

Mojave Desert Ecosystem Conceptual Model

What, Why, and How



Desert Manager's Group

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Borrego Springs, CA

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What is an Ecosystem Conceptual Model ?

“A framework for understanding the relationships between components and processes of an ecosystem, and the human activities that affect them.”

(Sierra Nevada National Forests Land Management Planning Monitoring Strategy Development, 1999)

- Ecosystem → Web of life and related infrastructure
- Conceptual → Theoretical Beliefs
- Model → Simplified representation of reality

Ecosystem Conceptual Models can be used to:

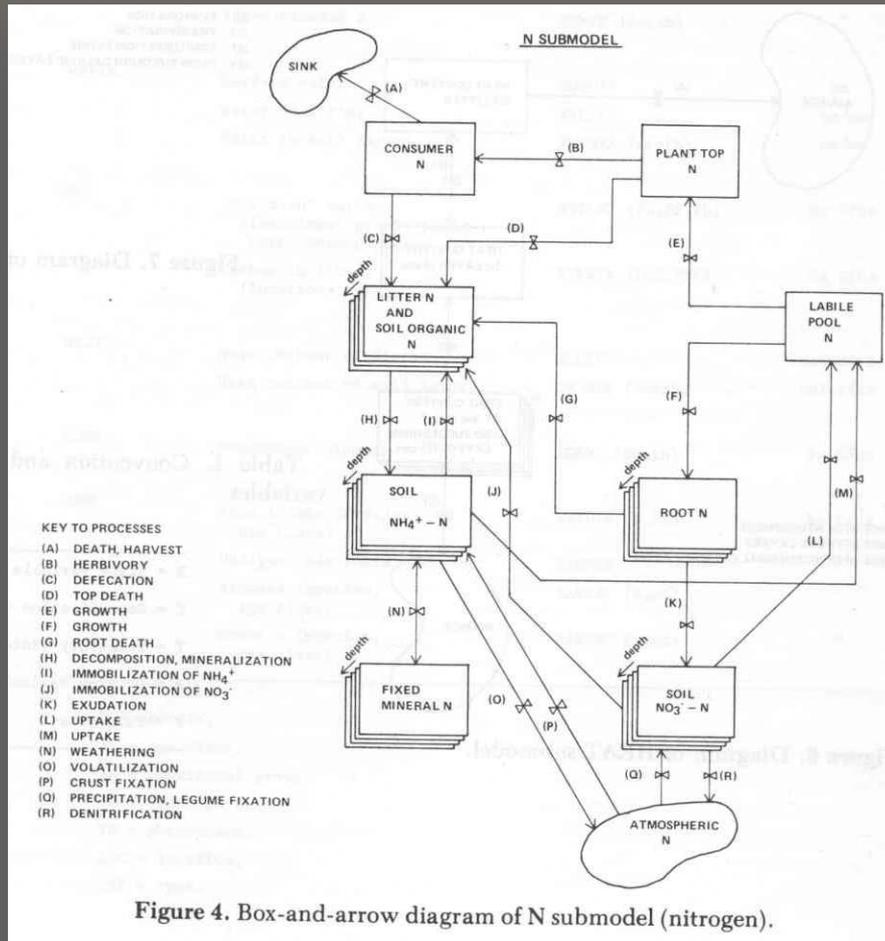
- a) Facilitate Communication
Between Scientists and Managers
- b) Foster development of consensus
Common view of ecosystem dynamics across
disciplines.
- c) Give scientific credibility to monitoring strategy

Models are not truth; the map is not the terrain

➤ A model is a hypothesis or set of hypotheses.

➤ “A model is a purposeful representation of reality” (Starfield, 1994).

➤ All models are wrong, some models are useful.



“We do not wish to show that everything is connected, but rather to show which minimal number of connections that we can measure may be used as a surrogate for the whole system in a predictive model.”

Allen and Hoekstra (1992)

Why develop an Ecosystem Conceptual Model ?

By analogy: a set of house plans is a conceptual model. Would you try to build a house without plans?

