**Lecture 30 – Ecology**

* Ecology (oikos + logos): scientific study of interactions between (organisms) and

(environment)

* Subdisciplines within ecology
  + Oragnismal ecology: (Organisms) and their environments
  + Population ecology: (Population) and their environments
  + Community ecology: Biotic interactions between (species)
  + Ecosystem ecology: Energy flow and (chemical) cycling
  + Landscape ecology: Interactions among (ecosystem)
  + Global ecology: (Biosphere)
* An organism’s environment is determined by both abiotic and biotic factors

Abiotic: (non-living) Biotic: (living)

Physical Prey

Chemical Competitors

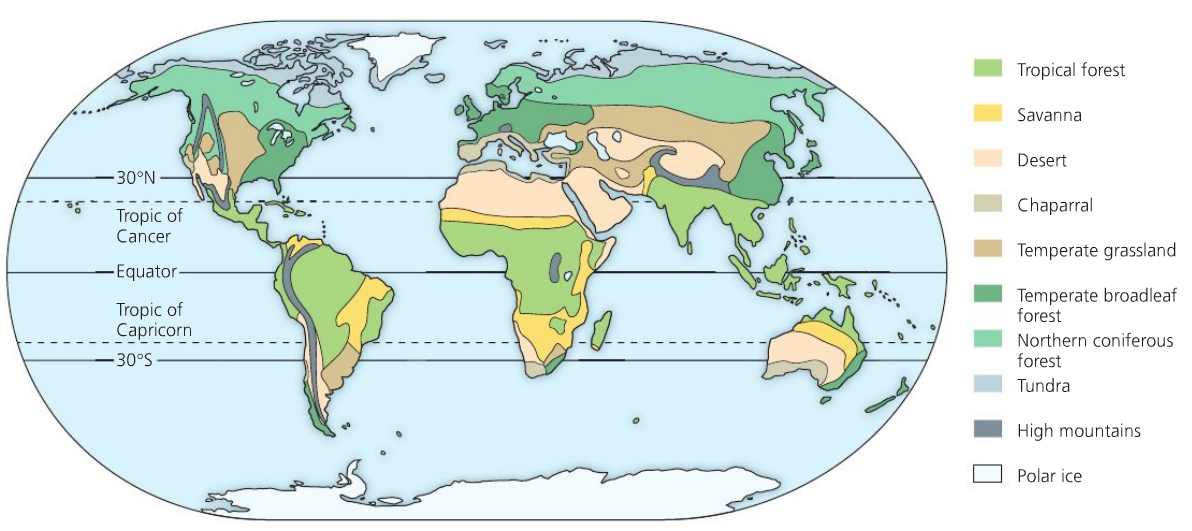
Geological Predators

Interaction determines (distribution) and (abundance) of organisms

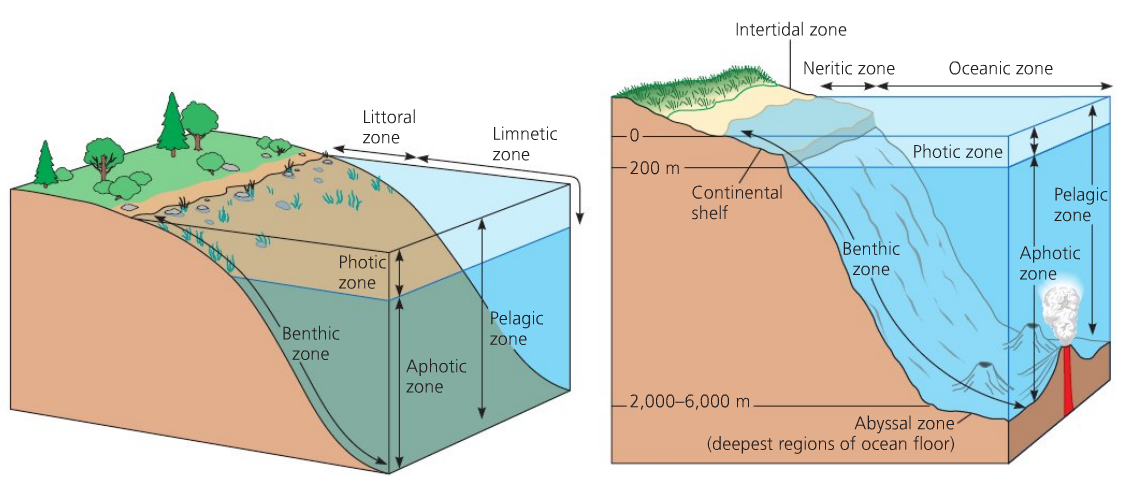
* (Climate) is a long-term, prevailing weather condition in a particular area
  + Main components: temperature, precipitation, sunlight, wind
  + (Macroclimate): global, regional, local level
  + (Microclimate): very fine patterns (e.g. fallen logs)
* Incidence of solar radiation drives global climate (Understand why there are differences in global climate, Fig. 52.2)
  + There is latitudinal variation in sunlight intensity
* Intensity of solar radiation varies seasonally because earth is (tilted) on its axis relative to its plane of orbit around the sun (Fig. 52.1)
* Intense solar radiation near the equator initiates a global pattern of (air circulation) and

