

## Lecture 22: BIOL 3427: Plant Science, Spring 2008

### Plant Ecology Chapters 31 & 32 (available on-line through publisher's webpage)

#### Ecology

- definition
- What is an ecosystem?
- other important terms
  - population
  - community

#### Ecosystem Energetics: Trophic Levels

- autotrophs and heterotrophs
- trophic levels
  - primary producers
  - primary consumers
  - secondary consumers
- Where do omnivores go?
- food chains and food webs
- decomposers
- parasites
- pyramids
  - energy
  - biomass
  - numbers

#### Nutrient and Material Cycling

- importance of recycling
- experiments at Hubbard Brook
  - deciduous forest in New Hampshire
  - established mass balance relationships for several nutrients
  - clearcut large area in 1965-1966

#### Interactions Between Organisms – Beyond Trophic Relationships

- competition
  - definition
  - importance of growth rate
  - favors specialization
  - affected by other factors

- allelopathy
- mutualism
  - definition
  - examples studied already
  - ant-acacia example
- plant defenses
  - against herbivory
  - against pathogens
  - incredibly complex

### Community and Ecosystem Development

- succession
  - definition
  - recovery from disturbance
  - use in restoration ecology

### Global Ecology

- biomes
  - determined by climate
  - importance of elevation and latitude
- vegetation distribution

### Major Biomes

- rainforests
- savannas and deciduous tropical forests
- deserts
- grasslands
  - grasses regrow from basal meristems
    - many fine roots
  - In U.S.
    - western shortgrass prairie
    - central tallgrass prairie
  - once home to huge herds of grazing mammals with large predators
- temperate deciduous forest
- temperate mixed and coniferous forest
- Mediterranean scrub
- taiga and boreal forest
- arctic tundra
  - 1/5 of land surface
  - also alpine tundra

– already subjected to atmospheric warming

#### The Arctic

- Arctic Circle 66.5°N
- cold, damp soils
- relatively small number of plant and animal species
- low productivity (few trees)

#### Guiding Questions

- How important are species diversity and community composition to ecosystem function?
- As temperatures warm, how will plant communities and ecosystems be affected?
- How do responses of the plants affect soil fauna and nutrient cycling, and are there feedbacks to the plants?

#### Effects of Climate Warming on Above- and Belowground Community Structure

#### Where We Are

- documented correlations among plant, mammal, and soil community responses to increased nutrients
- need models to help us determine the net effect of all of these pools and fluxes on the regional carbon cycle