



## *Ecology: Major Biomes*

Biomes: terrestrial ecosystems  
within specific climatic regions

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## *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. Aquatic life zones cover the majority of the Earth's surface
6. Conclusions

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## *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

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## *Grassland(prairies, steppes) -1*

- ◆ 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

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## *Grassland(prairies, steppes) -2*

- ◆ Hot summer and cold winter
- ◆ Slow succession
- ◆ Why the USA is the number one country for grain production? (rice, corn, wheat...)

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## *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
  - Sequoia and Metasequoia (found in China early last century - living fossil)
- ◆ Tallest and Biggest trees (440 feet!)

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### 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

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### Chaparral



California chaparral shrublands



California oak woodlands

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### 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!

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### 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

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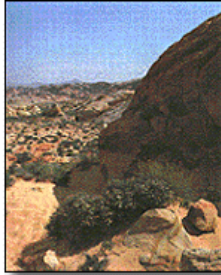
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### Desert



American Southwest



southwestern Africa

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### 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)

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## 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 60 - 600 inches  
highest rainfall per year?  
highest rainfall per day?
- ◆ Man (*Homo sapiens*) origin
- ◆ Relatively fast succession

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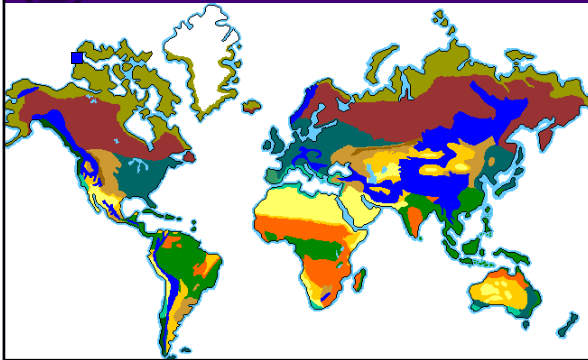
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## Biomes




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24 hours (World)	Foc-Foc, La Réunion	Jan. 7-8, 1966	72	182.5
24 hours (N. Hemisphere)	Paishih, Taiwan	Sept. 10-11, 1963	49	125
24 hours (Australia)	Bellenden Ker, Queensland	Jan. 4, 1979	44	114
24 hours (U.S.)	Alvin, Tex.	July 25-26, 1979	43	109
24 hours (Canada)	Ucluelet Brynnor Mines, British Columbia	Oct. 6, 1967	19	49
5 days (World)	Commerson, La Réunion	Jan. 23-28, 1980	156	395
1 month (World)	Cherrapunji, India	July 1961	366	930
12 months (World)	Cherrapunji, India	Aug. 1860-Aug. 1981	1,042	2,647
12 months (U.S.)	Kukui, Maui, Hawaii	Dec. 1981-Dec. 1982	739	1878

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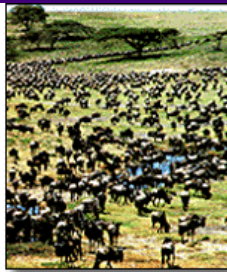
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## Grassland and Savanna



shortgrass prairie



African savanna

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## 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

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## Tropical rainforest -2

- ◆ Buttressed trees, cauliflory and smooth bark common
- ◆ Leaf waxy with an entire margin and a long pointed drip-tip
- ◆ Rainfall 60+ inches per year (normally 100-200 inches), rains each month, each week, even everyday
- ◆ Succession very rapid

