Ecological Site Inventory in the National Cooperative Soil Survey

Information Organization

and

Decision-Making

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Soil Ecology and Ecological Site Inventory

Ecological Site Inventory in the National Cooperative Soil Survey

- Brief Background
- Key Concepts
- Applications

SOME ECOLOGICAL SITE BACKGROUND

- FOREST SITES (Korstian 1919)
- RANGE SITES (Dykesterhuis 1948)
- CRITERIA FOR GROUPING SOIL PROPERTIES AND DESCRIBING VEGETATION DYNAMICS

Ecological Sites

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

Ecological Site Description Components

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

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

Interpreting the Impacts of Climate and Management on Ecosystem Services

- Quantitative understanding of soil X vegetation properties
- Spatial distribution of those interactions

Key Concepts for ESDs

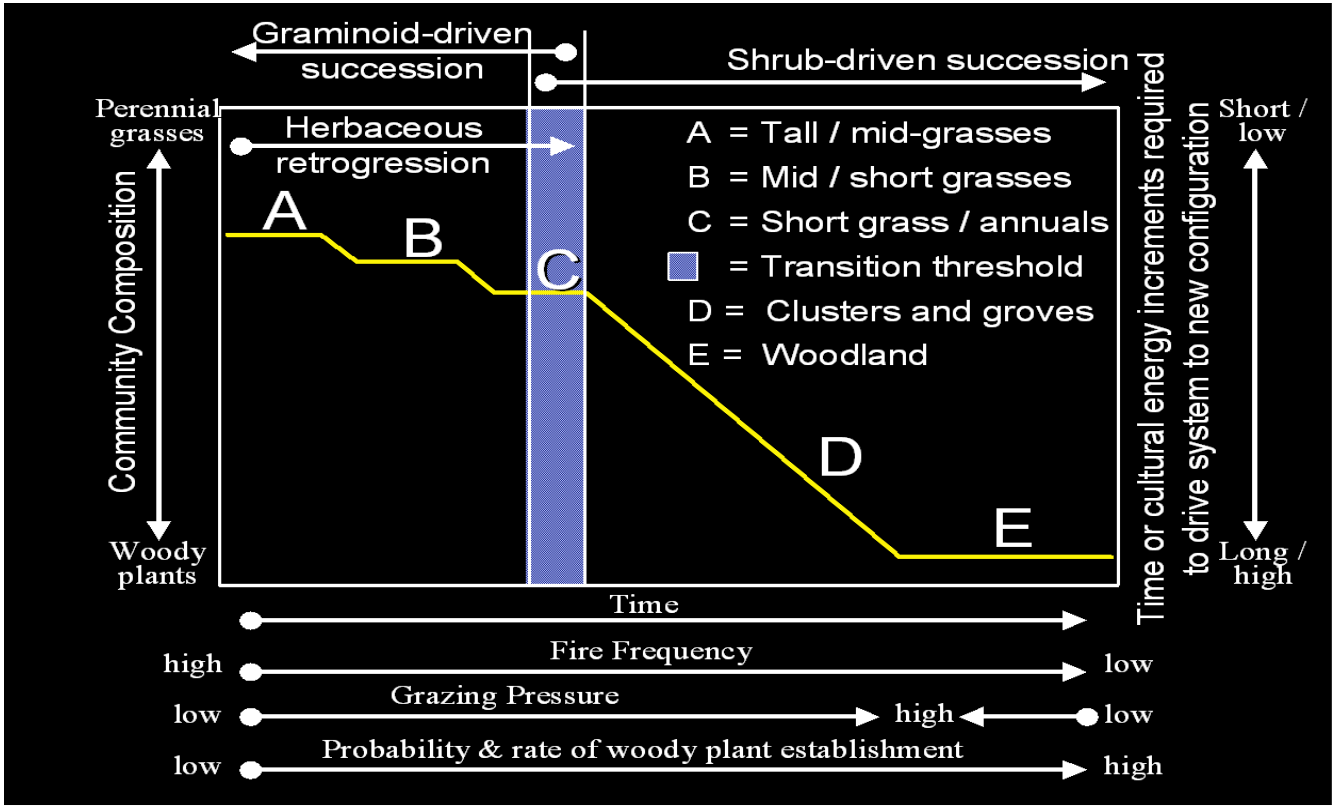
- Disturbance ecology
  - Resistance and resilience (thresholds)
  - Soil plant systems (positive and negative feedbacks)
  - Existence of multiple stable states

