Ecological Site Inventory

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Soil Ecology

Ecological Sites-Inventory

- Brief History
- Key Concepts
- Applications

SOME ECOLOGICAL SITE BACKGROUND

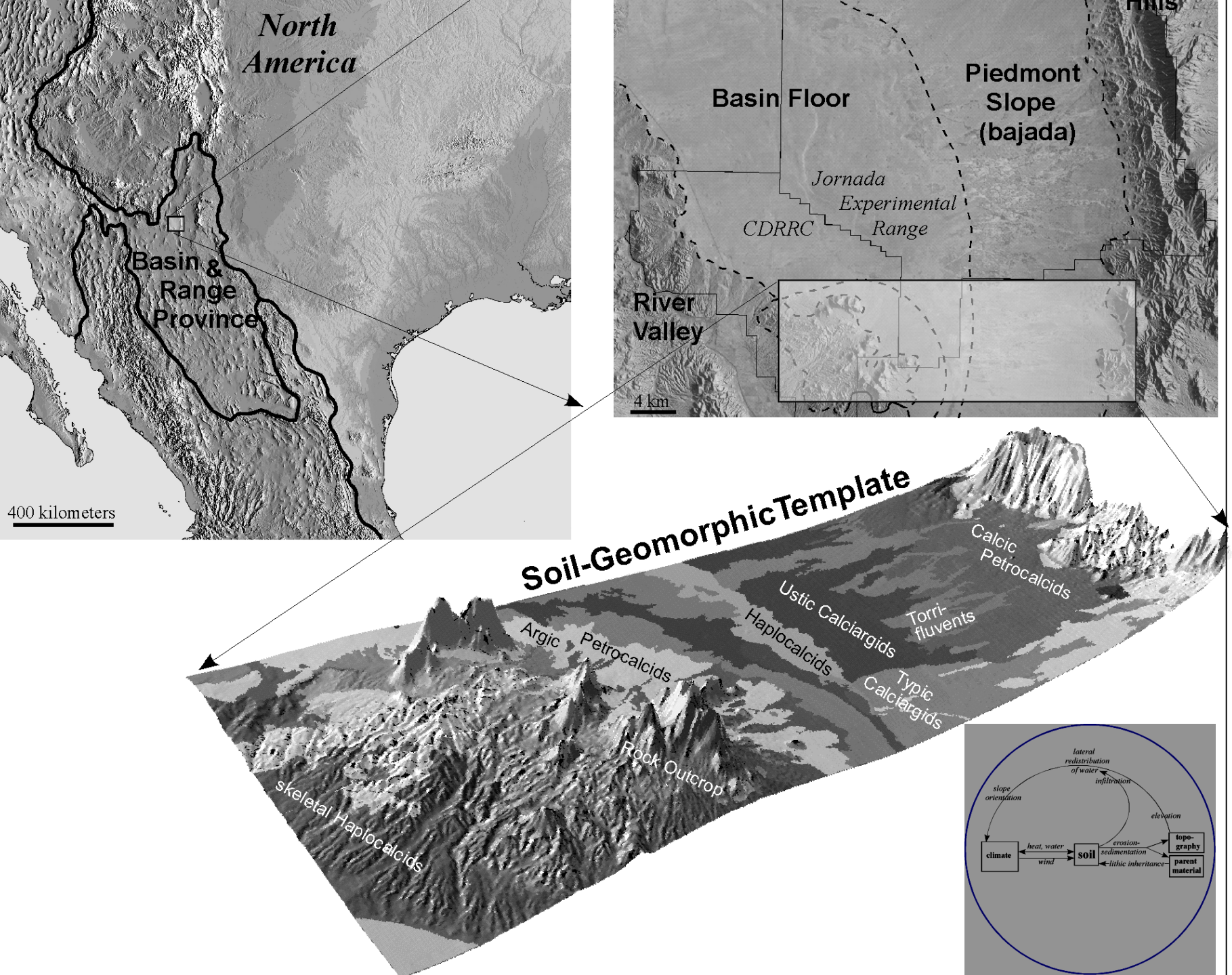
- FOREST SITES (Korstian 1919)
- RANGE SITES (Dykesterhuis 1948)
  - “edaphic functional units”
- CRITERIA FOR GROUPING SOIL PROPERTIES AND DESCRIBING VEGETATION DYNAMICS

