ENV 103

Biomes

Major varieties of world ecosystems

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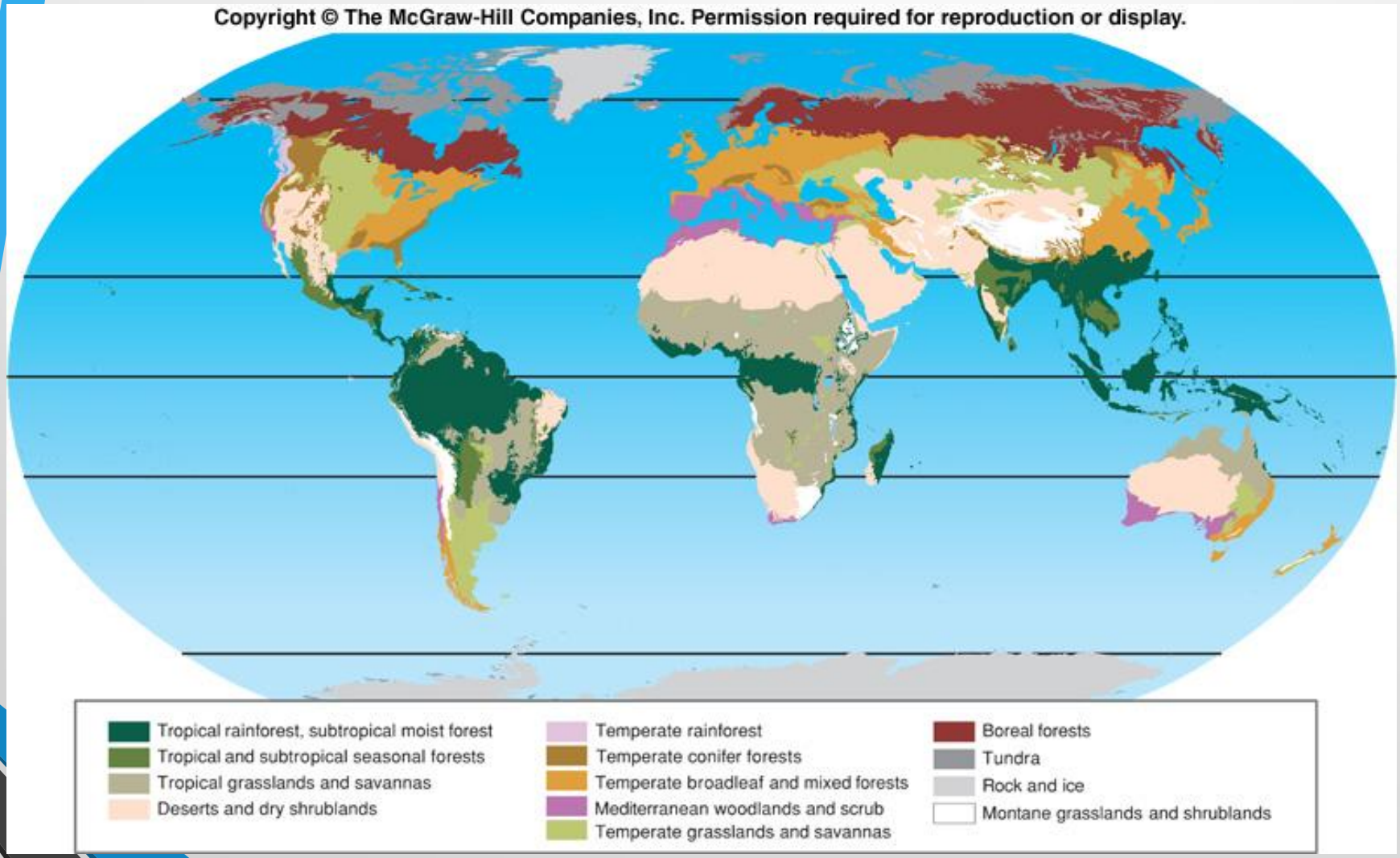
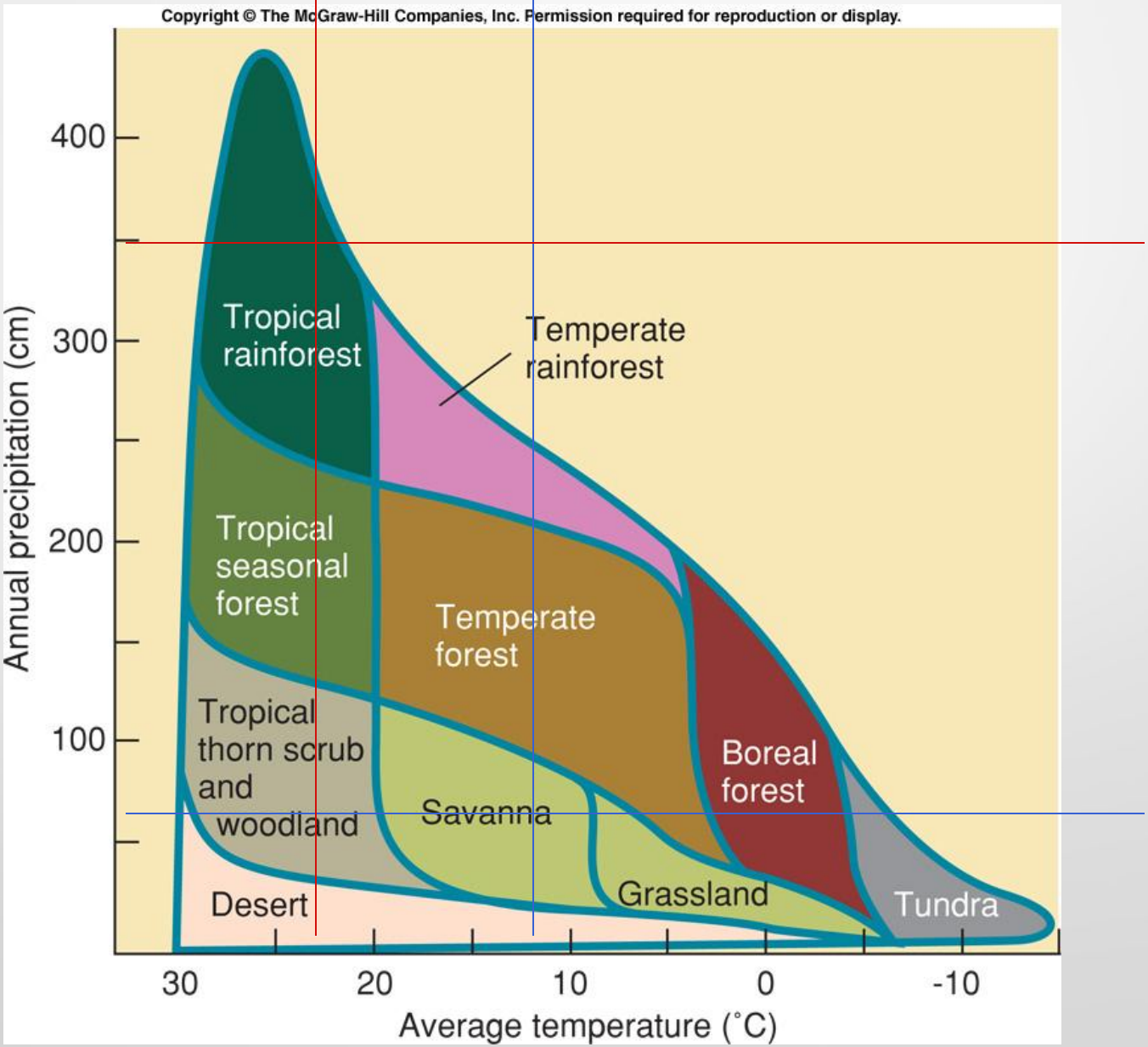
Biomes are climatically and geographically defined as similar climatic conditions on the Earth, such as communities of plants, animals, and soil organisms, and are often referred to as ecosystems. Some parts of the earth have more or less the same kind of abiotic and biotic factors spread over a large area creating a typical ecosystem over that area. Such major ecosystems are termed as biomes. Biomes are defined by factors such as plant structures (such as trees, shrubs, and grasses), leaf types (such as broadleaf and needle leaf), plant spacing (forest, woodland, savanna), and climate.

