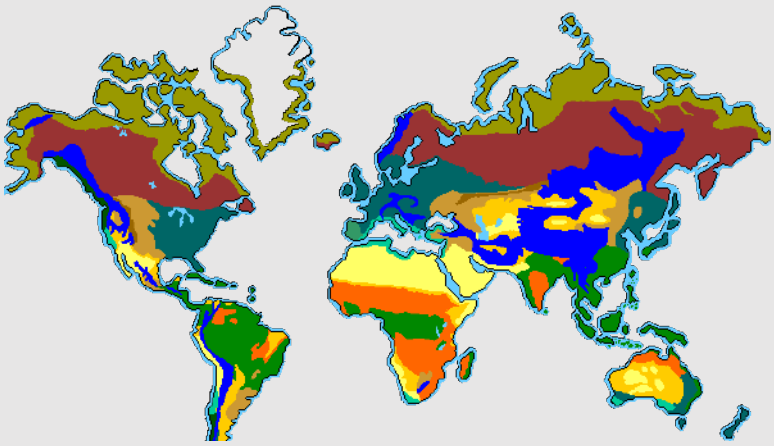


World Biomes

Overview of Chapter

Earth's Major Terrestrial Biomes

1. Tundra
2. Boreal Forests
3. Temperate Rainforest
4. Temperate Deciduous Forests
5. Grasslands
6. Chaparral
7. Deserts
8. Savanna
9. Tropical Rainforests

Aquatic Biomes

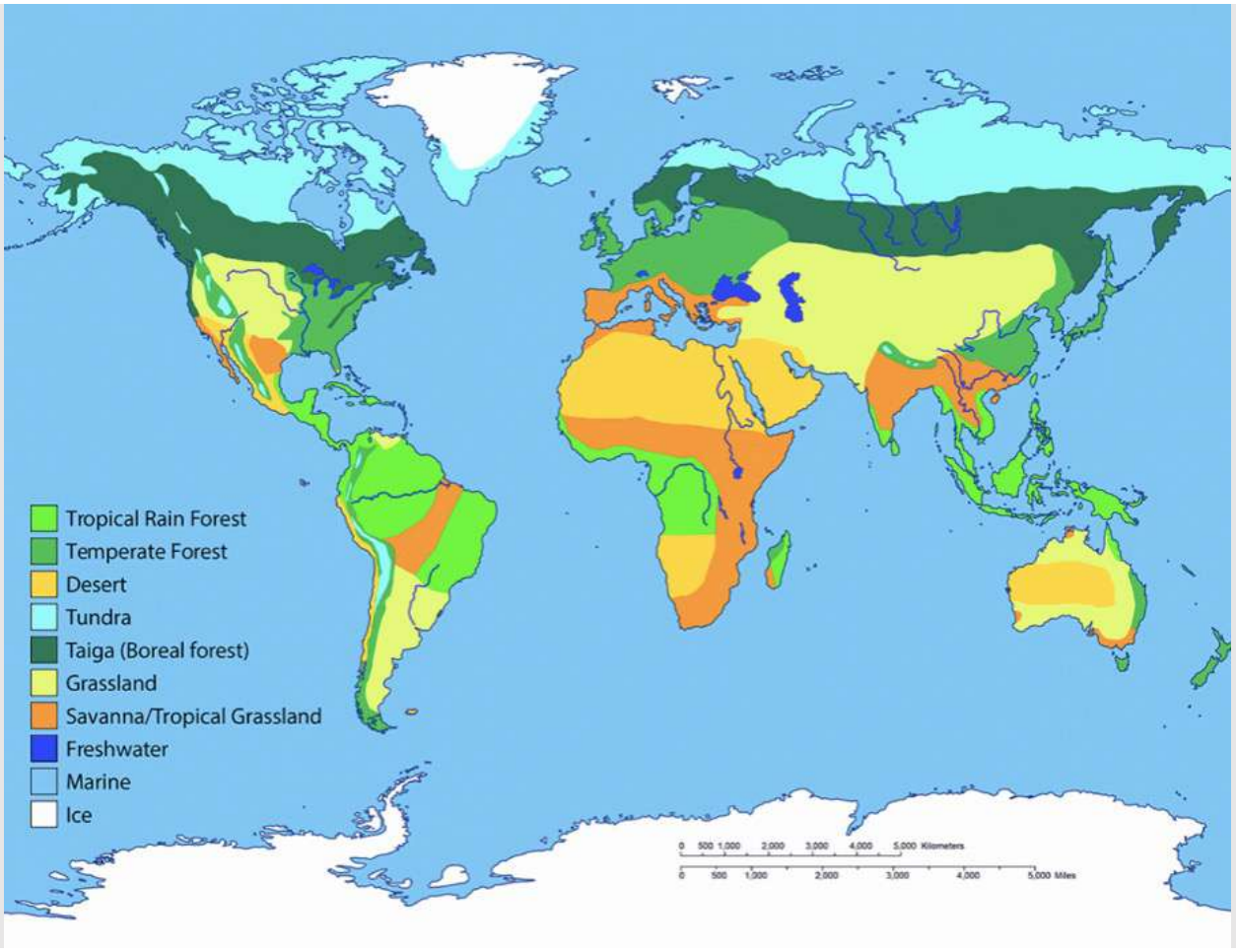
1. Freshwater Ecosystems
2. Estuaries
3. Marine Ecosystems