Ecological Site Inventory

- Conceptual groupings
  - Defined by Us
  - Ability to produce vegetation/respond to management
  - Communication Challenges
- Drivers include climate, landscape position, soil properties
- Responses include dynamics of soils and vegetation-can be reduced to a set of ‘behavior syndromes’
- A way to organize information spatially

Ecological Site Description Components

- SITE CHARACTERISTICS-ABIOTIC (climate, landscape position, soil properties)
- STATE AND TRANSITION MODELS-BIOTIC (soil/vegetation interactions, drivers of change-wildlife, climate, management)
- INTERPRETATIONS-VARIETY OF USES
- REFERENCES


North America
Basin & Range Province
400 kilometers
Hills
Piedmont Slope (bajada)
Basin Floor
Jornada Experimental Range
CDRRC
River Valley
4 km
Soil-Geomorphic Template
Calcic Petrocalcids
Ustic Calciargids
Torri-fluvents
Haplocalcids
Argic Petrocalcids
Typic Calciargids
Rock Outcrop
Skeletal Haplocalcids
lateral redistribution of water
infiltration
slope orientation
elevation
climate
heat, water
wind
soil
erosion-sedimentation
lithic inheritance
topo-graphy
parent material

Key Concepts for ES biotic component

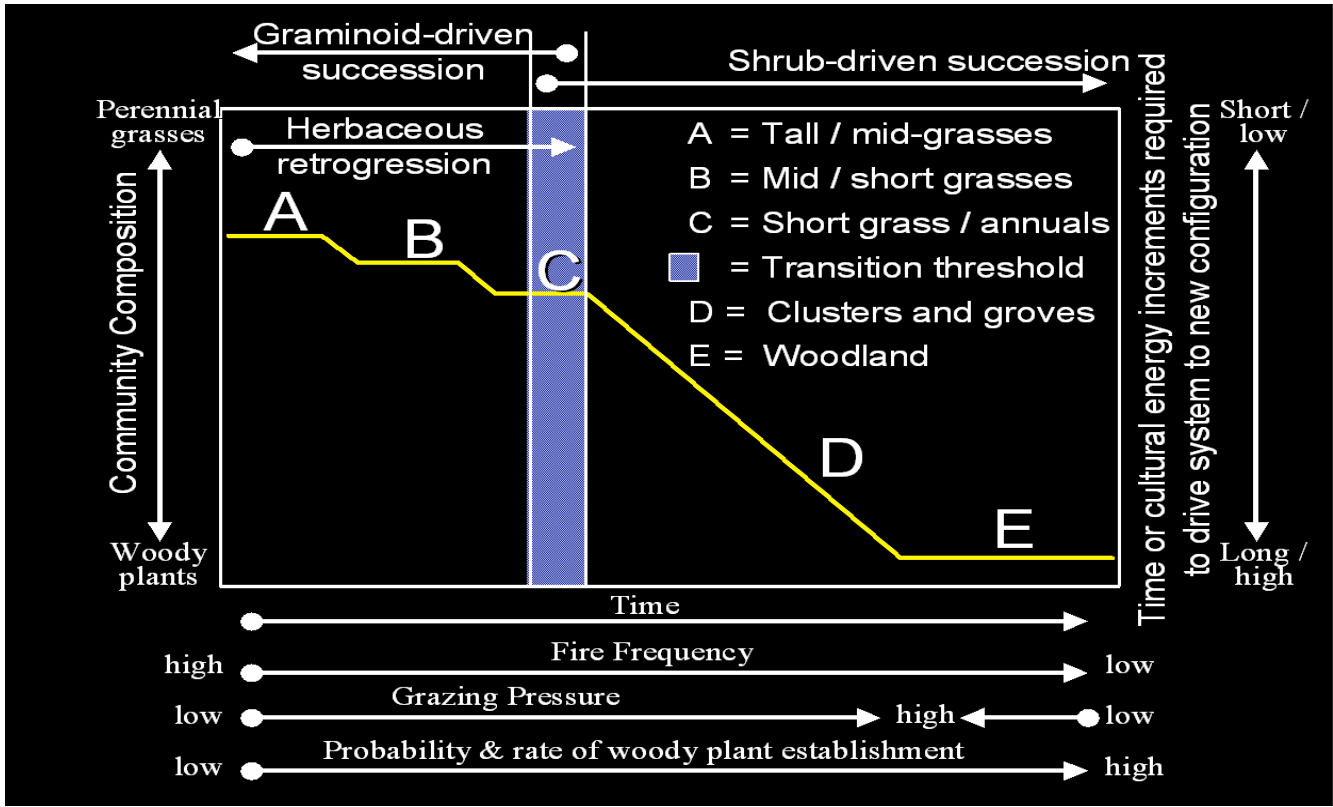
- Disturbance ecology
  - Resistance and resilience (thresholds)
  - Soil plant systems (positive and negative feedbacks)
  - Existence of multiple stable states

RESISTANCE AND RESILIENCE

•RESISTANCE-how much disturbance or stress can a soil/plant system tolerate before it changes ?

