Environmental Science
3-1 Notes

I Climate – climate is the long term average of weather conditions (average temperature and precipitation)

II Land Biomes- A large area characterized by its climate and plants (flora) and animals (fauna) that live there.

A) Temperate Deciduous Forest
1) Temperature = seasons with warm summers and cold winters
2) Precipitation = 29.5 – 49 inches/year (75-125 cm/year) evenly spread
3) Flora = Deciduous trees, shrubs, ferns, mosses, flowers
4) Fauna
a) Herbivores = Squirrel, rabbit, deer
b) Carnivores = Coyote, hawks, snakes
c) Omnivores = Raccoon, opossum, skunk

B) Coniferous (evergreen) Forest / Taiga / Boreal Forest
1) Temperature = has seasons with short summers and long, cold winters
2) Precipitation = 14 - 29.5 inches/year (35- 75 cm/year)
3) Flora = coniferous trees, shrubs, mosses
4) Fauna
a) Herbivores = Squirrel, snowshoe hare, moose, elk
b) Carnivores = Coyote, wolf, lynx, eagles, hawks
c) Omnivores = Raccoon, opossum, skunk, black bear, porcupines

C) Tropical Rain Forest (Most biodiverse land biome (50% + of all living things)
1) Temperature = Hot and humid
2) Precipitation = Up to 157.5 in/year (400 cm/year)
3) Flora = Trees, ferns, vines
4) Fauna
a) Herbivores = Birds, insects
b) Carnivores = reptiles, amphibians
c) Omnivores = Some monkeys, wild forest pig
5) Other
a) Canopy/treetops is where most animals live
b) Canopy is thick allowing only 1% of sunlight to reach ground
c) Soil is poor because most nutrients are in plants

D) Temperate Grasslands (Prairie, Steppes, Pampas)
1) Temperature = has seasons with warm summers and cold winters
2) Precipitation = 10 - 29.5 inches/year (25- 75 cm/year) mostly snow
3) Flora = grasses, flowering plants, some trees by standing water
4) Fauna
a) Herbivores = prairie dog, bison, pronghorn antelope
b) Carnivores = Coyote, eagles, hawks
c) Omnivores = Shrew, Skunk

E) Savanna
1) Temperature = Hot with Wet and Dry Season

2) Precipitation = 59 inches/year (150 cm/year)
3) Flora = grasses, thorny bushes, few scattered trees
4) Fauna
    a) Herbivores = antelope, elephant, zebra, buffalo
    b) Carnivores =Lions, leopards, hyena, crocodile
    c) Omnivores = Baboon, some birds

F) Desert
1) Temperature = Hot days and cool nights
2) Precipitation = 10 inches/year (25 cm/year)
3) Flora = Cacti, creosol bushes
    a) Have extensive roots, store water in tissues, and have thorns or chemicals to avoid being eaten.
4) Fauna
    a) Herbivores = desert tortoise, jackrabbit, kangaroo rat, insects
    b) Carnivores = Coyote, desert fox, roadrunner, reptiles
    c) Omnivores = Raven
    d) Most animals are nocturnal and have light fur

G) Tundra
1) Temperature = Cold with short growing season
2) Precipitation = 12-20 inches/year (30-50 cm/year)
3) Flora = mosses, lichens, fast growing flowers
4) Fauna
    a) Herbivores = Caribou, musk oxen, arctic hare, lemmings
    b) Carnivores = wolves, arctic fox, wolverines
    c) Omnivores = Raven
    d) Animals have compact bodies and thick fur or feathers
5) Other
    1) Permafrost- Layer of soil below top soil that is permanently Frozen.
    2) Alpine Tundra – Located above the tree line on all major Mountains.