The Vital Signs Monitoring portion of the NPS Natural Resource Challenge specifies five goals:

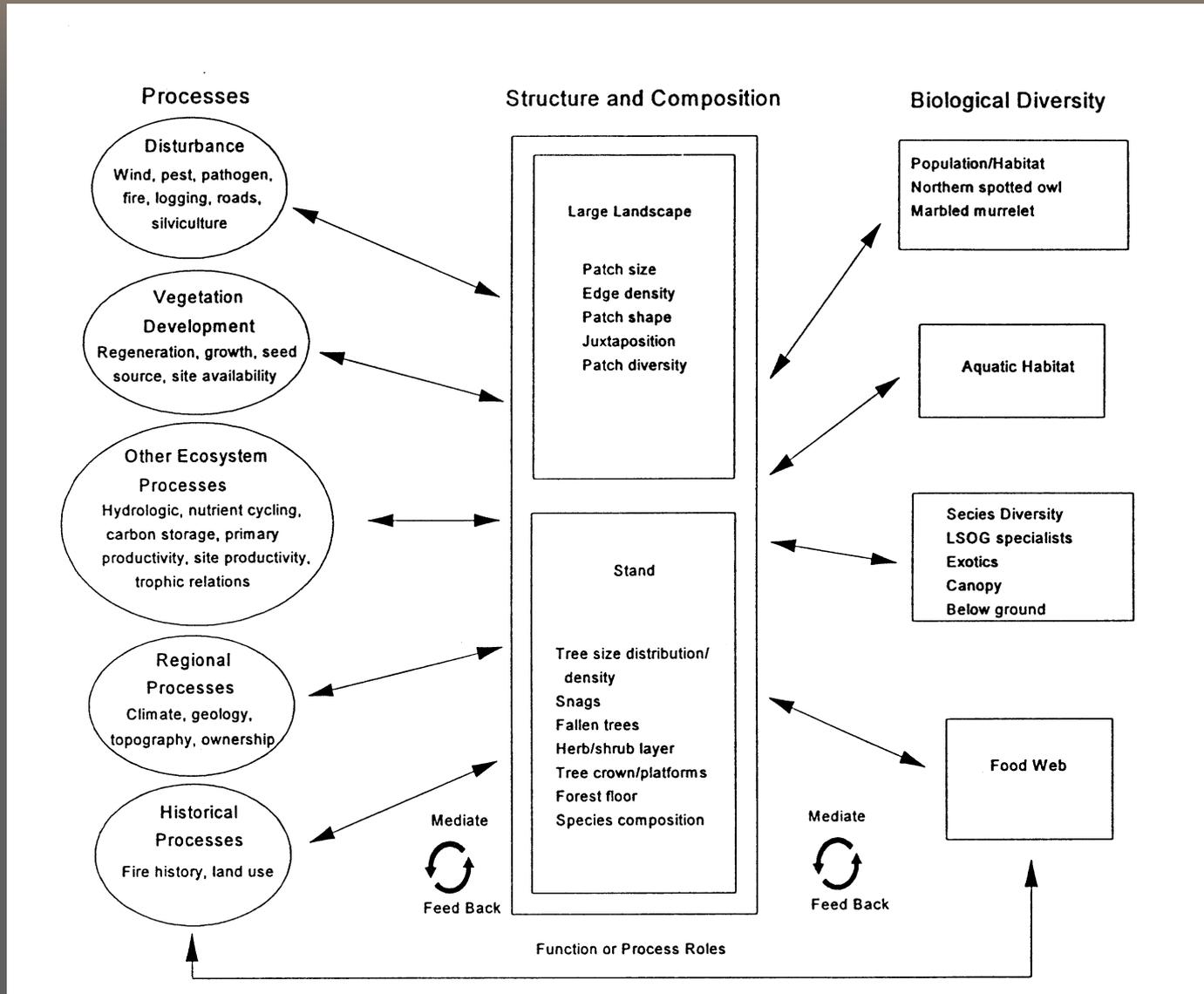
1. Complete vital signs scoping workshops and monitoring plans for all parks.
- 2. *Develop a conceptual model for the network.***
3. Select monitoring components.
4. Evaluate and test monitoring and protocols.
5. Expand existing monitoring.

How to develop an Ecosystem Conceptual Model

1. State the model objectives.
2. Bound the system of interest.
3. Categorize the components within the system of interest.
4. Identify the relationships among the components of interest.
5. Represent the conceptual model.
6. Describe the expected patterns of model behavior.

