What is plant ecophysiology?

Jan 22, 2019

Ecophysiology = Ecology + Physiology

Ecology: definition

The study of the relationships between organisms and:

- 1.Each other
- 2.The environment

Ecology: definition

The study of the relationships between organisms and:

- 1.Abiotic environment
- 2.Biotic environment

What aspects of the abiotic and biotic environment influence plant functioning?

Hierarchy of Ecology

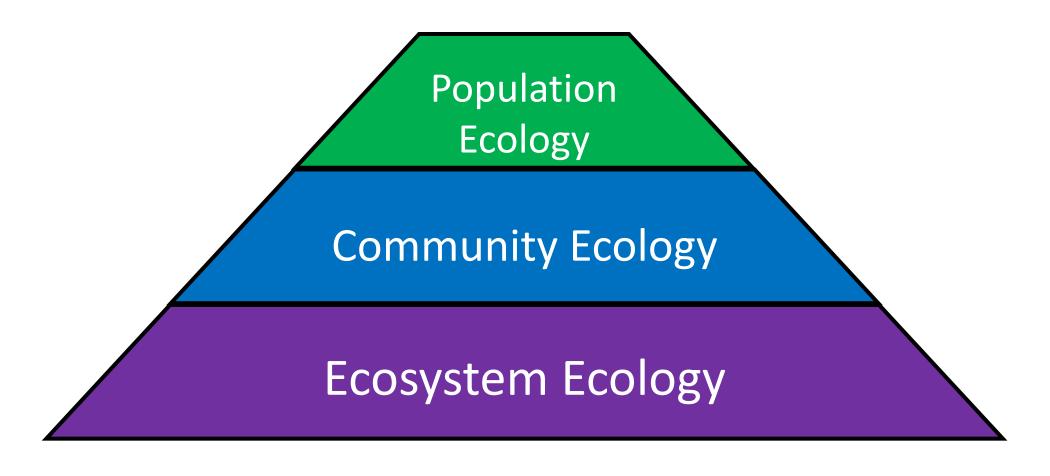
Ecosystem Ecology

Hierarchy of Ecology

Community Ecology

Ecosystem Ecology

Hierarchy of Ecology

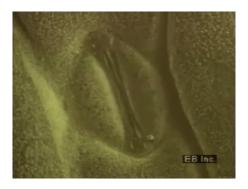


Hierarchy of Ecology Physiological Ecology Population **Ecology** Community Ecology **Ecosystem Ecology** Physiology: a definition

The functioning of an organism that allows it to survive, grow, and reproduce

Ecophysiology: a definition

Responses to environmental conditions observable at the *individual* level



Ecophys discussion: traits

Discussion

- •What is a plant trait?
- •How do plants get their traits?

Discussion

- •What is the difference between acclimation and adaptation?
- •How would you know?

Why do we care about plants and their traits? Discussion of Chapin (2003)

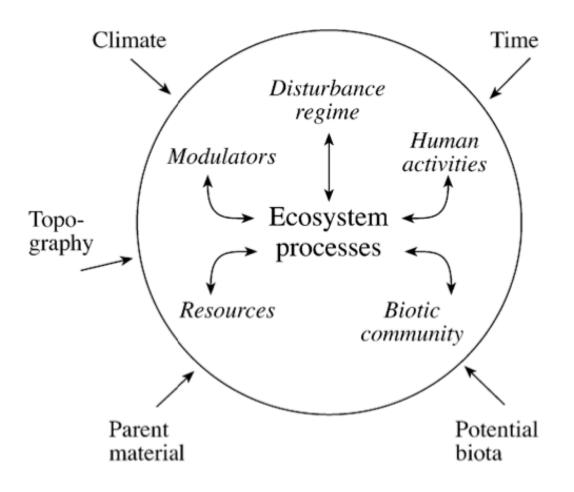


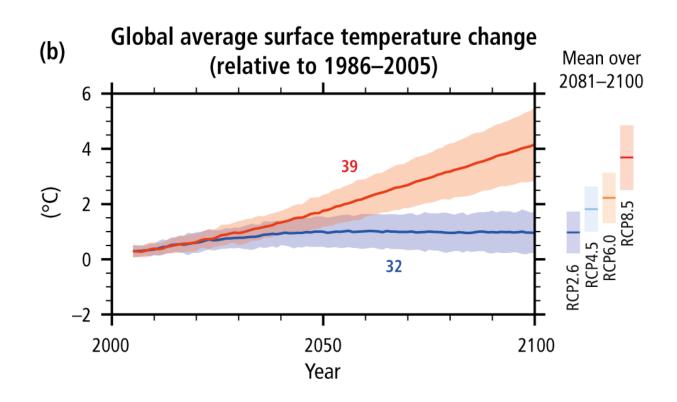
FIG. 1. The relationship between state factors (outside the circle), interactive controls (inside the circle) and ecosystem processes. The circle represents the boundary of the ecosystem. Reprinted from Chapin *et al.* (2002), with the permission of Springer-Verlag.

Ecosystem Service



Global changes to state factors

- Changes in atmospheric gas concentration (e.g., elevated CO₂)
- Warming temperatures
- Altered precipitation patterns
- Nutrient deposition

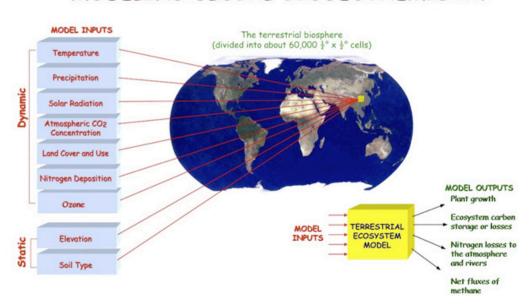


Plants as interactive controls

- Biodiversity
- Disturbance regulators (e.g., fire)
- Movers of resources
 - atmospheric carbon dioxide gross respiration decomposition primary production Carbon litterfall Soil Vegetation and Detritus exchange Structural Nitrogen litterfall production mineralization Nitrogen Terrestrial Ecosystem Model (TEM) The Ecosystems Center, Marine Biological Laboratory (Woods Hole, Massache

- Modulators (e.g., albedo, microclimate)
- Interaction with humans (e.g., agriculture)

MODELING GLOBAL BIOGEOCHEMISTRY



To understand how ecosystem services will change in the future, we need to understand plants