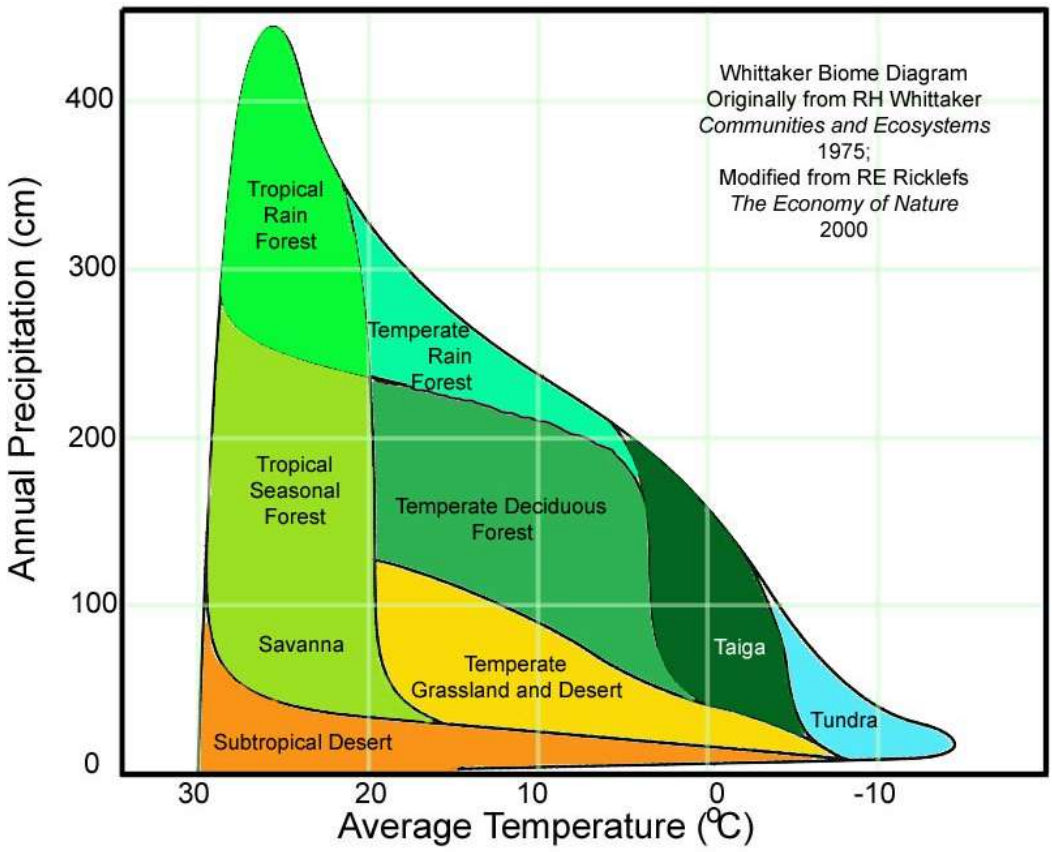
Earth's Major Biomes

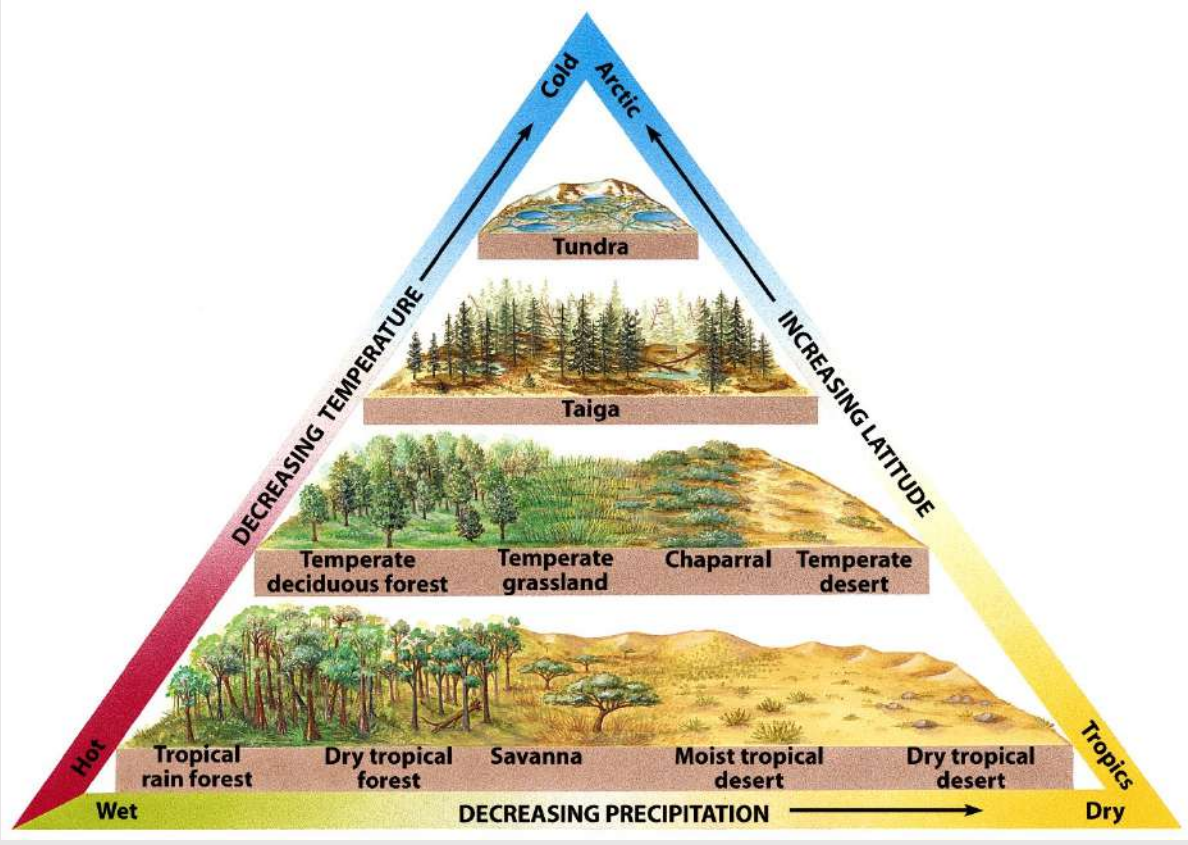
- Biome
  - A large, relatively distinct region with a similar climate soil, plants, and animals, regardless of where it occurs in the world
  - Nine major terrestrial biomes

