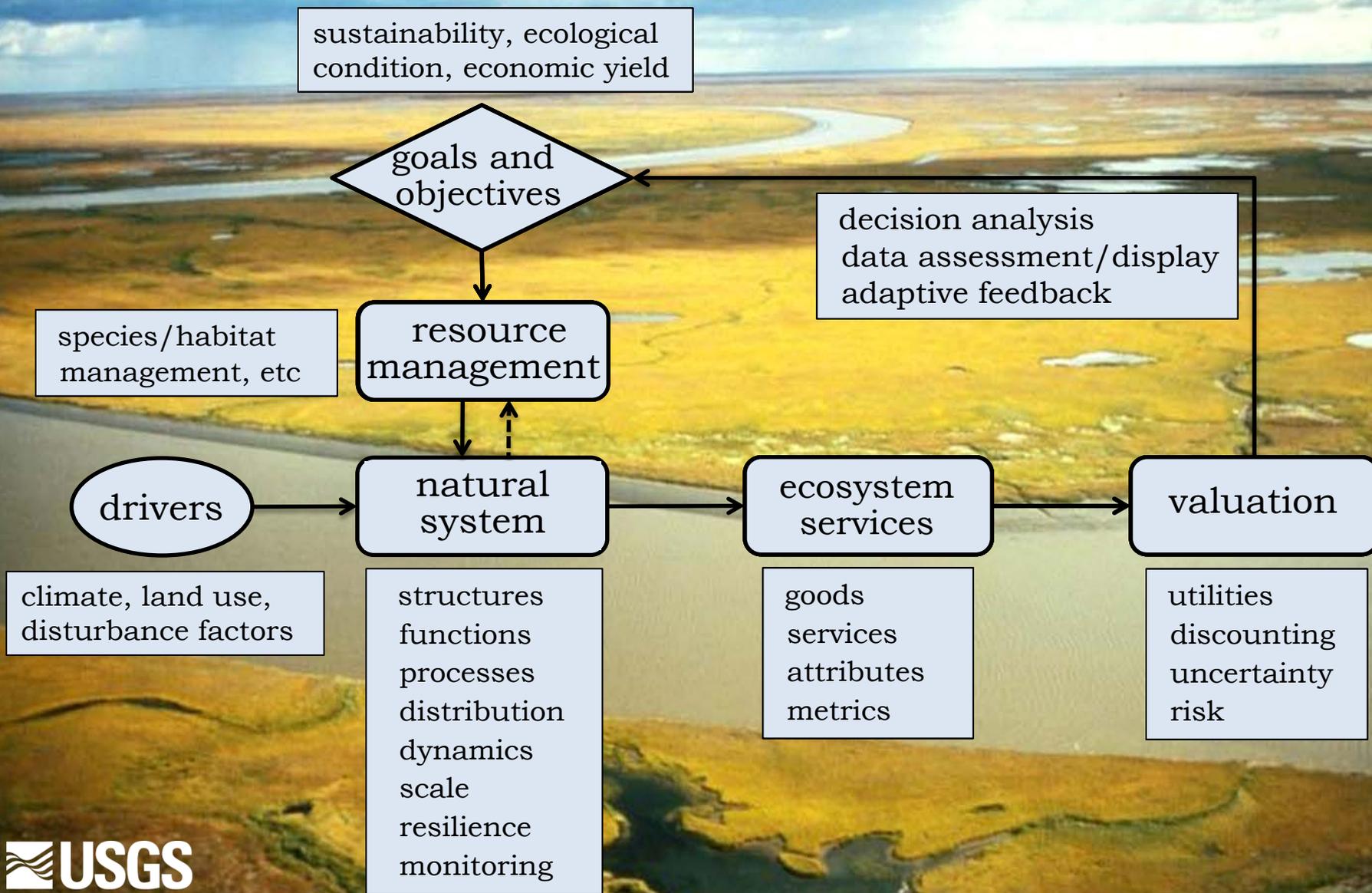
SDC Framework for Science-based Decision Making



SDC Framework for Science-based Decision Making



SDC Framework for Science-based Decision Making



Key System Attributes in the Framework

- The system changes through time
- The system is subject to environmental fluctuations
- The system is subject to management through time
- There is limited understanding about how the system works



Integration of Hydrology and Ecology

- Hydrological systems have all these attributes
- Ecological systems have all these attributes
- There is bi-directional influence between hydrology and ecology
- This science and decision making framework can serve as a platform for integrated investigation and management of these systems

USGS Science and Decisions Center

Pursuing a vision of

- Science informing resource management
- Resource management facilitating science

<http://www.usgs.gov/sdc>