Environmental Science Notes 3-2 NAME_____

Marine Ecosystems (Oceans)

I. Abiotic factors
   A. Water Temperature-- decreases with depth
   B. Pressure-- increases with depth
   C. Sunlight-- decreases with depth

II. Plankton- microscopic organisms that float or drift freely in all freshwater and marine environments and are the base of the food chains.
   A. Phytoplankton- plant like plankton that create 50-85% of the Earth's oxygen
   B. Zooplankton-animal like plankton

III. Ecosystems
   A. Intertidal Zone - Where ocean meets land and undergoes tides
      1. Types
         a) Mud Flats
         b) Rocky Shore
         c) Sandy Beach
      2. Animals: crabs, sea star, anemones, urchins, snails, clams
      3. Adaptations
         a) Shells or flexible to deal with wave action
         b) Can breathe both air and under water
         c) Holdfasts- root like structures or glue to hold to rocks
      4. Estuary – Areas where freshwater rivers mix with salt water making a very nutrient rich ecosystem.
   B. Neritic Zone – Warm, gently sloping bottom, receives lots of sunlight
      1. Coral reef – most biodiverse aquatic ecosystem
      2. fauna and flora: Sponges, coral, turtles, seaweed, sea horse, colorful fish, octopi, dolphins
   C. Oceanic Zone – Steeply dropping floor of open ocean
      1. Animals= Sharks, whales, schooling fish, squid, jellyfish

   D. Benthic Zone – Deep ocean floor
      1. Thermal vents—cracks in the ocean floor that blow out heated sea water and chemicals (gases)
         a) Bacteria here eat hydrogen sulfide (rotten egg smell) from the vent. They are the bottom of the food chain. No sunlight needed!
         b) Pressures are extreme and would crush an unprotected human
         c) Temperature in the vent reaches 400-600 degrees but doesn't boil due to the water pressure above it
         d) Toxic chemicals released
         e) Total darkness
      2. Animals: Lantern Fish, tube worms, crab, chemosynthetic bacteria
      3. Adaptations
         a) Hard or flexible to deal with extreme pressures
         b) Scavenge on dead material that sinks from above ("ocean snow")
         c) Bioluminescence – Chemically make light
         d) chemosynthesis--Bacteria can make food from the energy in sulfur compounds that come out of hydrothermal vents
   E. Sargasso Sea- Floating rafts of algae that support an entire ecosystem

   F. Polar Ice of Antarctic and Arctic that supports a large variety of life like sea lions, penguins, polar bears.

Environmental Science Notes 3-3 NAME_____

Freshwater Ecosystems

I. Streams and Rivers
   A. Spring – place where water flows from underground river
   B. Stream – tiny flow of water from spring or runoff
   C. Tributary—streams that join a larger stream
   D. River—very strong wide stream
   E. Abiotic factors
      1. Speed of river
         a. Fast moving- more dissolved O2 in water (good for insects, fish)
         b. Slow moving – much less O2
      2. Temperature of river
         c. Cold- more O2 can be dissolved
         d. Warm- less O2 can be dissolved

II. Ponds and lakes
   A. Depth and temperature uniformity are the major differences between lakes and ponds.
   B. Zones
      1. Littoral Zone – Area closest to edge of water that receives plentiful sunlight allowing for abundant plant growth
         a. Flora – cattails, rushes, water lilies
         b. Fauna – Frogs, salamanders, turtles, fish
      2. Open water zone – surface of open water with no plants
         a. Flora – Phytoplankton
         b. Fauna – Bass, lake trout, salmon
      3. Deep water zone – No light can reach here.
         a. Flora – none (no light)
         b. Fauna – Scavengers like cat fish, carp, bacteria

III. Wetlands – Area sometimes underwater or with wet soil
   A. Marsh – flooded grassland located allow rivers and lakes
      1. Flora – Reeds, rushes, cattails, wild rice, duck weed
      2. Fauna – ducks, muskrat, turtles, frogs, fish
   B. Swamp- Flooded forest
      1. Flora – water loving trees like Cyprus, cedar, and willows as well as duck weed and water lilies
      2. Fauna – Fish, snakes, ducks, salamanders, frogs, turtles, alligators
   C. Bog- Sphagnum moss floating on a pond (water bed).