Community Ecology

Community Defined – all of the organisms that inhabit a particular area; an assemblage of populations of different species living close enough together for potential interaction

Community Structure

Species diversity – species richness (the number of species in a community) and relative abundance (the number of individuals of each species in a community)

Individualistic Hypothesis – views the community as a chance assemblage of species found in the same area simply because they have similar abiotic requirements

Interactive Hypothesis – views the community as an assemblage of closely linked species associated by mandatory biotic interactions and functioning as an integrated unit

Interactions Between Populations of Different Species

+/- Interspecific interactions – beneficial to one species and detrimental to the other

Predation – interactions in which animals feed on other organisms

Parasitism – symbiotic interaction in which one organism that lives in or on another (parasite) benefits, and the other (host) is harmed

-/- Interspecific interactions –detrimental to both species

Interspecific competition – two or more species relying on similar limiting resources

The competitive exclusion principle – two species with similar needs for the same limiting resource cannot coexist in the same place

+/0 Interspecific interactions – commensalism is a symbiotic interaction that is beneficial to one species and neither beneficial nor detrimental to the other

Examples include "hitchhiking" species such as algae on aquatic turtles and barnacles attached to whales, birds that eat insects flushed out by grazing animals, birds nesting in trees, epiphytic plants on their hosts

+/+ Interspecific interactions – mutualism is a symbiotic interaction that is beneficial to both species

Requires coevolution

Examples include flowering plants and their pollinators, nitrogen-fixing bacteria and legume plants, cellulose-digesting microorganisms and termites and ruminant animals, mycorrhizal association of fungi and roots of plants

Disturbance and Nonequilibrium

- Nonequilibrium resulting from disturbance is a prominent feature of most communities
- Events such as storms, fire, floods, droughts, overgrazing, and human activities damage communities, remove organisms from them, and alter resource availability
- Succession – process of change that results from disturbance
  - Ecological succession – transitions in species composition over ecological time
    - Primary succession – ecological succession in a virtually lifeless area where soil has not yet formed (e.g., new volcanic islands)
    - Secondary succession – ecological succession in an area where an existing community has been cleared by a disturbance that leaves the soil intact
    - Processes that function throughout succession include
      - Inhibition – existing species inhibit the growth of newcomers
      - Facilitation – species of one stage alter the environment in ways that allow species of the next stage to grow
- Modern nonequilibrium view of succession
  - Succession is not a linear predictable series of stages leading to a stable endpoint
  - Succession is an ongoing process that can take a variety of pathways depending on the size, frequency, and severity of disturbances
  - Some disturbances are followed by regrowth in that area and migration of species from adjacent areas – this does not significantly alter community structure
  - Major changes in community structure result from disturbances that lead to colonization of the disturbed area by species from distant areas (recruitment)

This lecture outline was prepared partly from *Biology*, by Campbell and Reece, 2002 (6th edition), and from *Botany – An Introduction to Plant Biology*, by Mauseth, 1998 (2nd edition), and may contain phrases or entire sentences taken verbatim from those sources.