- Location of each biome is primarily determined by:
  - Temperature (varies with both latitude and elevation)
  - Precipitation

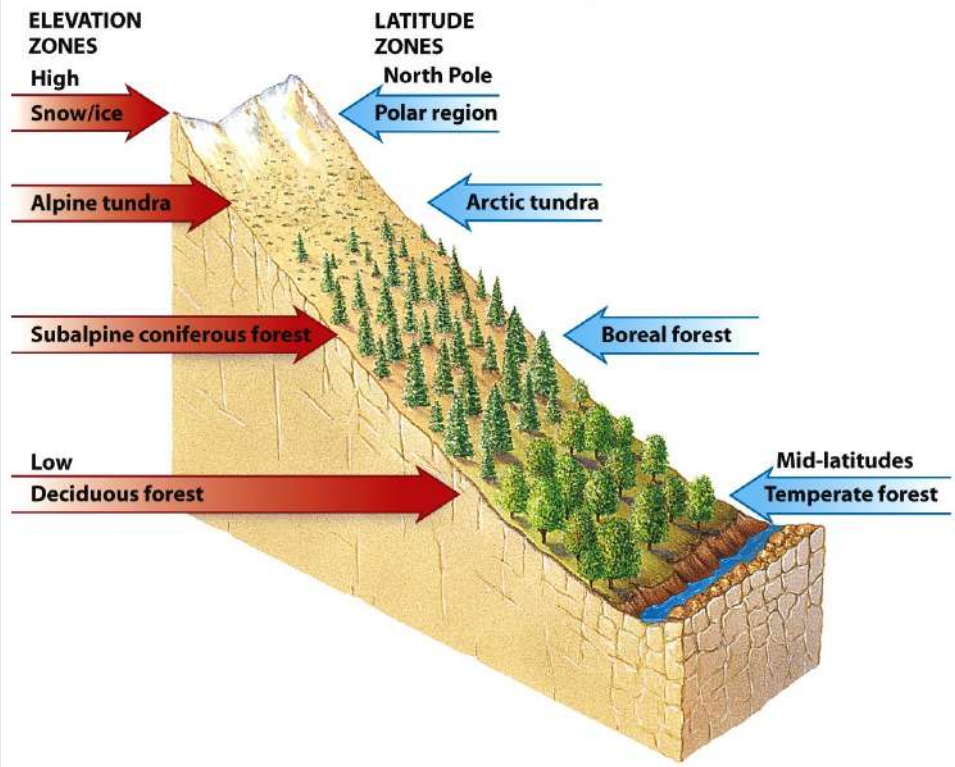
- Biomes can also be affected by
  - Winds, rapid temperature changes, fires, floods, etc.