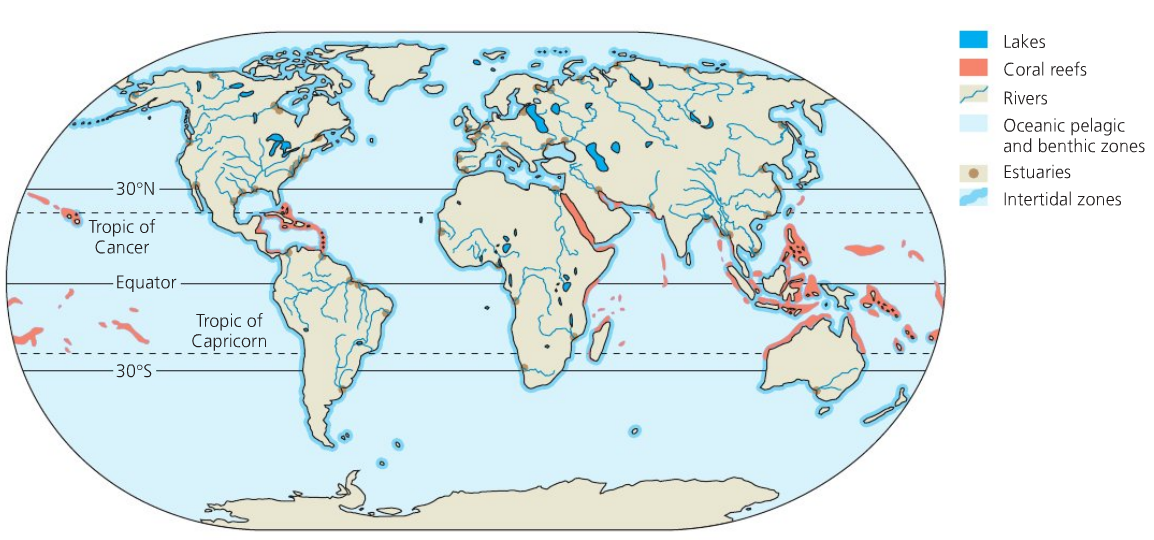
(precipitation) (Fig. 52.3)

* 30oN and 30oS have (arid) climate, often associated with desert
* Understand why.
* Bodies of water, mountains, and changing angle of the sun affect local climate
  + Because of the high specific heat of water, oceans and large lakes tend to moderate the climate of nearby land.
* Small organisms are affected by small-scale climate (microclimate)
  + Shade, evaporation, changing wind pattern, etc.
* (Biomes) are major terrestrial or aquatic life zones
* Terrestrial biomes characterized by (vegetation)
  + Terrestrial biomes show strong latitudinal patterns
  + (Temperature) and (precipitation) characterize terrestrial biomes (Fig. 52.10)



