ENERGY FLOW

1. ECOSYSTEMS

ecosystem
- community plus physical environment
- energy relationships & chem cycles

abiotic components
- sunlight, soil, weather, inorganic

autotrophs = producers
- photosynthesis (green plants)
- chemosynthesis (sulfur bacteria)

heterotrophs
- consumers (herbivores, carnivores)
- decomposers (saprophages)

2. ENERGY FLOW

sun - source of all energy on earth
- thermal energy & light energy
- 70% light reflected/absorbed by atmo
  30% reach earth's surface
- plant capture 10% (assimilate 1%)

energy flow - not closed in biosphere
- originate outside, released into space

primary productivity - rate energy
  captured by photosynthetic plants
- lowest in tundra, desert, open ocean
- high in trop. forest, coral reef, estuary

secondary productivity
- nutrients eaten eaten by consumers
  minus energy for metabolism
- energy left over for growth & devel.

3. FOOD CHAINS

food chain - linear sequence of energy transfer

herbivores - food plentiful-low quality

carnivores - primary or secondary

omnivores - consume plants & animals

scavengers - animals consume dead
- saprophyte if plant or fungi

decomposers - bacteria or fungi
- reduce organic matter into inorganic

trophic levels - 3-4 in most chains
- maximum 5 (top predator inefficient)
- minimum 2 (koalas, some whales)
- meat wasteful, plants more efficient

4. FOOD PYRAMIDS & WEBS

food pyramid
- quantify trophic levels in food chain
- generally transfer only 10%

pyramid of numbers
- count number of individual organisms
- inverted if small herbivores use tree

pyramid of biomass
- measure biomass, weight, or energy
- inverted if aquatic (algae low biomass)

food web
- interconnect all chains in ecosystem
- complex less stable than simple

5. CYCLES

biogeochemical cycling
- circular flow of elements between organisms & physical environment
- enters plants, exits thru decomposers
- driven by energy flow

elements - bulk C H O N P S
- macro-elements Ca Mg K Na
- micro-elements B Cu I Fe Si Zn

reservoir - atmo, ocean, or sediment

6. WATER CYCLE

reservoir
- 97% ocean (71% of earth's surface)
- 2% glaciers
- 1% fresh (lake, river, ground, atmo)

cycling
- atmosphere (clouds, fog, ice)
- precipitation (rain, snow, etc.)
- interception (fall & absorb by plants)
- percolation (seep into ground water)
- surface runoff (when soil saturated)
- evaporation (return to atmosphere)