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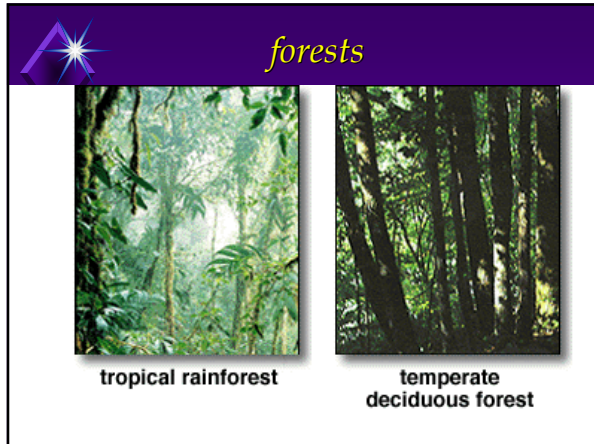
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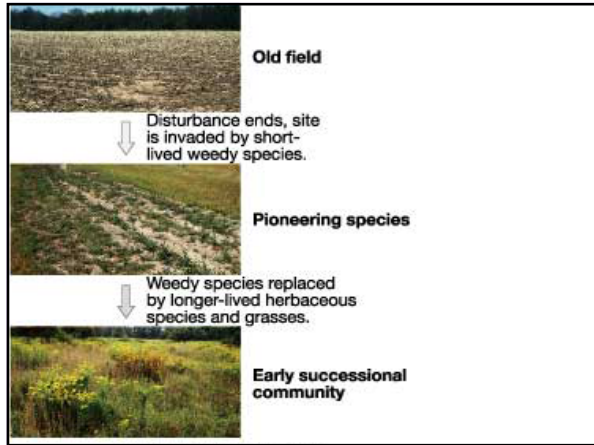
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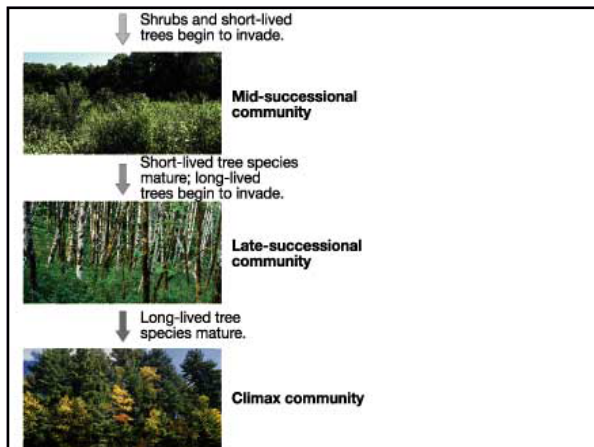
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*Aquatic life zones cover the majority of the Earth's surface*

- ◆ Fresh water life zones
- ◆ Estuaries: Life between rivers and oceans
- ◆ Ocean life zones

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### *Fresh water life zones*

- Only 2% of Earth's surface
  - Interconnected with terrestrial ecosystems
  - Open: derives organic material from outside
- Stationary water (lakes):
  - shore, open water, deep water life zones
- Flowing water (rivers): different ecosystem
  - Higher dissolved oxygen
  - More heterotrophic (fewer producers)

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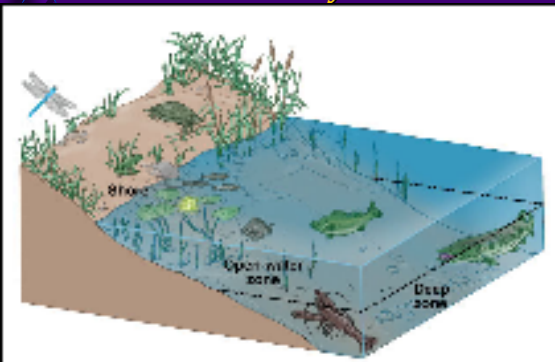
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### *Fresh water life zones*



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## Estuaries: Life between rivers and oceans

- ◆ Where rivers meet the ocean: mix of fresh and salt water habitats in marshes, deltas, bays
- ◆ Various adaptations of plant and animal life to changing flow rates and salinity
- Nutrient supply: abundant; derived from terrestrial ecosystems upstream (also easily polluted from these sources!)

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## Ocean life zones -1

- Limiting factors to ocean life:
  - Concentration of oxygen (highest at or near surface)
  - Availability of light and food
- Habitats:
  - **Intertidal zone:** between the high and low tide water marks  
harsh environment; changing conditions  
rocky/sandy shores: abundant life

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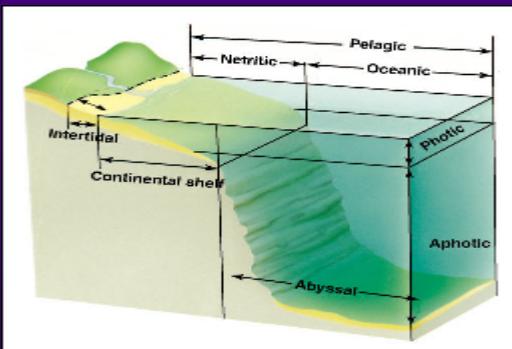
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## Ocean life zones



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## *Ocean life zones -2*

Neritic zone: shallow waters along the coasts

30-60 miles out on continental shelf  
surface to 200 meters down

abundant life in intricate food webs

Open-sea zone: beyond continental shelf;  
depths: 200 m to ocean floor

diverse ecosystem with intricate food webs

below 200 m: little light; bizarre adaptations

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### *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*

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I love my home  
- Savanna!



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