General Ecological Principles

ecology: a study of organisms interactions with the abiotic and biotic components of their environment •••••

biosphere: the total living world and all aspects of the environment with which it interacts •••••

ecosystem: self contained group of interacting communities •••••

community: self contained group of interacting species •••••

population: self contained group of interacting individuals of the same species •••••

I. Abiotic Factors
- A. Lithosphere - solid: rocks, soil particles, sediments,etc
  - weathering
    - mechanical
    - chemical
- B. Hydrosphere - liquid: water in every form; oceans, groundwater, rivers, lakes, rainfall, ice
- C. Atmosphere - gas: primarily nitrogen, oxygen and carbon dioxide gas with mixture of other gaseous compounds
- D. Tolerance Ranges and Limiting Factors

II. Biotic Factors
- A. Feeding Strategies: herbivores, carnivores, omnivores, detritivores
- B. Production & standing crop
- C. Interactions
  1. symbioses: mutualism, commensalism, parasitism
  2. predator / prey relationships
  3. competition
     - a. intraspecific competition
     - b. interspecific competition
  4. population level interactions (Population Ecology)
     - a. fluctuations in populations and genetic variation
     - b. immigration and emigration
     - c. isolation and evolution
     - d. local extinctions
  5. community level interactions (Community Ecology)
     - a. concept of the niche
     - b. foraging theory
     - c. community structure

III. Matter Cycling in Ecosystems
- A. Trophic Levels and Food Webs: producers, consumers, decomposers
- B. Pyramids of Numbers and Biomass
- C. Biogeochemical Cycles

IV. Energy Flow in Ecosystems

A. Kinds of energy used in ecosystems
    1. solar
    2. chemical
    3. mechanical
B. Productivity
    1. respiration vs production
    2. gross vs net productivity
    3. primary & secondary productivity
C. Energy Flow & Trophic Structure
    1. factors that limit productivity
    2. ecological efficiency and the "10% rule"
    3. length of food chains

V. Ecosystems
A. Factors which structure ecosystems
    1. Climatic Factors & Latitude and Altitude
    2. Vegetation
    3. Animal Communities
    4. Ecosystem Stability
    4. species diversity, species richness, and biodiversity
B. Types of Ecosystems (Biomes, Faunal Realms, Biogeographic Provinces)
    1. Terrestrial Biomes
        a. tundra
        b. taiga (boreal forests)
        c. coniferous forests
        d. desert
        e. chaparral
        f. grasslands and savannas
        g. deciduous forests
        h. tropical forests
    2. Marine Biomes
        a. pelagic (photic vs aphotic zones)
            i. neritic = coastal, above continental shelf
            ii. oceanic = deep water area beyond continental shelf
        b. benthic
            (photic zone)
            i. supralittoral (= splash zone) = highest tides and waves
            ii. littoral (=intertidal) = between normal high and low tide
            iii. sublittoral (=subtidal) = along continental shelf
            (aphotic zone)
            iv. bathyl = continental slope; 200-4000 meters depth
            v. abyssal = abyssal plane; 4000-6000 meters depth
            vi. hadal = trenches; greater than 6000 meters depth
        c. marshes & saltwater swamps
        d. coral reefs
    3. Freshwater Biomes
            i. lentic = lakes, ponds, reservoirs
            ii. lotic = streams and rivers
            iii. wetlands & freshwater swamps
            iv. groundwaters and springs