•RESILIENCE – what is the probability that the system will return to the original state when the stress or disturbance is removed?

•THRESHOLDS-point in time or space that change occurs

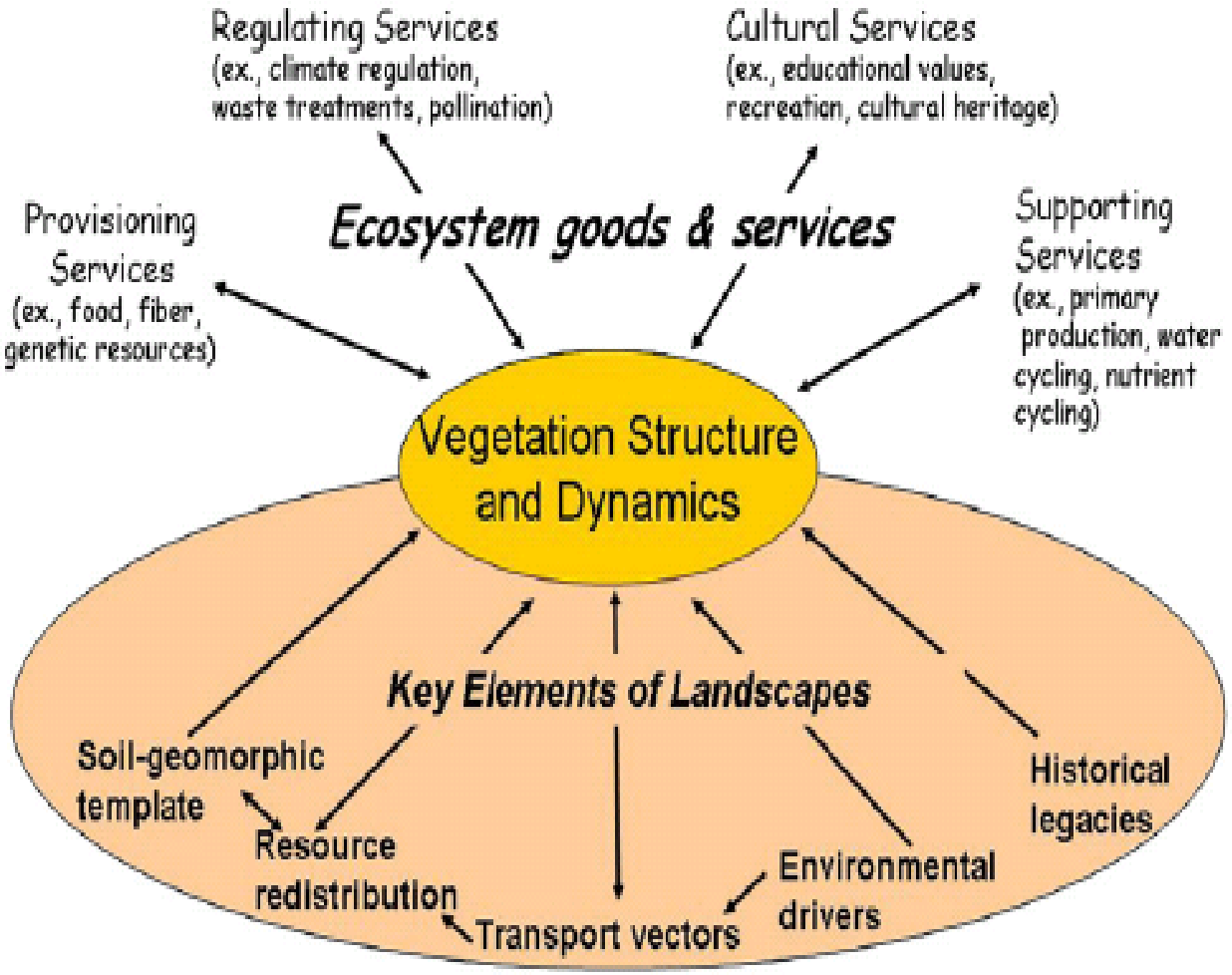


Ecological Site Descriptions and Ecosystem Services

- The interactions between soils and vegetation determine the provision of ecosystem services
- Interpretations that are meaningful and useful to people require an understanding of those interactions

Why is an understanding of the interactions of soil and vegetation important?