RESISTANCE AND RESILIENCE

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

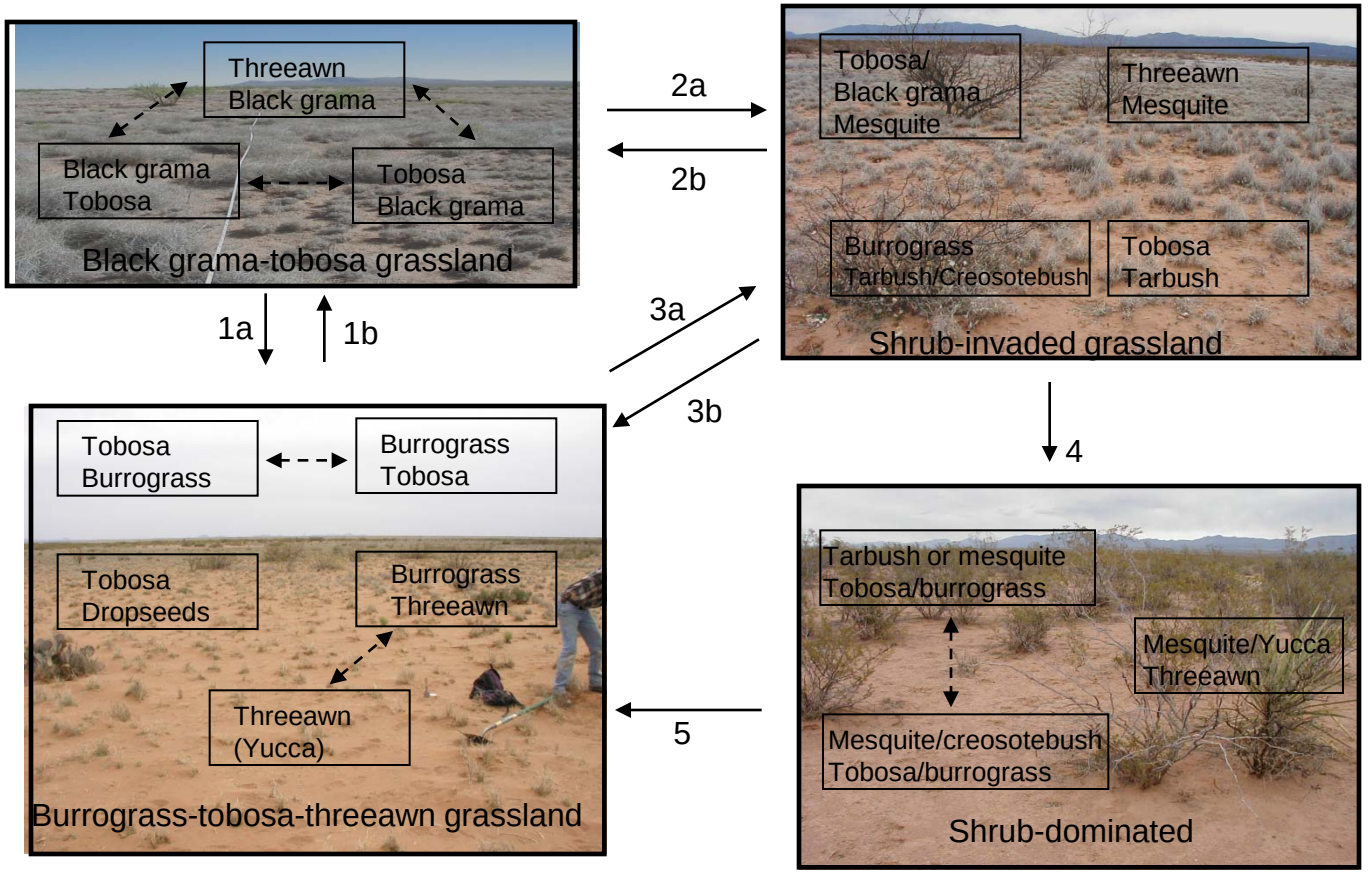
•RESILIENCE – what is the probability that the system will return to the original state when the stress or disturbance is removed?

