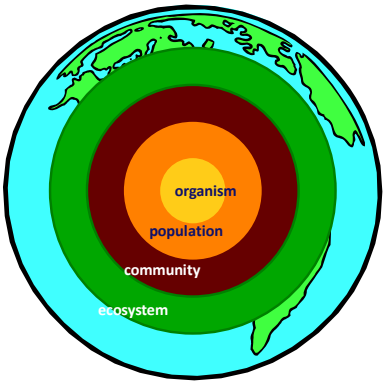
Studying organisms in their environment

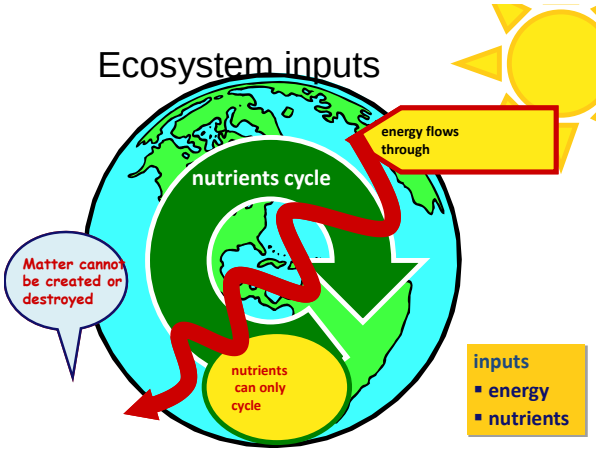


Ecosystem

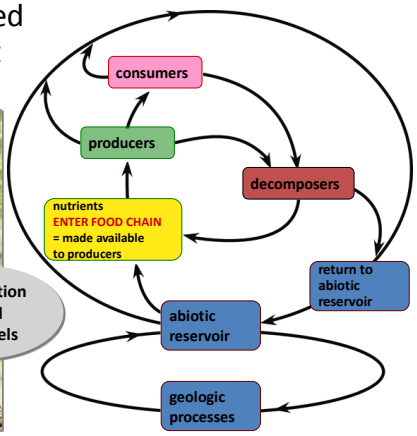
- All the organisms in a community plus abiotic factors
  - ecosystems are transformers of energy & processors of matter
- Ecosystems are self-sustaining

- capture energy
- transfer energy
- cycle nutrients

Ecosystem inputs

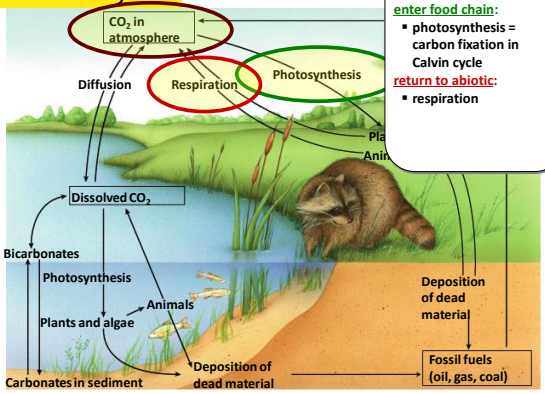


Generalized Nutrient cycling



Decomposition connects all trophic levels

Carbon cycle

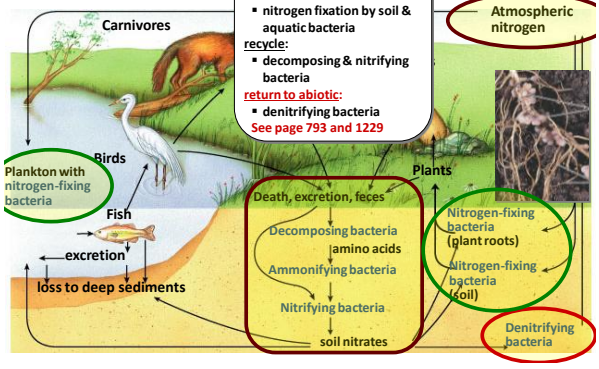


abiotic reservoir:
- CO_2 in atmosphere

enter food chain:
- photosynthesis = carbon fixation in Calvin cycle

return to abiotic:
- respiration

Nitrogen cycle



abiotic reservoir:
- N in atmosphere

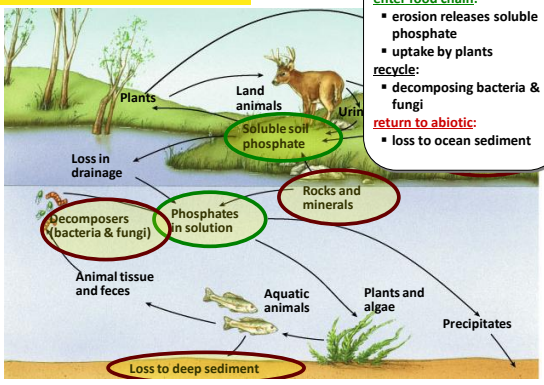
enter food chain:
- nitrogen fixation by soil & aquatic bacteria

recycle:
- decomposing & nitrifying bacteria

return to abiotic:
- denitrifying bacteria

See page 793 and 1229

Phosphorus cycle



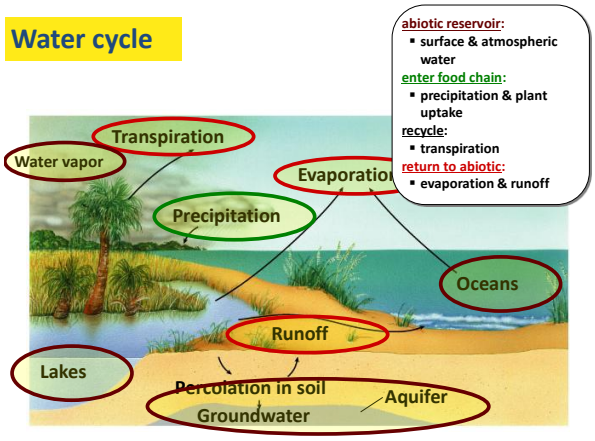
abiotic reservoir:
- rocks, minerals, soil