- Soils information alone is a poor predictor of ecosystem services essential to life (Necessary, but not sufficient)
- Vegetation information alone is a poor predictor of ecosystem services essential to life (Necessary, but not sufficient)
- ESDs bring soils and vegetation dynamics information together


Regulating Services
(ex., climate regulation, waste treatments, pollination)
Cultural Services
(ex., educational values, recreation, cultural heritage)
Provisioning Services
(ex., food, fiber, genetic resources)
Ecosystem goods & services
Supporting Services
(ex., primary production, water cycling, nutrient cycling)
Vegetation Structure and Dynamics
Key Elements of Landscapes
Soil-geomorphic template
Resource redistribution
Transport vectors
Environmental drivers
Historical legacies

ESDs for Conservation Planning

Identifying objectives using a ‘multiple potential’ approach

Each state has a unique set of ecosystem services

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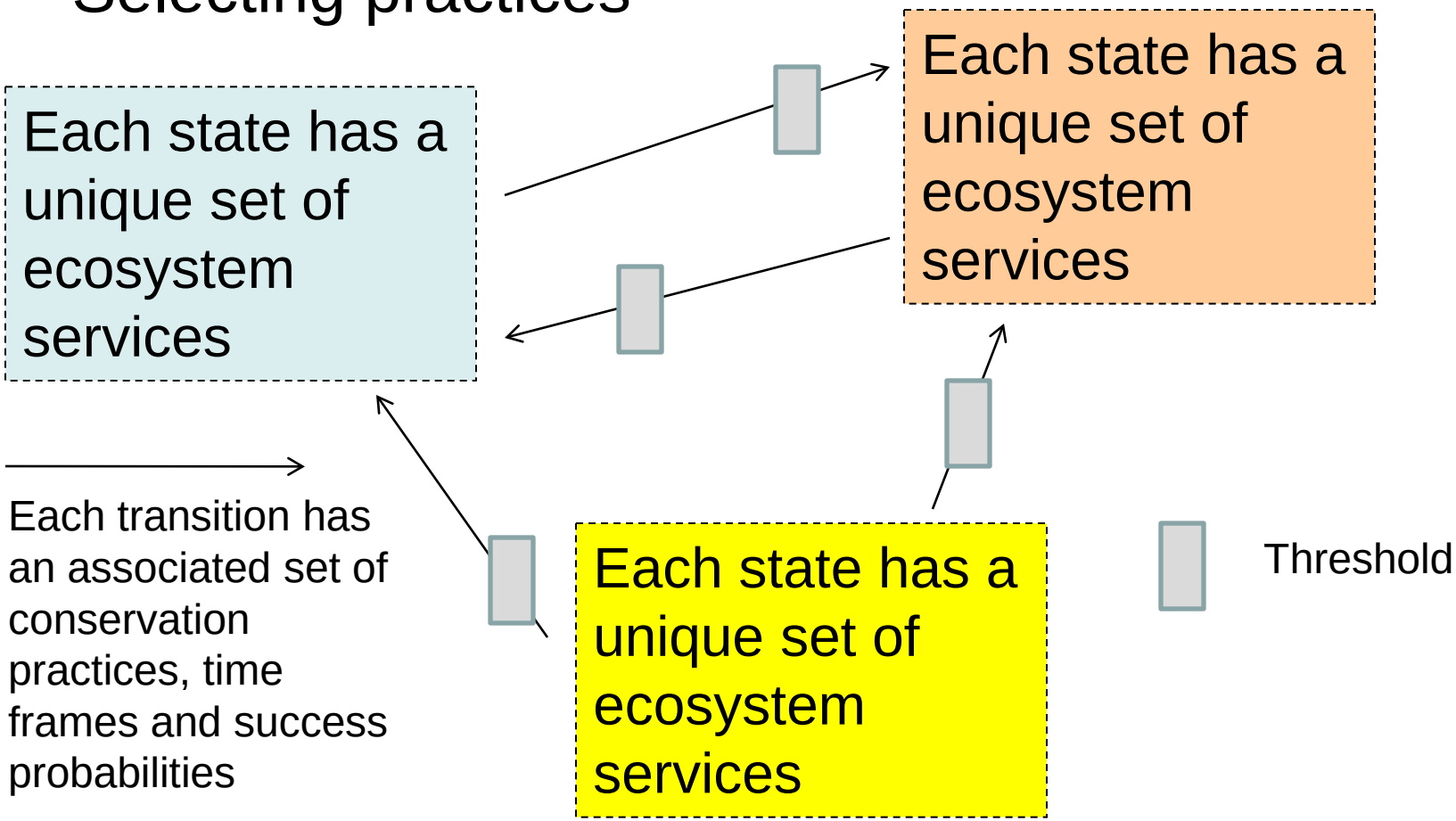
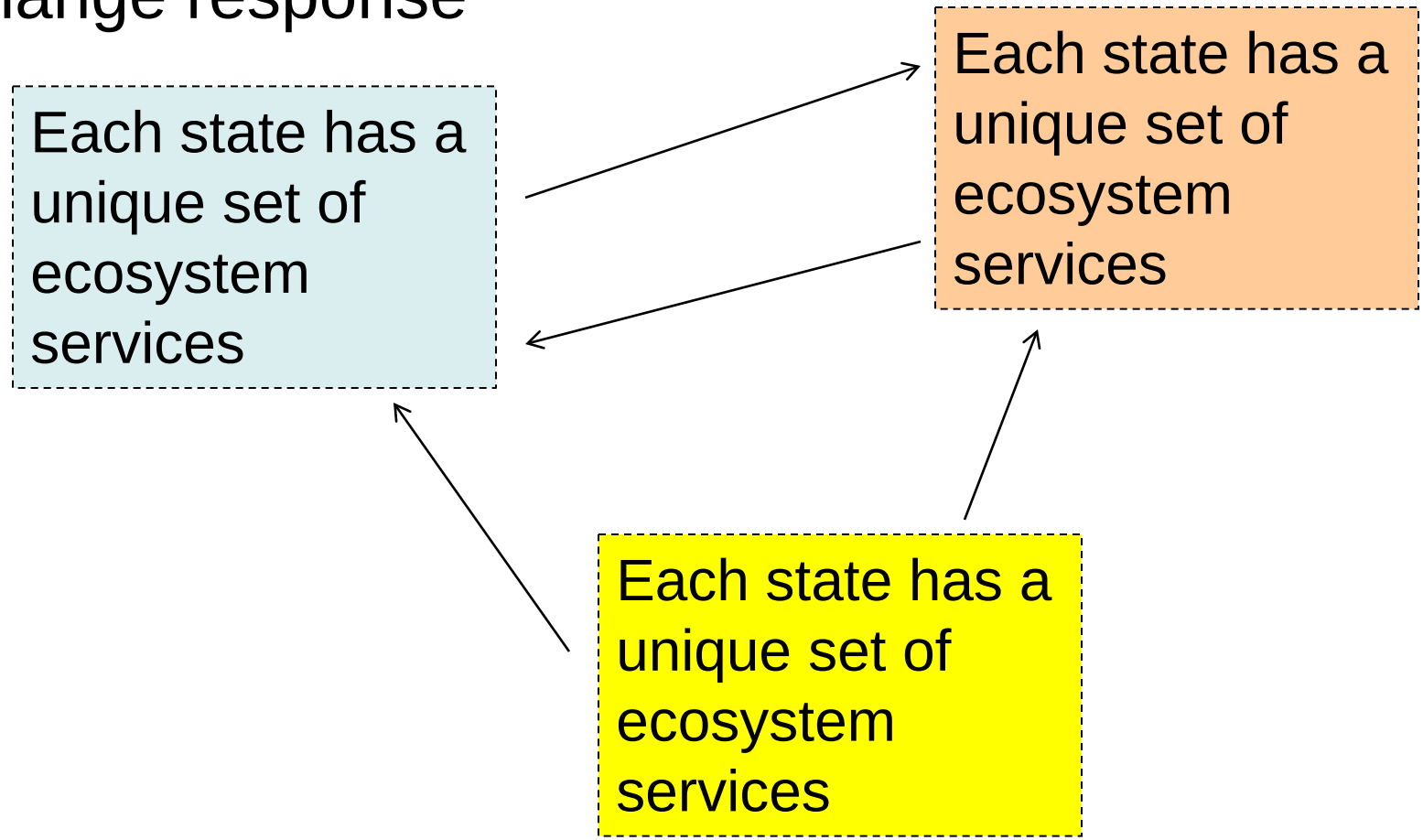
ESDs for Conservation Planning

