INTRODUCTION TO BIOMES, AND FOREST BIOMES

- 1. Introduction
- 2. Biome types and distribution
- 3. Equatorial and tropical forest biome
- 4. Midlatitude broadleaf and mixed forest biome
- 5. Needleleaf and montane forest biome

Types of terrestrial biomes:

FOREST (mainly trees) SAVANNA (transitional) **GRASSLAND** (mainly grasses) SHRUBLAND (dry conditions, leathery scrub vegetation) **DESERT** (very dry conditions, drought-tolerant species) TUNDRA (cold conditions, grasses and small herbs)

Relationship between climate and ecosystems. Source: Christopherson, 2012, p. 564.

torest

Precipitation

Grasslands

Wet

Moist tundra

Cool desert

Temperate

Hot

Spruc **Eir forest**

> Shor orass

Ra

Hot

Temperate desert

Deciduou forest

grass

Hot desert

Dry

Dry tundra

Cool

Alpine

CHIDOCRATINE C

Cold

and

Altitudinal and latitudinal zonation. Source: Christopherson,

2012, p. 565.

Vertical zonation Increasing altitude from sea level



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Global terrestrial biomes. Source: Christopherson, 2012, p. 596-657.





Global terrestrial biomes.

Source: Christopherson, 2012, p. 596





Biogeographic realms- (a) plants. Source: Christopherson, 2012, p. 592.



Biogeographic realms- (b) animals.

Source: Christopherson, 2006, p. 651.





Present-day coastlines. Source: CLIMAP Project members, 1976.



Coastlines at 18,000 BP. Source: CLIMAP Project members, 1976.



FOREST BIOMES: THREE DIFFERENT ONES

- Equatorial and tropical forest biome
- Midlatitude broadleaf and mixed forest biome
- Needleleaf and montane forest biome

Forest biomes: three different ones

Adaptations to climate apparent in:

• FOREST STRUCTURE

• FEATURES OF TREE SPECIES

LOW-LATITUDE (tropical rain) FOREST

Obvious climatic characteristics?

Climate characteristics of equatorial and tropical

forests. Source: Christopherson, 2012, p. 262.



 Station: Uaupés, Brazil
 Elevation: 86 m (282.2 ft)

 Lat/long: 0° 08' S 67° 05' W
 Population: 10,000

 Avg. Ann. Temp.: 25°C (77°F)
 Ann. Temp. Range:

 Total Ann. Precip.:
 2 C° (3.6 F°)

 291.7 cm (114.8 in.)
 Ann. Hr of Sunshine: 2018





 60 m (200 ft.)
 High

 level
 canopy

40 m (130 ft.)

20 m (65 ft.)

15 m (50 ft.)

5 m (15 ft.)

Middlelevel canopy

Lowerlevel canopy

Source: Christopherson, 2009, p. 658

Emergents

40-100 per hectare.

Species density very high:

Epiphytes

Lianas

~1% of canopy light

 60 m (200 ft.)
 High

 level
 canopy

 50 m (165 ft.)
 High

40 m (130 ft.)

20 m (65 ft.)

15 m (50 ft.)

5 m (15 ft.)

Middlelevel canopy

Lowerlevel canopy OXISOL: a highly weathered soil found in tropical wet environments



Global distribution of oxisols. Source: Christopherson, 2012, p. 540.



Buttress roots on a tree in Singapore.



Deforestation in Brazil. Source: Rowntree *et al.*, 2012, p. 130.

1975





Deforestation in Brazil. Source: Rowntree *et al.*, 2012, p. 130.

2001









Source: Christopherson, 2012, p. 600.



(b) 2009

Source: Christopherson, 2012, p. 600.

Brazil's deforestation compared to U.S. land area. Source: Christopherson, 2012, p. 601.



Midlatitude broadleaf and mixed forest

Obvious climatic contrasts with low latitudes?

Climate characteristics of equatorial and tropical

forests. Source: Christopherson, 2012, p. 262.



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 Ann. Hr of Sunshine: 2018



Climate characteristics of midlatitude forests. Source: Christopherson, 2009, p. 295.



Bluefield, West Virginia.

Avg. annual temperature: 12 °C (53.6 °F)

Total Annual Precipitation: 101.9 cm (40.1 in.)

Broadleaf forest in the Appalachians.

Source: ForestryImages.

Note density of species somewhat less than tropical forests– canopy is less dense.



Broadleaf forest in the Appalachians.

Source: ForestryImages.

Forest floor is dark, but less dark than tropical forests. *Seasonal* light variations are very important



Late winter needleleaf forest scene near Portland, ME. Source: Christopherson, 2009, p. 300.



HIGH-LATITUDE NEEDLELEAF (boreal) FOREST

Obvious climatic challenges for plant growth?

Climate characteristics of midlatitude forests.

Source: Christopherson, 2009, p. 295; see also Christopherson, 2012, p. 266.



Bluefield, West Virginia. Avg. annual temperature: 12 °C (53.6 °F) Total Annual Precipitation:

101.9 cm (40.1 in.)

Climate characteristics of needleleaf forests.

Source: Christopherson, 2012, p. 272.









Adaptations:

Trees more spread out

Tree shape sheds snow

Mostly evergreen Needles well insulated Thick bark insulates trunk