enter food chain:
- erosion releases soluble phosphate
- uptake by plants

recycle:
- decomposing bacteria & fungi

return to abiotic:
- loss to ocean sediment

Water cycle

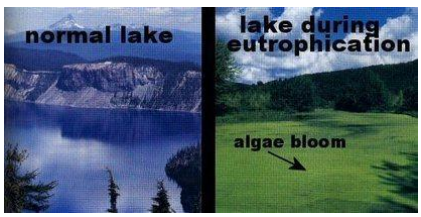


Limiting Nutrient

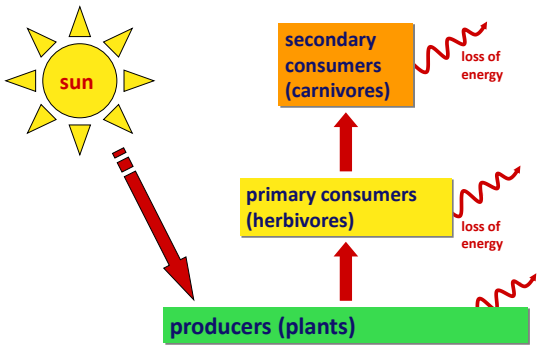
- Necessary for plant growth, but available in smaller quantities

Eutrophication

- Overgrowth of algae in response to increased nutrient availiability

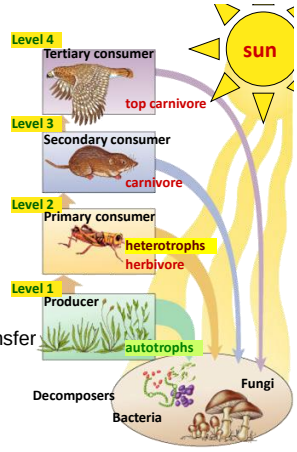


Energy flows through ecosystems



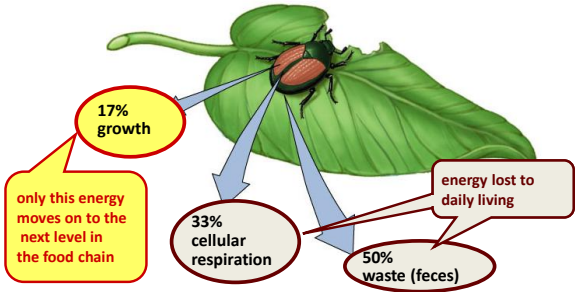
Food chains

- Trophic levels
  - feeding relationships
  - start with energy from the sun
  - captured by plants
    - 1st level of all food chains
  - food chains usually go up only 4 or 5 levels
    - inefficiency of energy transfer
  - all levels connect to decomposers



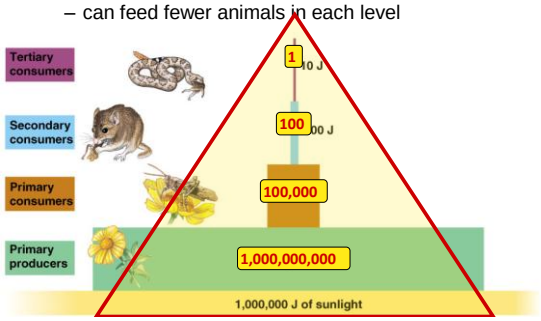
Inefficiency of energy transfer

- Loss of energy between levels of food chain
  - To where is the energy lost? The cost of living!



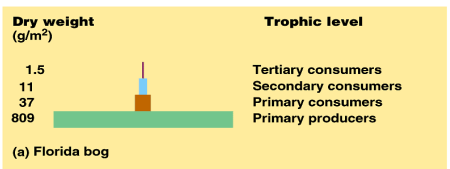
Ecological pyramid

- Loss of energy between levels of food chain
  - can feed fewer animals in each level



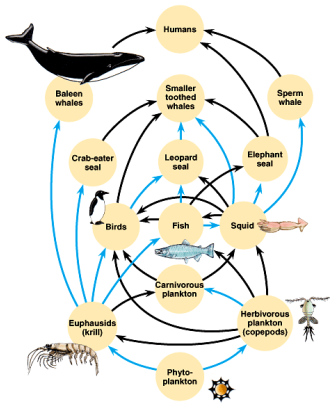
Biomass Pyramids

- Biomass refers to dried biological matter that either is living or was recently living. Biomass is measured by obtaining the mass after water has been removed from the substance.



Food webs

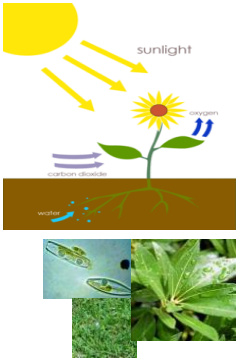
- Food chains are linked together into food webs
- Who eats whom?
  - a species may weave into web at more than one level
    - bears
    - humans



Primary Production

- Primary production is the production of organic compounds from atmospheric or aquatic carbon dioxide (CO_2).
- Occurs through the process of photosynthesis, using light as a source of energy, or chemosynthesis, using the oxidation or reduction of chemical compounds as a source of energy.

Primary Production



- **Gross primary productivity** is the *total* amount of energy that producers convert to chemical energy in organic molecules per unit of time.
  - The plant must use some energy to supports its own processes.
  - What is left over *in that same amount of time* is **net primary productivity** which is the energy available to be used by another organism.

Secondary Production

- Generation of consumer biomass in an ecosystem