Ecology: Major Biomes

Biomes: terrestrial ecosystems within specific climatic regions

Outline

1. Key concepts
2. The sun and its effects on climate
3. Atmospheric circulation and its effects on climate
4. Biomes cover wide geographic areas
5. Key Terms
6. Conclusions

Key Concepts:

- Energy from the sun is the initial energy source for nearly all ecosystems on Earth
- Interactions among global air circulation patterns, and ocean currents result in regional variations in patterns of temperature and rainfall
Key Concepts:

- A biome is a large unit of land that is characterized by climax vegetation of the ecosystem within its boundaries.
- Water covers more than 71% of the earth’s surface.

The sun and its effects on climate:

- Biomes: terrestrial ecosystems within specific climatic regions.
- Characteristics determined by temperature and rainfall (climate) and geographic features (mountains, etc.).
  - Heat from sun and its seasonal variations.
  - Global atmospheric and oceanic circulation patterns.

Biomes cover wide geographic areas:

Biomes classified into nine categories:

- Tundra
- Taiga
- Temperate deciduous forest
- Grassland
- Relic conifer forest
- Chaparral
- Desert
- Savannah
- Tropical rain forest
Tundra-1

- Most northerly biome in Eurasia, North America; between taiga forests and permanent ice
- Characteristics:
  - Meadow-like vegetation: sedges (few grasses) and lichens
  - Long, cold winters with low annual rainfall; Permafrost (permanent ice never melts);
    Warmest month has average daily mean temperature of 10°C or less
  - Short summers (growing season 2-4 months)
Tundra:
- Latitudinal (arctic) tundra and montane tundra (alpine tundra)
- Asexual reproduction
- Few species (the simplest biome)
- About top 30 cm soil thaws during the growing season, roots can freely penetrate it. Below that, the soil water permanently frozen
- A similar tundra vegetation occurs in high mountains
  - 60°N Alaska timberline (tree line) 900 m, 45°N Rocky mountain 3000 m, 20°N Central MEX 4000 m
- Exceeding slow succession
Taiga – Cold conifer forest-1
- Northern coniferous forest (spruce, pine, fir); Eurasia, North America – forest belt – the largest biome
- Characteristics:
  - Long, cold winters; little precipitation; short winter days and vice-versa; rapid plant growth and reproduction in summer
  - Large mammals abundant

Taiga – Cold conifer forest-2
- Growing season 3-5 months; temperature above 30°C sometimes
- Daily temperature is below freezing six months (Siberia average daily temperature is –43°C in January)
- Dominant plants: Cone-bearing plants spruce (Picea), fir (Abies), pine (Pinus)
- Leaves evergreen, needle-like
- With low shrubs and forbs, almost no grasses
- Slow succession: forbs-shrubs-trees

Temperate deciduous forest-1
- Climate supports trees which lose leaves seasonally (deciduous: leaf-dropping habit)
- Principal forests of Northern hemisphere
- Characteristics:
  - Warm summers, cold winters, moderate rainfall
  - More vegetation on forest floor/ more light
  - Animal life on ground and in trees
  - In areas with colder winters, coniferous forests abundant
Temperate deciduous forest
- Growing season about 200 days; typical four seasons
- Precipitation: 30-60 inches per year
- Dominant plants:
  - maple: *Acer*
  - oak: *Quercus*
- Slow succession: forbs-grasses-pines-oaks

Grassland (prairies, steppes)
- Also called Temperate Grassland
- Moderate rainfall: 15-30 inches per year
- Characteristics:
  - Large quantities of grasses (few shrubs or trees)
  - Many burrowing rodents
  - Herds of large grazing animals
  - Rich soil/ often converted to agriculture

Grassland (prairies, steppes)
- Hot summer and cold winter
- Slow succession
- Why the USA is the number one country for grain production? (rice, corn, wheat...)
Relic conifer forest

- Dominant northern regions 60-65 myr ago
- Remain little bit in California (Pacific coast regions of California to Canada)
- Cone-bearing trees related to spruce-fir
  Sequoiadendron, Sequoia, and Metasequoia (found in China early last century - living fossil)
- Tallest and Biggest trees (440 feet!)

http://www.rmtrr.org/oldlist.htm

Chaparral – Mediterranean vegetation

- Western side of continents, between 30°-40° latitude, with cool wet winter and warm dry summer
- Dominant plants: drought and fire-adapted shrubs, forbs
- Fire climax
- Leaf with wax, hard, thick
- Well developed underground stems and roots
- Very rapid succession

Chaparral

California chaparral shrublands
California oak woodlands
Desert -1

- Extremely dry and hot; sparse vegetation; dry air flows over desert regions
- Moisture lost to tropical forests or windward sides of mountains
- Temperature extremes; 30 degrees C difference from day to night
- Various adaptations of plants and animals to conserve water and stay cool!

Desert -2

- Rainfall: 0-10 inches per year, uneven – one year may plenty and another year no rain at all
- Dominant plants: many succulents – adapted to drought
- Large number of annual herbs
- Wettest plants found here
- Very slow succession

Desert

American Southwest southwestern Africa
**Savanna-1**
- Savanna - Dry forest – Monsoon forest
- Open grasslands (tall grasses); scattered shrubs, trees
- Equatorial, but the rainfall cannot support forest; grasses can grow
- Found between tropical forests and deserts
- Vegetation supports:
  - large herds of herbivores (zebra, gazelles)
  - carnivores (lions, etc.)
  - invertebrates (many insects, including termites)

**Savanna-2**
- Two seasons: dry and wet
  - 4-6 months rain and 6-8 months no rainfall
- Rainfall 10 - 60+ inches per year
- Could high as over 500 inches
- Relatively fast succession

**Biomes**

http://www.infoplease.com/ipa/A0001379.html
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**Grassland and Savanna**

- **shortgrass prairie**
- **African savanna**

**Tropical rainforest -1**

- Regions of high temperature and rainfall near equator
- Abundant species; plants including vines, epiphytes, orchids, bromeliads, lianas
- Trees support a diverse community of plants and animals (vines to mammals); greatest biodiversity; largest number of layers
Tropical rainforest -2

- Buttressed trees, cauliflory and smooth bark common
- Rainfall 60+ inches per year (normally 100-200 inches), rains each month, each week, even everyday
- Succession very rapid

Key Terms

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- Dominant species
- Succession
- Rainfall
In Conclusion

- The biosphere encompasses the earth’s waters, the lower atmosphere, and the uppermost portions of its crust in which organisms live.
- A biome is shaped by regional variations in climate, landforms, and soils.
- Water covers more than 71% of the earth’s surface.

I love my home – Savanna!