Whittaker Biome Diagram
Originally from RH Whittaker
Communities and Ecosystems
1975;
Modified from RE Ricklefs
The Economy of Nature
2000
Annual Precipitation (cm)
400
300
200
100
0
Tropical Rain Forest
Temperate Rain Forest
Tropical Seasonal Forest
Temperate Deciduous Forest
Savanna
Taiga
Temperate Grassland and Desert
Tundra
Subtropical Desert
30
20
10
0
-10
Average Temperature (°C)


Cold
Arctic
DECREASING TEMPERATURE
INCREASING LATITUDE
Tundra
Taiga
Temperate deciduous forest
Temperate grassland
Chaparral
Temperate desert
Hot
Tropical rain forest
Dry tropical forest
Savanna
Moist tropical desert
Dry tropical desert
Tropics
Wet
DECREASING PRECIPITATION
Dry

Vertical Zonation



Tundra

- Treeless biome in the far north with harsh, cold winters and extremely short summers
- Precipitation
  - 10-25 cm/yr
- Temperature
  - Short growing season
  - 50-160 days

Tundra

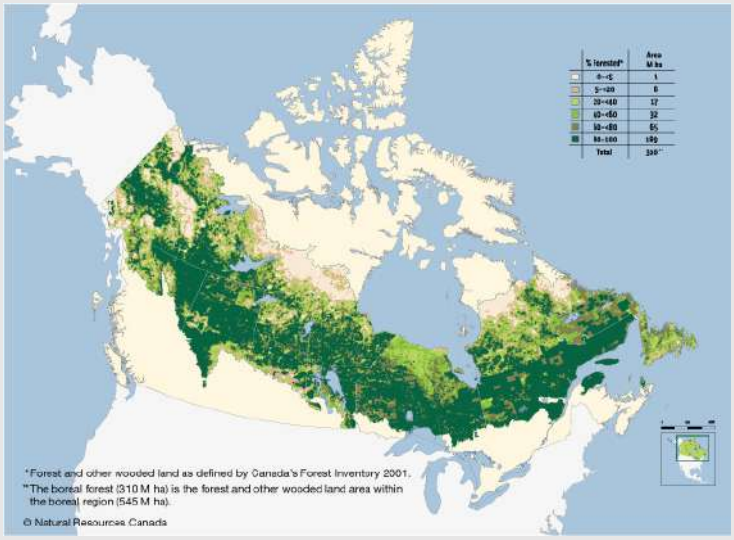
- Nutrient poor soils with little organic material
  - Permafrost present
- Low species richness
  - Veg is mostly grasses and sedges
  - Very simple food web
- Low primary productivity