Identifying objectives
Selecting practices



ESDs for Policy Development

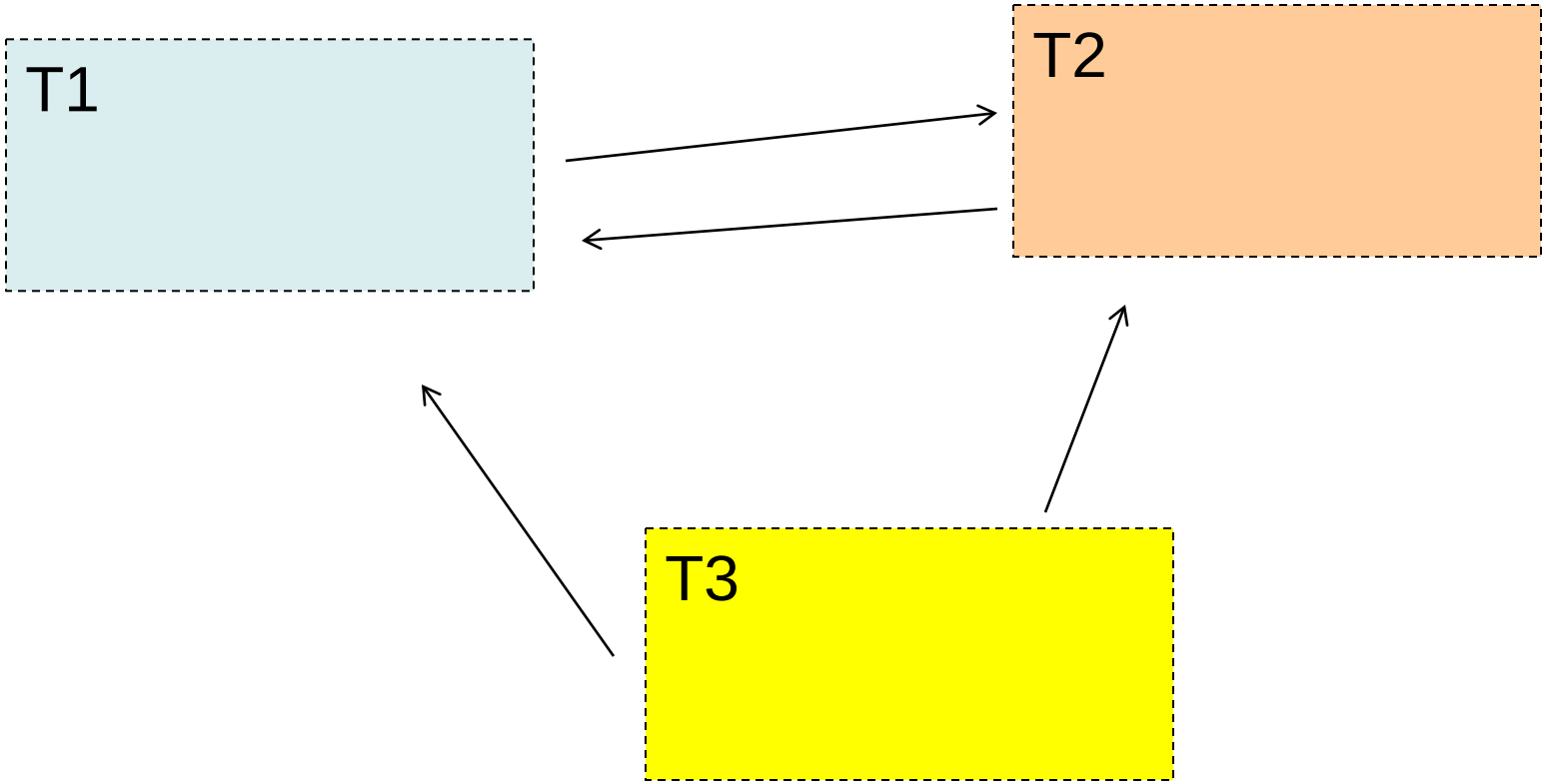
Resource allocation, targets for ecosystem services, Cost benefit ratios, probabilities of success, climate change response



ESDs for Monitoring and Assessment

Range of attributes associated with each state

Rangeland Health Assessment, Dynamic Soil Properties



NEXT STEPS

- Hierarchical Organization of Existing Sites and Information

- Communication with collaborators
  - Inventory
  - Management Interpretations

- Field work testing and refining concepts