•THRESHOLDS-point in time or space that change occurs



Application of the state and transition concept to a New Mexico rangeland

Loamy SD-2



1a-Overgrazing, soil fertility loss, erosion and sand loss; 1b-Soil stabilization or modification
2a-Shrub invasion due to overgrazing and/or lack of fire; 2b-Shrub removal, restore cover
3a-Shrub invasion; 3b-Shrub removal with grass recovery
4. Persistent reduction in grasses, competition by shrubs, erosion and soil truncation
5. Shrub removal with soil addition? (Bestelmeyer et al 2003)

ESDs for Conservation Planning

Identifying objectives using a ‘multiple potential’ approach

Each state has a unique set of ecosystem services

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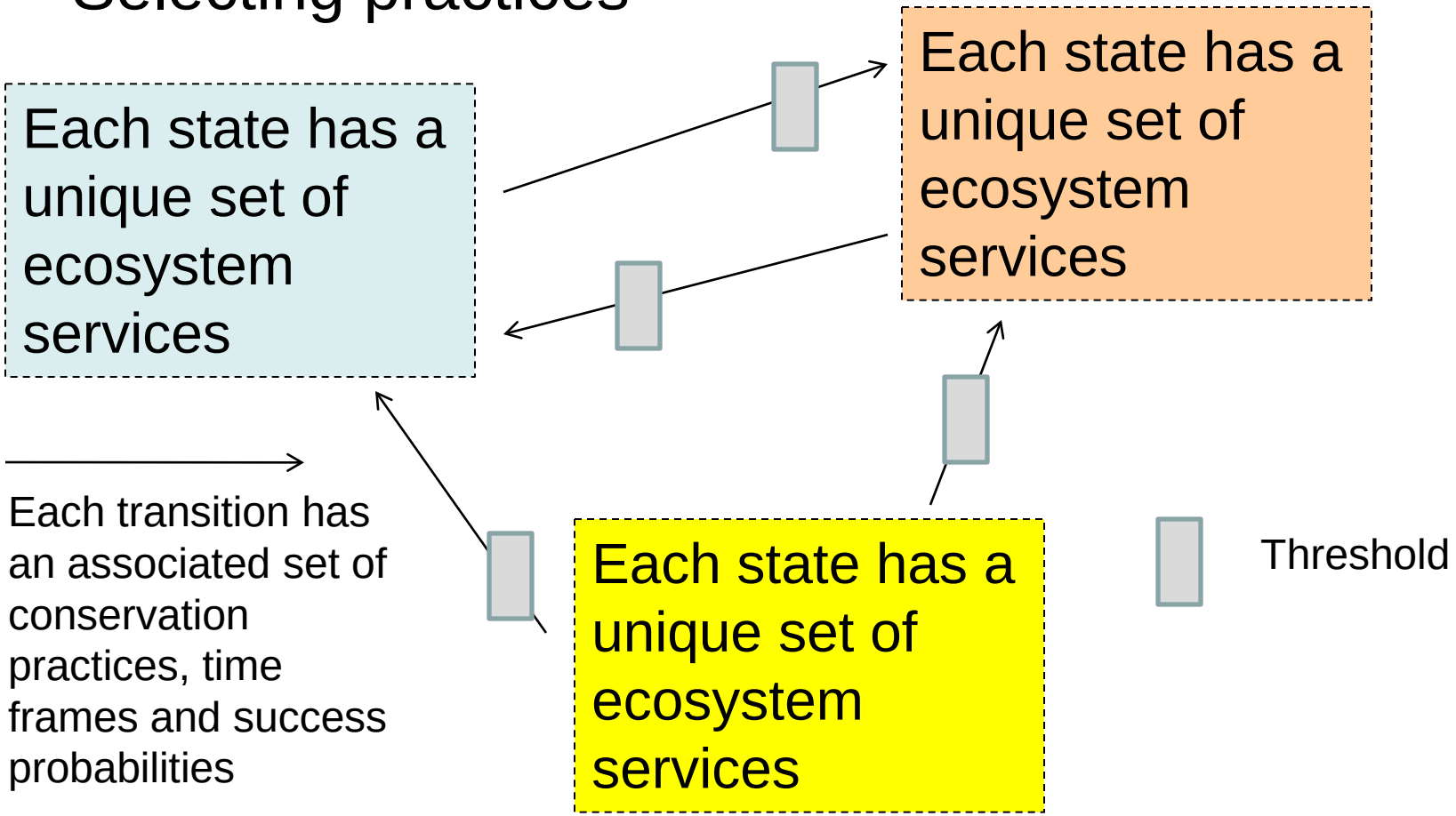
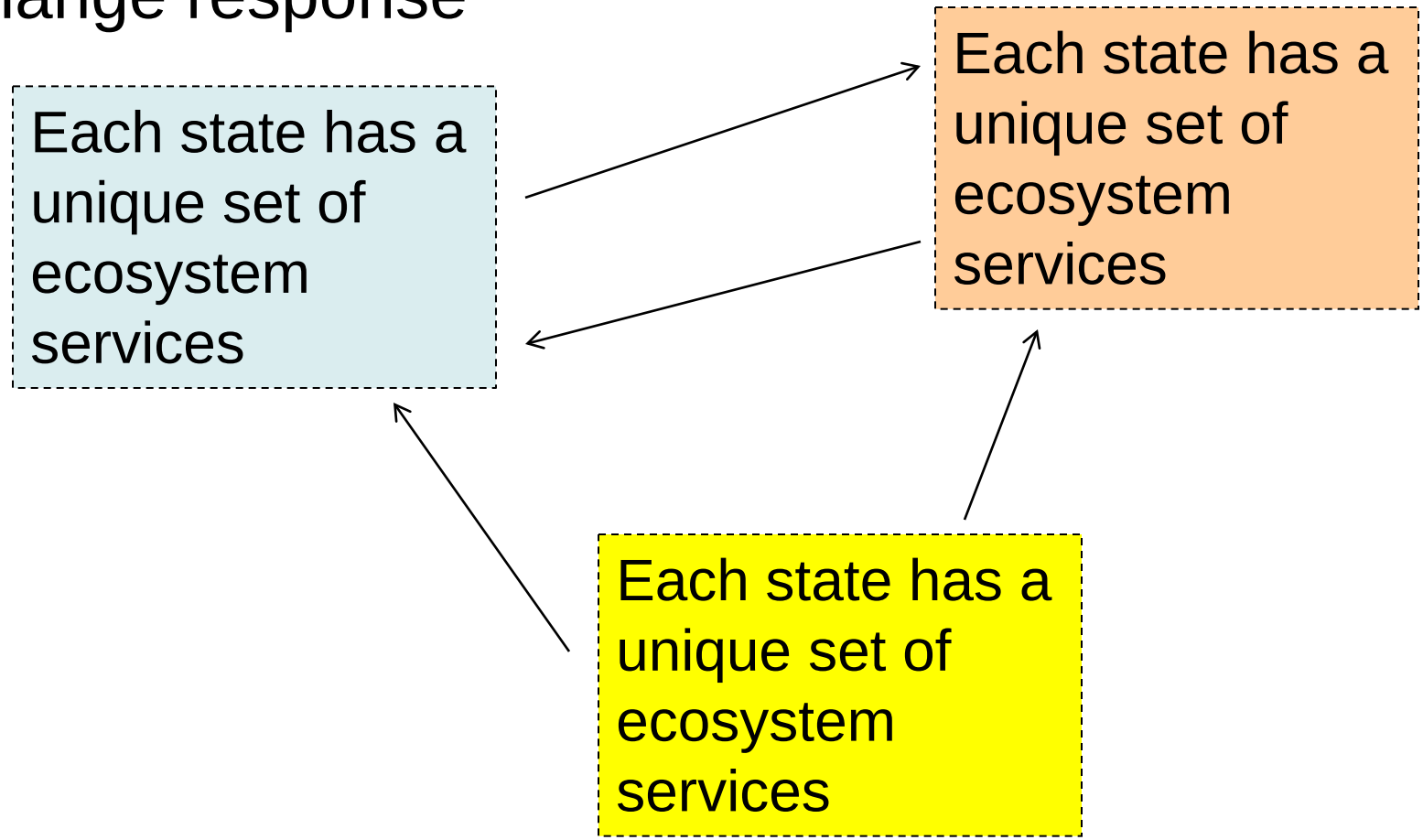
ESDs for Conservation Planning

