

Section II: The Living World AP Tips

- Ecology
 - Think back to Catalina: “No Waste in Nature”; “Everything is Connected”; “Everything runs on Energy”
 - 1st vs 2nd Law of Thermodynamics
 - 10% passed on between trophic levels
 - $GPP - R = NPP$
 - The energy produced from photosynthesis (GPP) minus respiration (R) – the energy used by the plants EQUALS the NPP or the energy available to consumers. You can calculate this – or use basic algebra to rearrange and solve for “x”
 - Ecosystems with diverse plant life (ex swamps, tropical rainforest, temperate rainforests, and coral reefs have high GPP)
 - Biogeochemical Cycles
 - Nitrogen (MEMORIZE)
 - Catalyst for change = bacteria
 - Storage = air/atmosphere 78% N
 - Nitrogen fixation- bacteria in root nodules of plants “fix” atmospheric N (to ammonia)
 - Assimilation- taken up into food webs (we use N in DNA, RNA, amino acids/proteins)
 - Ammonification- We all decompose back to ammonia
 - Nitrification- convert to nitrate (the form of N that plants use)
 - Denitrification- from soil back to N gas
 - HUMAN EFFECTS
 - Fertilizers → N runoff = eutrophication
 - Phosphorus
 - ONLY CYCLE WITHOUT A GAS PHASE
 - Catalyst for change: weathering/erosion
 - Storage: rocks
 - HUMAN EFFECTS
 - Mining – P in fertilizers & detergents (cause eutrophication)
 - Carbon
 - Catalyst for change: photosynthesis/respiration
 - Storage: rocks (ex. fossil fuels)
 - Carbon is “sequestered” underground
 - HUMAN EFFECTS
 - Mining/drilling fossil fuels
 - Deforestation
 - Sulfur

- Storage: rocks
- Natural: Volcanic eruptions
- HUMAN: coal burning power plants
 - $S + H_2O \rightarrow$ sulfuric acid \rightarrow acid deposition
 - Decreases pH of aquatic & terrestrial systems
 - Species w/ a low range of tolerance (ie trout) die \rightarrow disrupts food webs & decreases biodiversity
- Biomes
 - Tropical Rainforest
 - Most biodiverse; worst soil b/c rate of decomposition happens so fast
 - Temperate deciduous rainforest
 - Mostly in eastern USA; BEST SOIL (lose leaves in the fall = O horizon leaf litter = decomposes to good soil) \rightarrow provides habitat for FBI
 - Boreal Forest/Tiaga
 - Mostly in Russia
 - Artic Tundra
 - Plants adapted to cold weather and low precipitation – FRAGILE
- Aquatic Life Zones
 - Most biodiversity near the shore (littoral = freshwater; coastal = saltwater); estuary = part salt & fresh \rightarrow unique ecosystem w/ species adapted to daily tidal cycle & seasonal (temperature) run-off
 - Benthic = bottom
 - Phytoplankton in the upper (ex. limnetic [fresh] & euphotic [saltwater]) photosynthesize = high DO
 - Wetlands – wet part or all of year
 - Filters sediments, nutrients, toxins
 - Absorbs energy from storms (so if build on wetlands = more storm damage \rightarrow AKA Hurricane Katrina)
 - Provides habitats!
 - Coral Reefs (most diverse marine biome)
 - Pollutants & sediments threaten corals
 - Increase in CO_2 (climate change) can decrease pH (make ocean more acidic) and cause coral bleaching
- Lab: Species Diversity
 - Species richness = number of species
 - Species evenness = abundance of individual species
 - \rightarrow can measure/calculate with a “diversity index” \rightarrow candy lab

- Competitive exclusion – Resource partitioning (survival mechanism)
- Keystone species – important for ecosystem stability
 - Ex. sea otter; bees
- Predator – prey relationships
- EARTH IS 5 BILLION YEARS OLD
 - Punctuated equilibrium
 - Extinction leads to speciation
 - Current extinction period due to humans???
- Primary vs Secondary Succession
 - The evolution of an ecosystem