(Grant, Pedersen, and Marin, 1977)

Late successional and old growth forest model from the Northwest Forest Plan



How to develop an Ecosystem Conceptual Model

Borrow and adapt from previous work:

DESERT BIOME, Ecosystem Analysis Studies, U.S. International Biological Program, reports of progress 1973, 1974, and 1975.

Utah State University Ecology Center

I.B.P. Desert Biome data bank, 8-year set, on tape

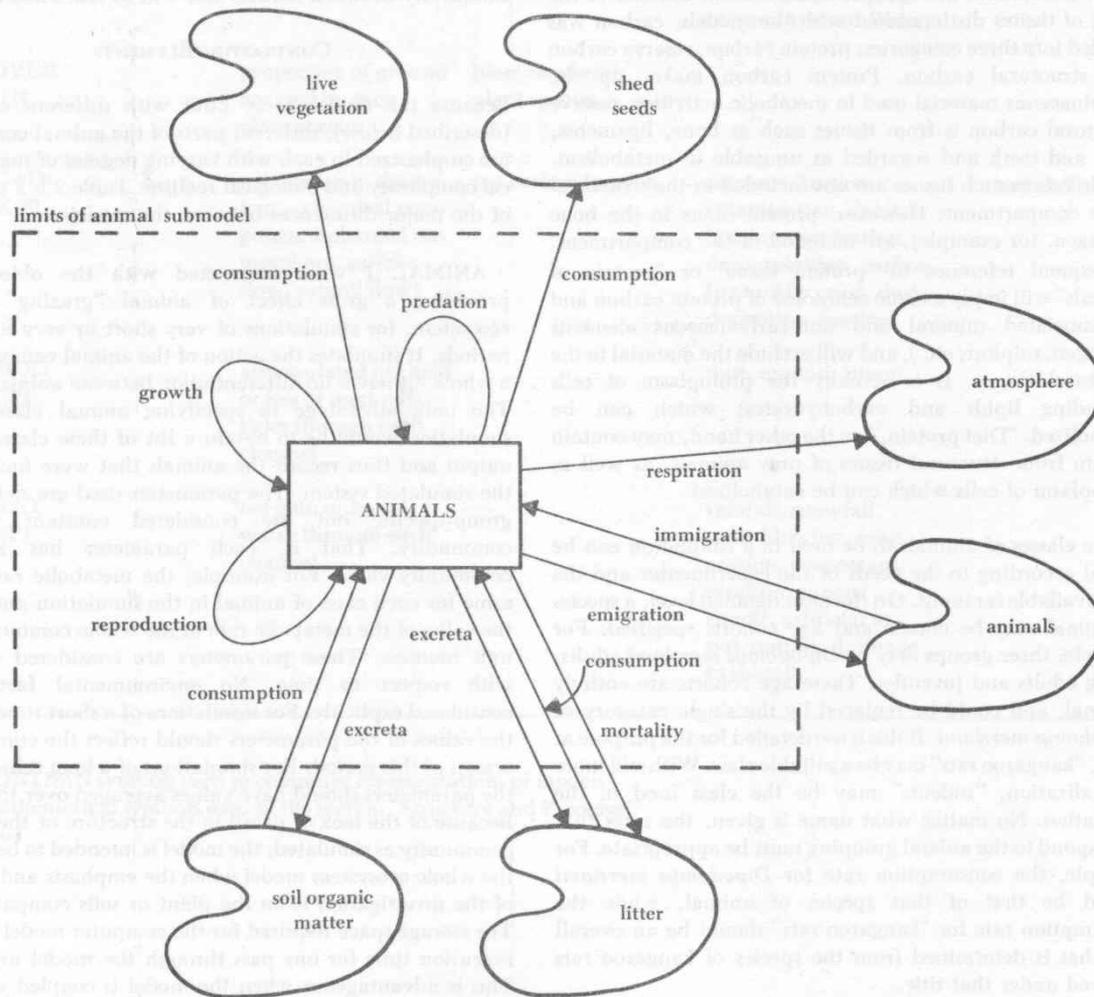


Figure 1. Processes in the animal models.