Identifying objectives
Selecting practices



ESDs for Policy Development

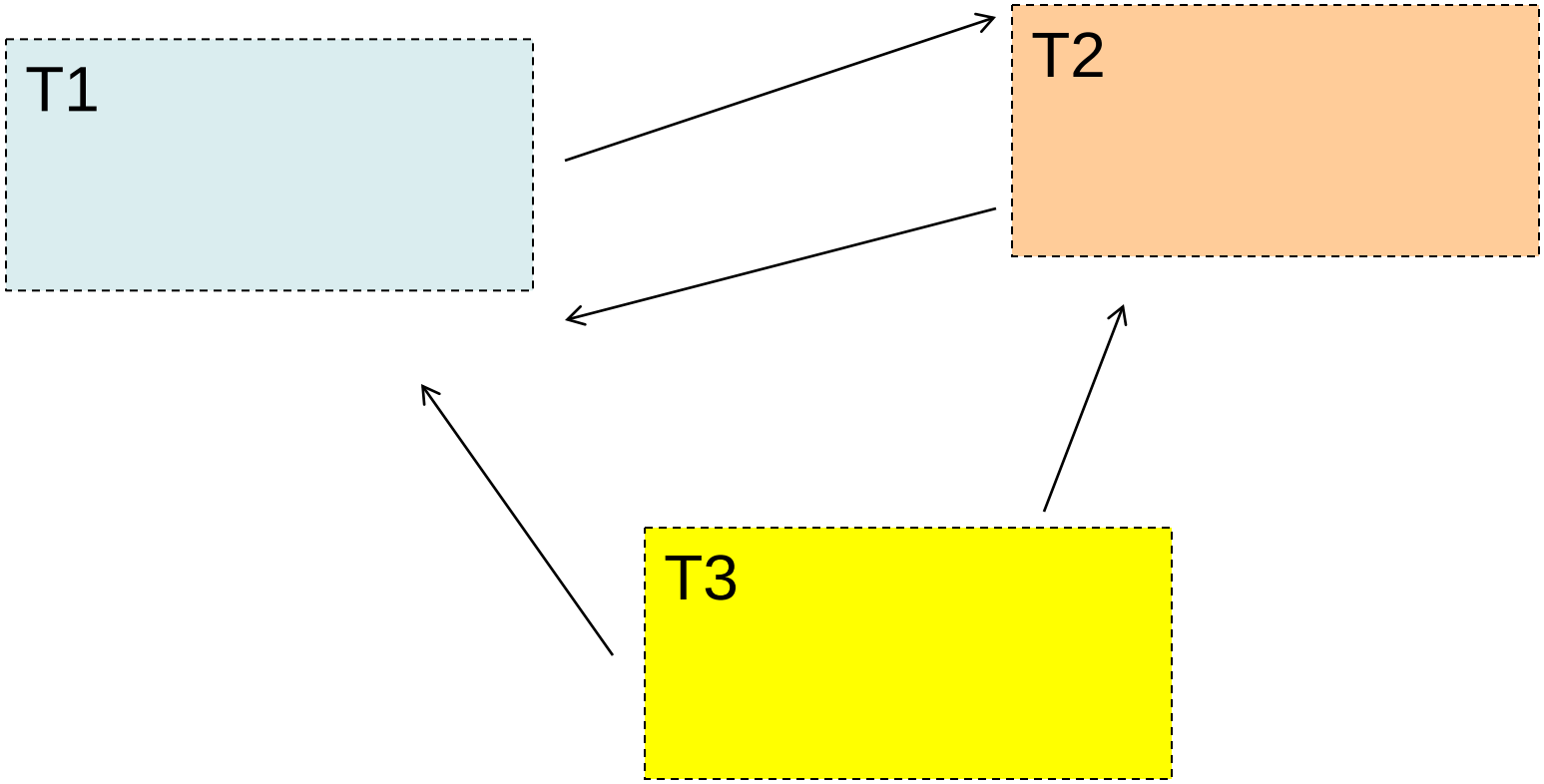
Resource allocation, targets for ecosystem services, Cost benefit ratios, probabilities of success, climate change response



ESDs for Monitoring and Assessment

What is the potential, direction of change, cause and effect

Attributes associated with each state



CONCLUSIONS

- Soil plant systems information is essential to natural resource management decision making
- Ecological Site Descriptions offer an effective means of capturing information for interpreting soil plant system behavior expressed as ecosystem services
  - Repositories of information
- Investigations and interpretations should focus on interactions

CHALLENGES
next 12-18mo

- Internal Consistency/Inventory
- Procedures, guidelines, training
- Database development and analysis