- **Biomes:** ecosystem of life zones, consisting of similar climatic, topographic, soil conditions (abiotic components) and similar biological communities (biotic components).
- Defined first by climate zone, then by major plant type.
  - Temperature and precipitation are most important determinants in biome distribution
  - Most terrestrial biomes are identified by the dominant plants of their communities.

World Biomes



Biomes & Climate



Biomes

Terrestrial

Forest

- Tropical
- Temperate
- Boreal forests (Taiga)

Tundra

- Arctic
- Alpine

Desert

Grassland

- Savannah
- Chaparral/Steppe

Aquatic

Marine

- Open ocean
- Antarctic ocean (edge of the ice)
- Estuary
- Coral Reef
- Shallow ocean/bay
- Mangrove forests

Freshwater

- River
- Lake
- Pond
- Wetlands (Swamps, marshes, etc.)

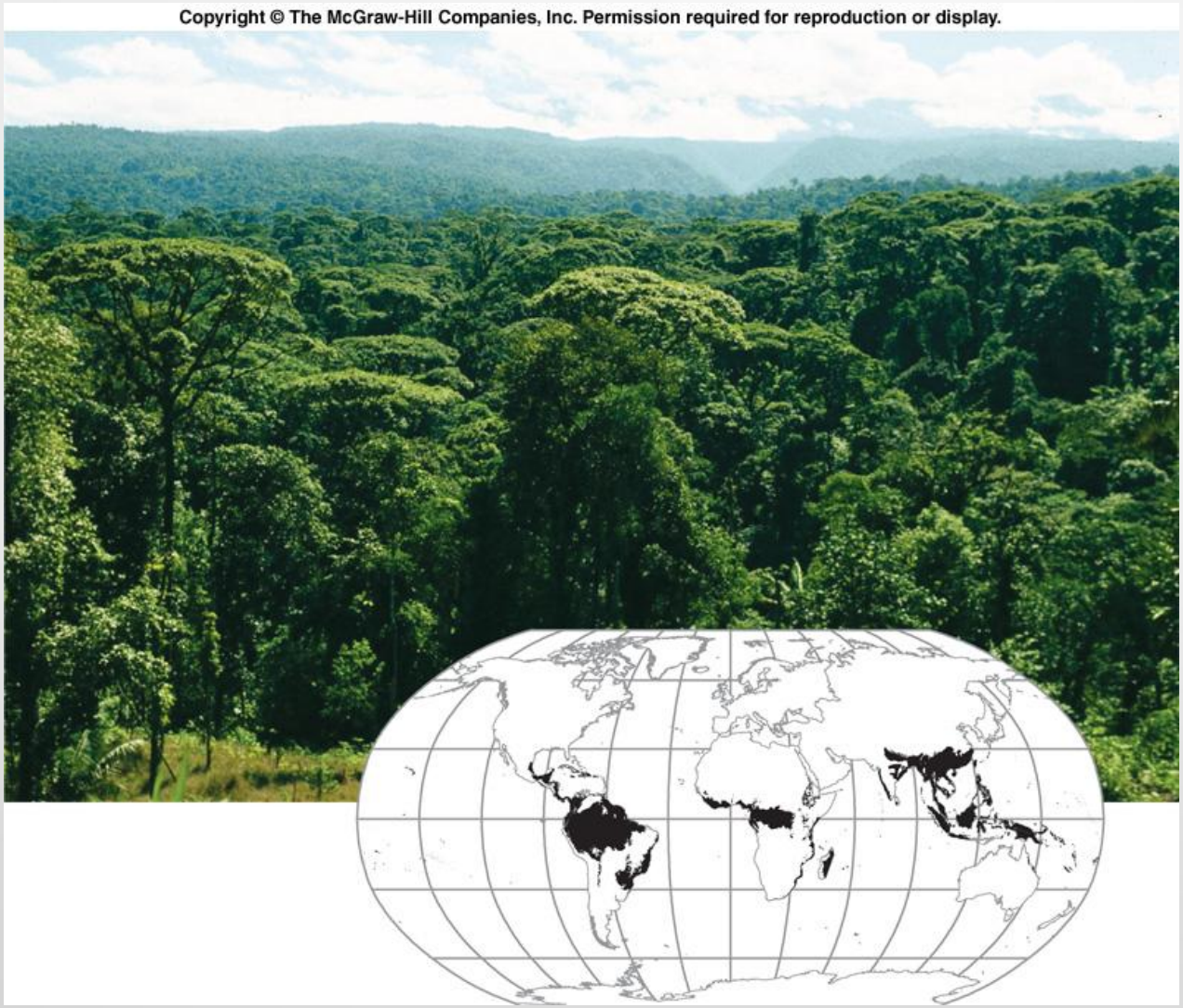
Forest

- A forest is a community of trees, shrubs, herbs, and associated plants and organisms that cover a considerable area that use oxygen, water and soil nutrients as the community attains maturity and reproduces itself.
- Depending on the geographical location, rainfall and temperature, forests contain different types of plant species, ranging from large trees to smallest of weeds.
- Based on their locations, forests are classified as

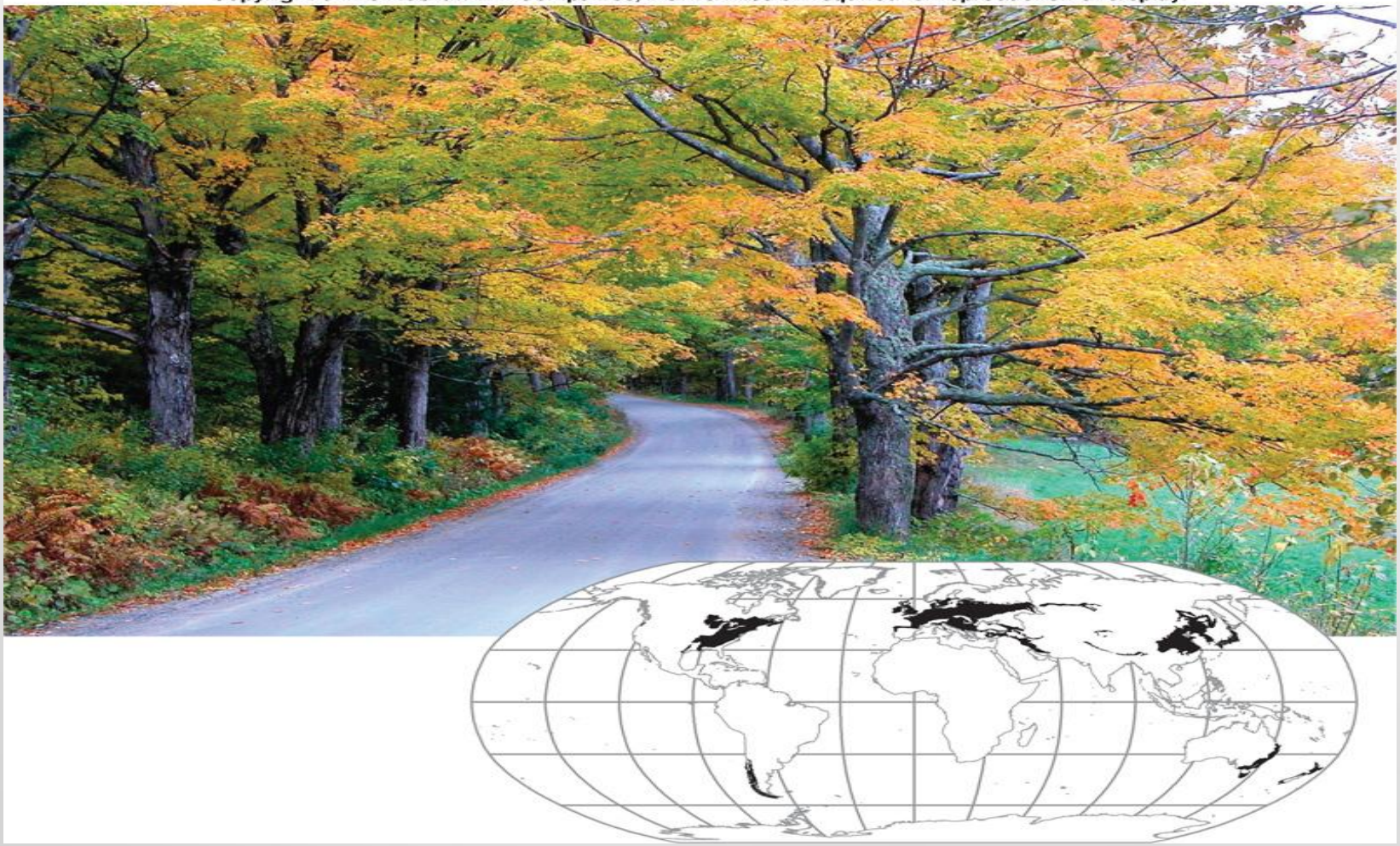
  - Tropical forest
  - Temperate forest
  - Coniferous forest (boreal /taiga)