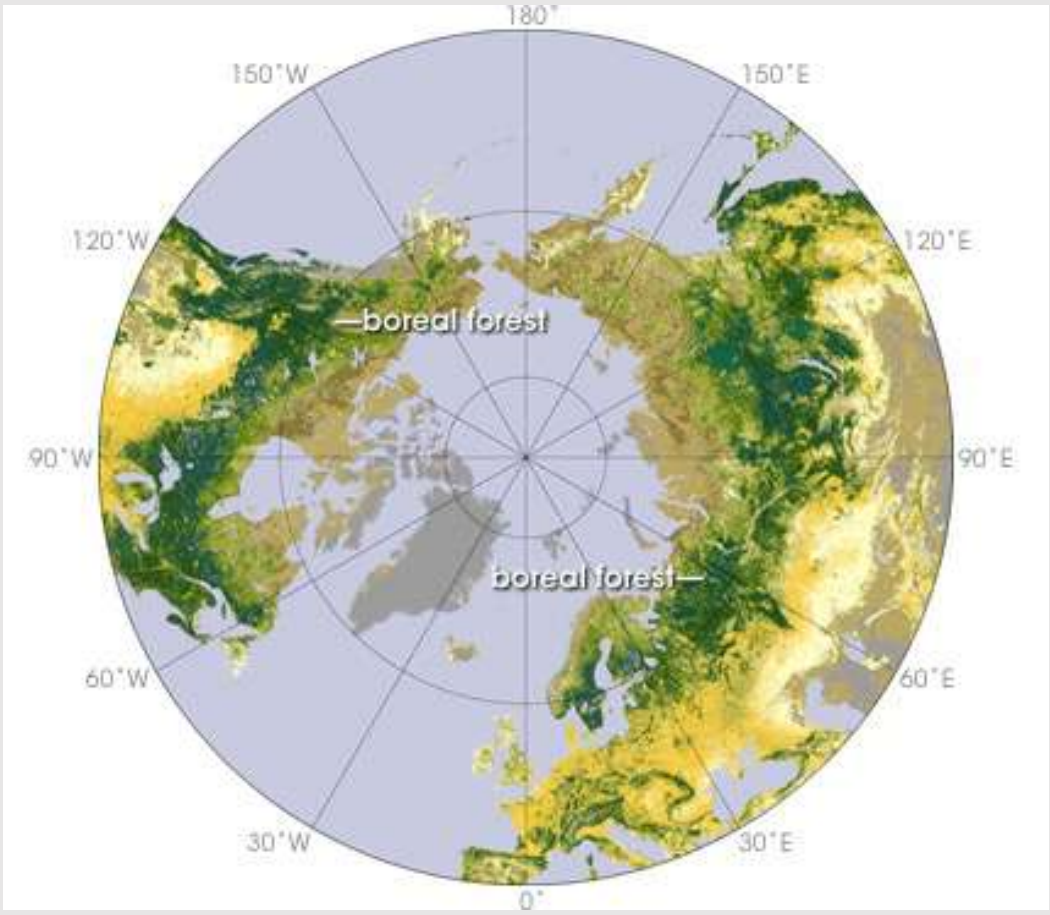
Alpine Tundra

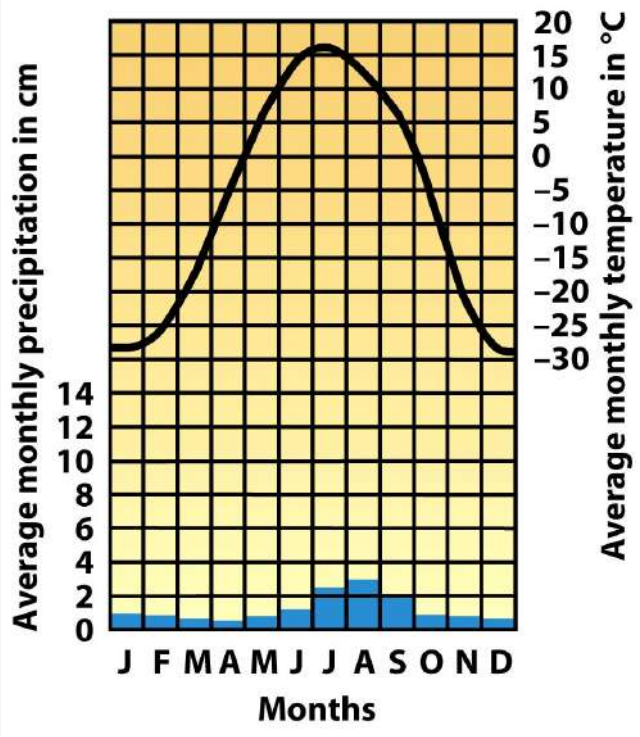
- Alpine tundra is a treeless biome found at high altitudes in mountains worldwide.
- It is characterized by low temperatures, short growing seasons, and harsh winds.
- The vegetation is adapted to the harsh conditions, with low-growing plants that have small leaves and animals often a thick covering of hairs or fur.
- The alpine tundra is home to a variety of animals, including small mammals, birds, and insects.
- Helps to regulate the water cycle.
- The alpine tundra is a fragile ecosystem, and it is susceptible to damage from human activities.
- It is also sensitive to climate change.

Boreal Forests

- A region of coniferous forests in the northern hemisphere
  - Just south of tundra
- Covers 11% of earth's land
- Growing Season
  - A little longer than tundra
- Precipitation
  - ~ 50 cm/yr






Average monthly precipitation in cm
14
12
10
8
6
4
2
0
20
15
10
5
0
−5
−10
−15
−20
−25
−30
Average monthly temperature in °C
J F M A M J J A S O N D
Months

- Soils are acidic and mineral poor
- Vegetation comprised of drought resistant conifers
  - White spruce
  - Balsam fir
  - Eastern larch
- Mostly small animals and migrating birds
- Some large animals are present
  - Wolves, bear, moose