* Tropical Forest
  + Distribution: (equatorial and subequatorial regions) regions
  + Precipitation: (high precipitation) precipitation (> 200 cm/year)
  + Temperature: (high) temperature (25-29oC) year-round
  + Other attributes: (high) biodiversity
* Savanna
  + Distribution: (equatorial and subequatorial) regions
  + Precipitation: seasonal rainfall (30-50 cm/year)
  + Temperature: (warm) (24-29oC) year-round
  + Other attributes: grasses and small non-woody plants, scattered trees, large herbivores
* Desert
  + Distribution: bands near (30)o north and south latitude
  + Precipitation: (low precipitation) precipitation (less then 30 cm/year)
  + Temperature: variable (high as 50oC, low as -30oC)
  + Other attributes: plants adapted for (dry) environments
* Chaparral
  + Distribution: midaltitude ( costal) regions (*matorral* in Spain and Chile, *maquis* in France, *fynbos* in South Africa)
  + Precipitation: seasonal precipitation (30-50 cm/year)
  + Temperature: (hot) summer, (cool) rest of the year
  + Other attributes: shrubs and small trees, high plant diversity, high diversity of small mammals
* Temperate Grassland
  + Distribution: (temperate) regions (*Great Plains* in North America, *veldts* in South Africa, *pampas* in Argentina, *steppes* in Russia)
  + Precipitation: seasonal precipitation (30-100 cm/year)
  + Temperature: (hot) summer, (cold) winter
  + Other attributes: grasses and forbs, large grazers, suitable for (agriculture)
* Northern Coniferous Forest
  + Distribution: northern North America and Eurasia (*taiga*), largest terrestrial biomes
  + Precipitation: annual precipitation from 30-70cm
  + Temperature: long and cold winter
  + Other attributes: conifers, migratory birds, moose, brown bears, etc.
* Temperate Broadleaf Forest
  + Distribution: midaltitudes in Northern Hemisphere, New Zealand, Australia
  + Precipitation: 70-200 cm/year
  + Temperature: Four distinct seasons, summer hot and humid
  + Other attributes: (deciduous) trees, vertical layers within the forest
* Tundra
  + Distribution: expansive areas of the Arctic (20% of Earth’s land surface)
  + Precipitation: 20-60 cm/year
  + Temperature: long and cold winter, short and chilly summer
  + Other attributes: (permafrost), caribou, reindeer
* Aquatic biomes characterized by (physical environment)
* Many aquatic biomes are physically and chemically (stratified) (layered)
  + Based on light penetration: (photic) vs. (aphotic)
  + Based on distance from shore and water depth: littoral vs. limnetic (freshwater), intertidal vs. neritic vs. oceanic (marine)
  + Based on environment: (pelagic) vs. (benthic) (freshwater), pelagic vs. benthic vs. abyssal (marine)





* Lakes
  + Physical: standing bodies of water
  + Chemical: salinity, O2 concentration, nutrient content vary greatly
  + Other attributes: variable
* Wetlands
  + Physical: (inundated) by water periodically
  + Chemical: a high capacity to (filter) dissolved nutrients and chemical pollutants
  + Other attributes: support plants adapted to water-saturated soil, one of the most productive biomes
* Streams and rivers
  + Physical: (current)
  + Chemical: Headwater high in O2, downstream with organic enrichment
  + Other attributes: great diversity of fishes and invertebrates
* Estuaries
  + Physical: a (transition) area between river and sea
  + Chemical: salinity varies (depending on the tide level)
  + Other attributes: saltmarsh grasses, algae, oysters, crabs, and many fishes
* Intertidal zones
  + Physical: periodically submerged and exposed by the tides
  + Chemical: (high) O2 and nutrient level
  + Other attributes: high diversity and biomass of marine algae, animals adapted for

(attaching) to hard substrate

* Oceanic pelagic zone
  + Physical: vast realm of open blue water; 70% of Earth’ surface
  + Chemical: (high) O2 level, generally (low) nutrient concentration
  + Other attributes: phytoplankton, zooplankton, many free-swimming animals
* Coral reefs
  + Physical: formed from calcium carbonate skeletons of corals, sensitive to

(temperature)

* + Chemical: require high O2 level
  + Other attributes: exceptionally high (species) (fishes and invertebrates)
* Marine benthic zone
  + Physical: seafloor below surface waters, cold, high water pressure
  + Chemical: sufficient O2
  + Other attributes: deep-sea hydrothermal vents support (chemoautotrophs) (oxidize H2S)