ECOLOGY (10%)

I. Ecosystems

a. Autotrophs: Utilize a chemical or light energy to synthesize organic compounds

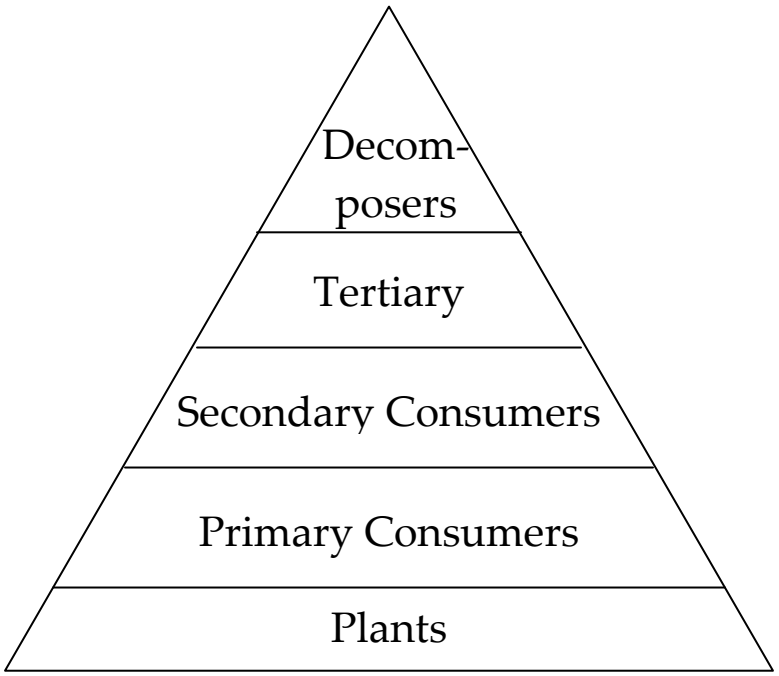
b. Heterotrophs: Need to eat other organisms to obtain organic molecules

c. Trophic Levels:

i. Loss of energy

1. Excretion
2. Not everything is eaten
3. Heat loss

ii. Loss of 90% at each level



d. Primary Productivity: Rate at which energy is stored in organic matters

e. Biomes: Communities
    i. Tropical Rainforest
        1. Huge amount of rainfall
        2. Most diverse in species
        3. Near the equator
        4. Lots of Decomposers
    ii. Tropical Savannah
        1. Not too much water
        2. Grasslands with scattered small trees
        3. i.e. Africa
    iii. Desert
        1. Very little water
        2. Succulents: Plants that have strategies to minimize water Loss
            a. Thick cuticles on leaves
            b. Spines
            c. Closed stomates during the day
    iv. Temperate Forest
        1. Moderate amounts of water
        2. Moderate temperatures
        3. Forests and trees
    v. Temperate Shrubland
        1. Little or no summer rains
        2. Chaparrals: Shrubs
        3. Mainly Angiosperm shrubs
        4. i.e. Mediterranean region in Europe
    vi. Temperate Grassland
        1. Not too much moisture
        2. Can not support a forest
        3. i.e. Prairie/Midwest
    vii. Temperate Desert (Semi-desert/Scrubland)
        1. Sage brush
    viii. Taiga
        1. Extremely cold environments
        2. Heavy snowfall
        3. Conifers (Gymnosperms)
        4. i.e. Canada or Alaska
    ix. Tundra
        1. Extremely cold environment
        2. Too cold or dry for trees
        3. Treeless
        4. i.e. Antarctica

f. Aquatic Environments:
    i. Lake
        1. Oligotrophic
            a. Low in nutrients
            b. Little plant life
            c. Deep and steep shores
            d. Small Littoral zone
                i. Area on the shore where plants can grow
            e. Overtime becomes Eutrophic
        2. Eutrophic
            a. Rich in nutrients
            b. More plant life
            c. Shallower shores
            d. Large Littoral zones
                i. Area on the shore where plants can grow
            e. Little dissolved O_2

II. Transformation of Communities

a. Succession: Overtime, untouched land will become a community
    i. Primary Succession
        1. No soil → Growth → New Community
    ii. Secondary Succession
        1. Old Community → Forest Fire/Disaster → Growth → New Community

III. Carbon Cycle

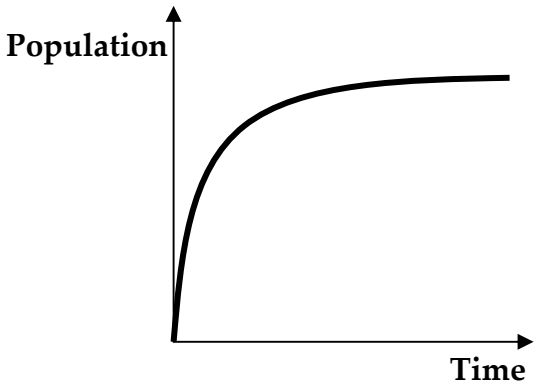
a. Atmosphere
    i. Contains CO_2 gas
b. Plants
    i. Fix CO_2 gas from atmosphere into Organic Molecules
    ii. Use CO_2 gas in Cellular Respiration
    iii. Release CO_2 gas into Atmosphere
c. Heterotrophs
    i. Utilize Organic Molecules
    ii. Release CO_2 gas into Atmosphere
d. In Recent Times
    i. CO_2 gas has increased in the atmosphere → BAD

IV. Nitrogen Cycle

a. Converts N_2 gas into usable form
b. N_2 gas is needed in:
    i. Amino Acids
    ii. Nucleotides
    iii. Nucleic Acids
c. 70% of air is made up of N_2 gas
d. Plants and Animals can <u>not</u> use Nitrogen in the form of N_2 gas
e. Cycle
    i. Atmosphere
        1. N_2 gas
    ii. Prokaryotes
        1. Convert N_2 gas into Ammonia (NH_3) or (NH_4^+)
    iii. Nitrifying Bacteria
        1. Convert Ammonia (NH_3) or (NH_4^+) into Nitrate (NO_2^-) or Nitrite (NO_3^-)
    iv. Plants
        1. Use Nitrate (NO_2^-) and Nitrite (NO_3^-)
        2. Legumes
            a. Mutualistic Symbiosis with Nitrifying Bacteria
                i. Nitrifying Bacteria in the nodules in the roots
                    1. Plant get usable Nitrogen from the Bacteria
                    2. Bacteria get organic molecules from the plant
    v. Animals
        1. Consume Plants to obtain Nitrogen

V. Competition

a. Carrying Capacity: Maximum number of organisms in a population that can be supported



b. Factors that effect population growth
    i. Density-dependent: Factors affected by the density of the population
        1. Food resources
        2. Disease
        3. etc.
    ii. Density-independent: Factors unaffected by the density of the population
        1. Natural disaster
        2. Famine
        3. etc.
c. Competitive Exclusion Theory
    i. Two different species will not occupy the same niche because the competition between them will be too intense