Fox


Lynxes


Bear


Squirrel

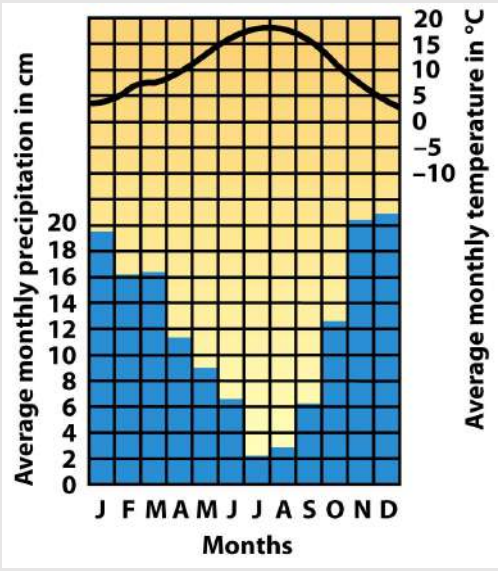

Reindeer


Moose


Wolf

Temperate Rainforest

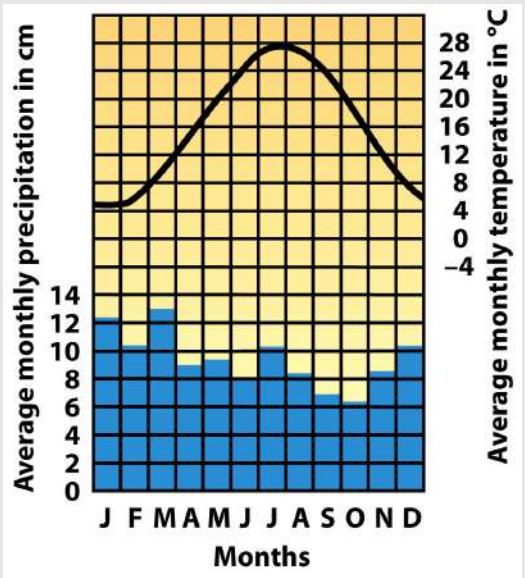
- Coniferous biome with cool weather, dense fog and high precipitation
  - Ex: Northwest US
- Precipitation
  - > 127 cm/yr
  - Heaviest in winter
- Temperature
  - Winters are mild
  - Summers are cool



- Soils are nutrient-poor, but high in organic material (dropped needles)
  - Cool temperatures slow decomposition
- Dominant Vegetation
  - Large evergreen trees
  - Old-growth forest
- Variety of cool climate animal life
- High species richness
- Heavily logged

Temperate Deciduous Forests

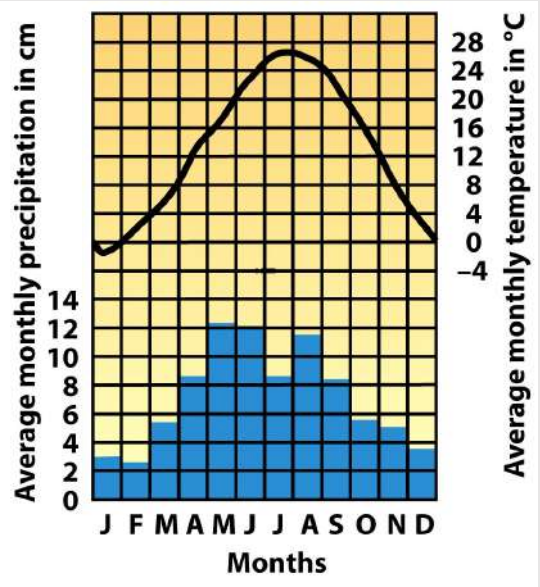
- Forest biome that occurs in temperate areas with a moderate amount of precipitation
- Precipitation
  - 75-150 cm/yr
- Temperature
  - Seasonality
  - Hot summers and cold winters



- Topsoil is rich in organic material and underlain by clay
- Vegetation is primarily deciduous
  - Oak, maple, beech
- Animals
  - Deer, bear and small animals
- Most of this biome land area has been regenerated after farming & timber harvest

Grassland

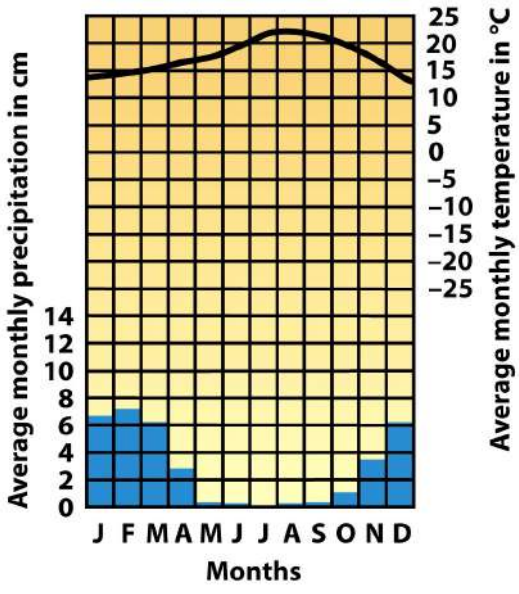
- Grasslands are biomes with hot summers and / or cold winters and less precipitation to support trees
- Precipitation
  - 25-75 cm/yr
- There are two different types of grasslands
  - tall-grass, which are humid and very wet
  - short-grass, which are dry, with hotter summers and colder winters than the tall-grass
- 90% of this biome has been lost to farmland



- Grassland biomes can be found in the middle latitudes, in the interiors of continents. They can have either moist continental climates or dry subtropical climates.
- In Argentina, South America, the grasslands are known as **pampas**. The climate there is humid and moist. Grasslands in the southern hemisphere tend to get more precipitation than those in the northern hemisphere, and the grass tends to be the **tall-grass variety**.
- In the middle of North America is a huge area of land which was once covered with grasses and colourful wild flowers. The French called the rolling plains of grass "**prairie**"
- There is a large area of grassland that stretch from the Ukraine of Russia all the way to Siberia. This is a very cold and dry climate because there is no nearby ocean to get moisture from. Winds from the arctic aren't blocked by any mountains either. These are known as the Russian and Asian **steppes**.