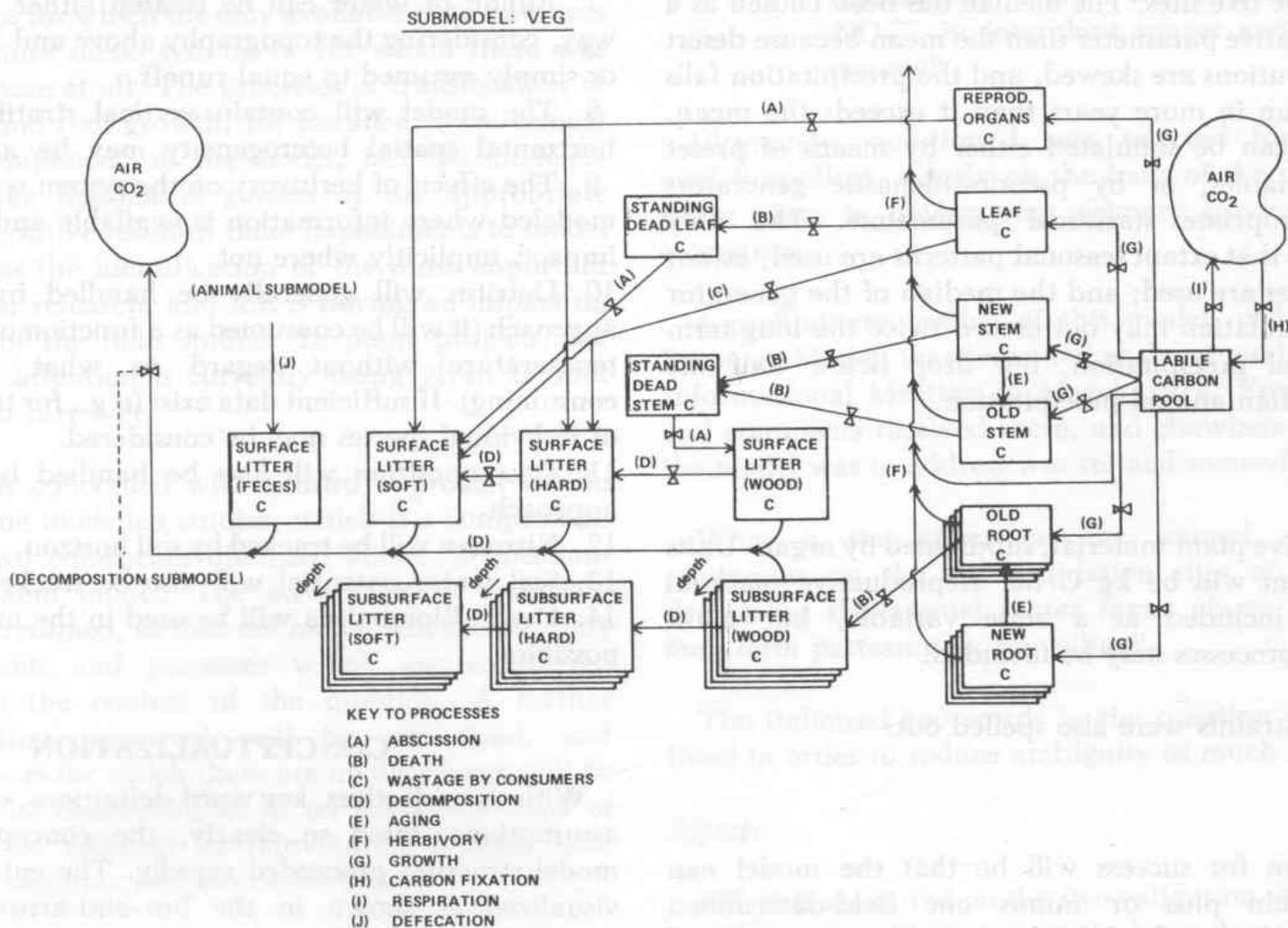


Figure 2. Box-and-arrow diagram of VEG submodel.

Ecosystem Conceptual Model for Monitoring

- The Natural Resource Challenge provides support for long-term ecosystem monitoring. Collaboration between the National Park Service and other agencies will facilitate collection of data that are useful to everyone.
- Conceptual model development will provide a framework for deciding what data get collected and how.
- Increased understanding of ecological status and trends, developed from the data and model, will be a shared benefit.