Chaparral

- Also called a Mediterranean Climate
  - Ex: Southern California
  - Ex: Greece
- Temperature
  - Mild, moist winters
  - Hot, dry summers
- Frequent fires

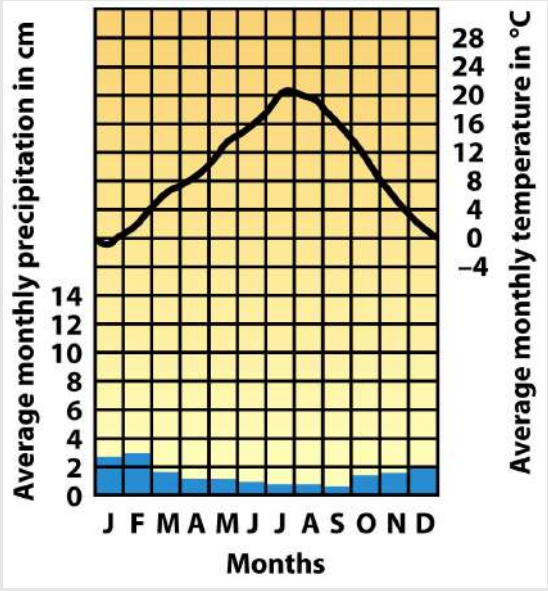


- Soil is thin and often not fertile
- Vegetation
  - Dense growth of evergreen shrubs
  - Lush during the growing season
- Animals
  - Mule deer, chipmunks, many species of birds

- Fire plays a big role in maintenance of this biome
- Lot of seeds are fire tolerant and some may even be activated by fire.

Deserts

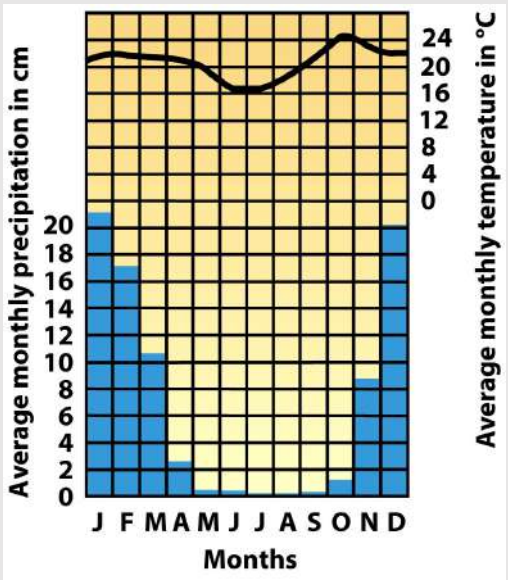
- Biome where lack of precipitation limits plant growth
- Temperature
  - Can very greatly in 24-hr period, as well as yearly (based on location)
- Precipitation
  - < 25 cm/yr



- Soils low in nutrients, high in salts
- Vegetation sparse
  - cactus and sagebrush
- Animals are very small to regulate temperature

Savanna

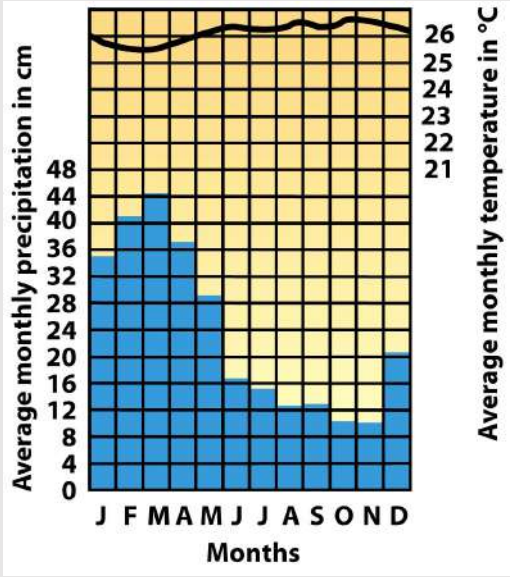
- Tropical grassland with widely scattered trees
- Temperature
  - Varies little throughout the year
- Precipitation
  - Seasons regulated by precipitation, not temperature
  - 76-150 cm/yr



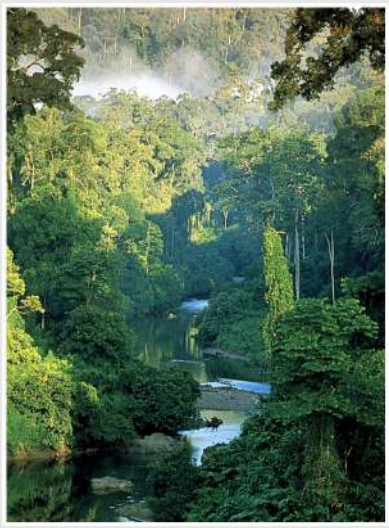
- Soil low in nutrients due to leaching
- Vegetation
  - Wide expanses of grass
  - Occasional Acacia trees
- Animals
  - Herds of hoofed animals
  - Large predators- lions, hyenas, etc.

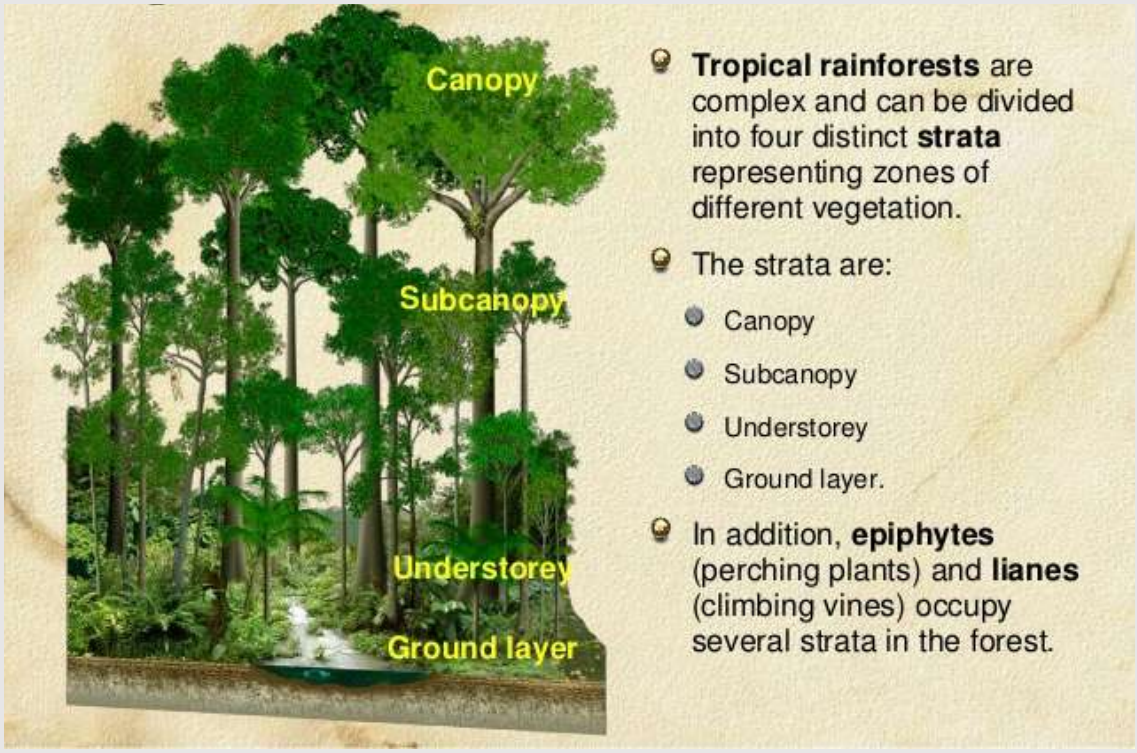
Tropical Rainforest

- Lush, species-rich biome that occurs where climate is warm and moist throughout the year
- Precipitation
  - 200-450 cm/yr
- Very productive biome
- Most species-rich biome



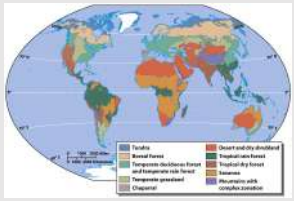
- Ancient, weathered, nutrient-poor soil
  - Nutrients tied up in vegetation, not soil
- Vegetation
  - 3 distinct canopy layers
- Animals
  - Most abundant insect, reptiles and amphibians on earth





- **Tropical rainforests** are complex and can be divided into four distinct **strata** representing zones of different vegetation.
- The strata are:
  - Canopy
  - Subcanopy
  - Understorey
  - Ground layer.
- In addition, **epiphytes** (perching plants) and **lianes** (climbing vines) occupy several strata in the forest.

Aquatic Biomes



- Fundamental Division
  - Freshwater
  - Saltwater
- Aquatic Ecosystems also affected by
  - Dissolved oxygen level, light penetration, pH, presence/absence of currents
- Three main ecological categories of organisms
  - Plankton- free floating
  - Nekton- strong swimming
  - Benthos- bottom dwelling

Thank You