	Tropical Forest	Temperate Forest	Coniferous Forest
Location	situated at tropical region of the earth, which is close to equator	occurring between 35^0 - 65^0 on either side of the equator	from about 50°N to 70°N latitude
Temperature	Hot and humid climate all the year round, average temperature is 27^0 C	Average summer temperature is below 10^0 C, Winter are very cold (-30^0 C and lower)	Short summer (not particularly warm) about 14^0 C, Very cold winter (-20^0 C and lower)
Precipitation	High annual rainfall 2000 mm+; Wet all the year round	Annual precipitation is low (under 300 mm); Precipitation is irregular and falls mostly as snow	Low annual total rainfall (less than 500 mm); Climate experiences extreme changes
Biodiversity	Majority of plant species and large proportion of animal species	Limited compared to tropical forest	More animals than plants
		Temperate forests are of two types – Deciduous forests- present in the northern hemisphere, shed leaves in winter Evergreen forests- present in the southern hemisphere	

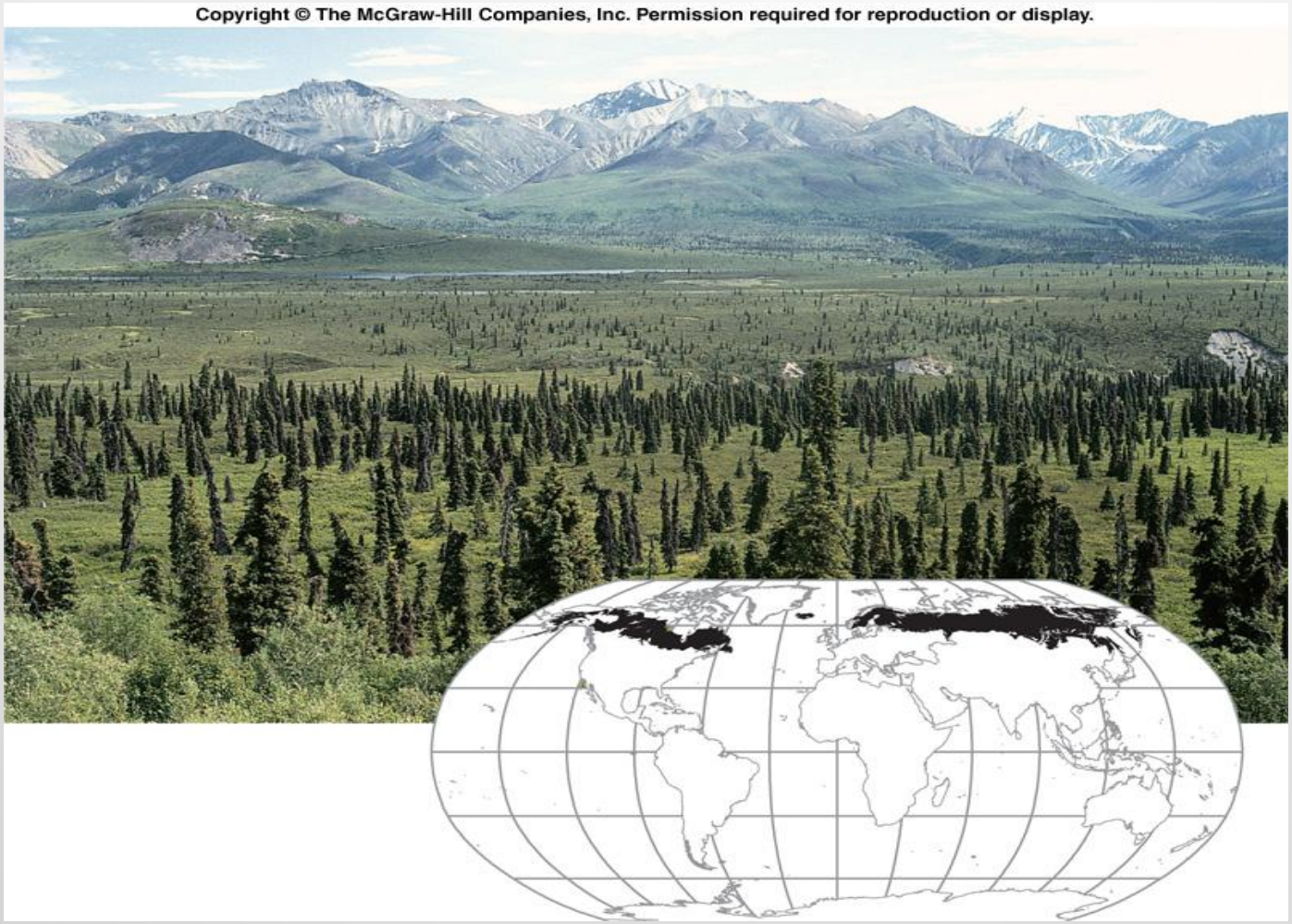
Tropical Rainforest



Temperate forest



Taiga (Boreal Forest)



Importance of Forest

- Watershed
- Habitat and Ecosystems
- Economic benefits
- Climate Control

Deforestation

- Clearing forests and woodlands is the most viable way in which people have changed the face of the earth.

Clearing of forests, or intentional destruction or removal of trees and other vegetation for agricultural, commercial, housing, or firewood use without replanting (reforesting) and without allowing time for the forest to regenerate itself. Deforestation is one of the major factors contributing to the greenhouse effect and desertification.

- **Reasons for deforestation:**
  - Expansion of agricultural and plantation activity for production of food (population increase)
  - Housing and urbanization
  - Construction of roads, railway and power transmission lines
  - Industrial activity
  - Mining
  - Cutting wood for different use
  - Wild grazing by domestic animals
  - Forest fires
  - pollution

Effects of Deforestation

- Decreased soil fertility from erosion
- Runoff of eroded soil into aquatic systems
- Loss of habitat for migratory species such as birds and butterflies
- Regional climate change from extensive clearing
- Release CO_2 into atmosphere from burning and tree decay

- **Reforestation** is the natural or intentional restocking of existing forests and woodlands that have been depleted, usually through deforestation.

- The term reforestation is similar to afforestation, the process of restoring and recreating areas of woodlands or forests that may have existed long ago but were deforested or otherwise removed at some point in the past.

- **Afforestation** is the establishment of a forest or stand of trees in an area where there was no forest.

Sustainable Management of Forest

Steps that can be taken for this purpose:

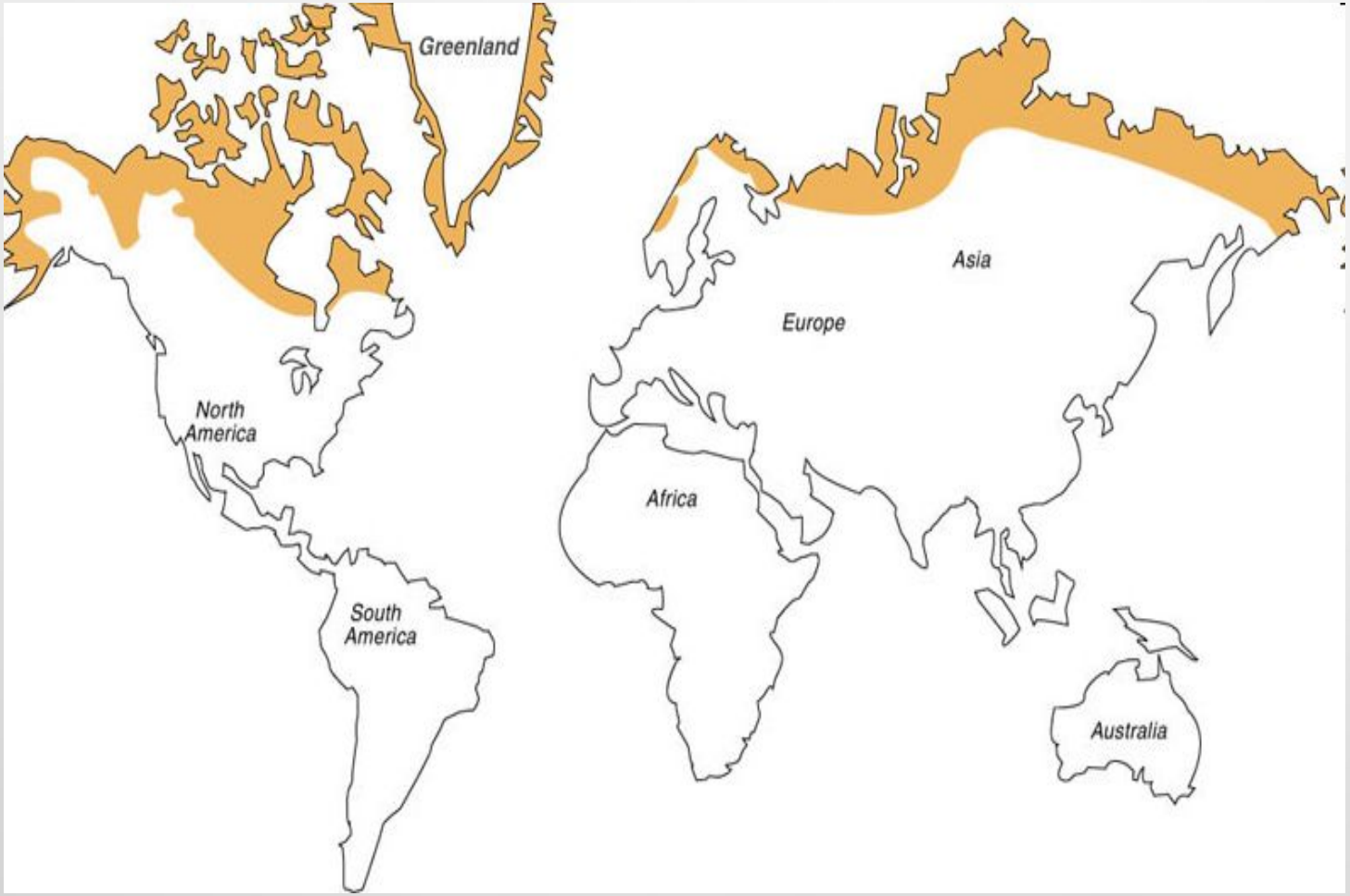
- Avoid major project, roads, railway in forest areas.
- Mining activity should be restricted.
- Dependence on timber should be reduced.
- Wild grazing should be restricted
- Commercial wood should be grown and harvested in wetlands so that forest are protected.
- Social and cultural organization should be engaged in sustainable management of forest.

Tundra

The word tundra means treeless land. The tundra is simplest biome in terms of species composition and food chains.

- Treeless, very short growing season, with cold harsh winters.
- Average summer temperature are below 10^0 C
- Winter are very cold (-30^0 C and lower)
- Annual precipitation is low (under 300mm)
- Precipitation is irregular and falls mostly as snow.
- There are two types of Tundra:
- Arctic tundra
- Alpine tundra

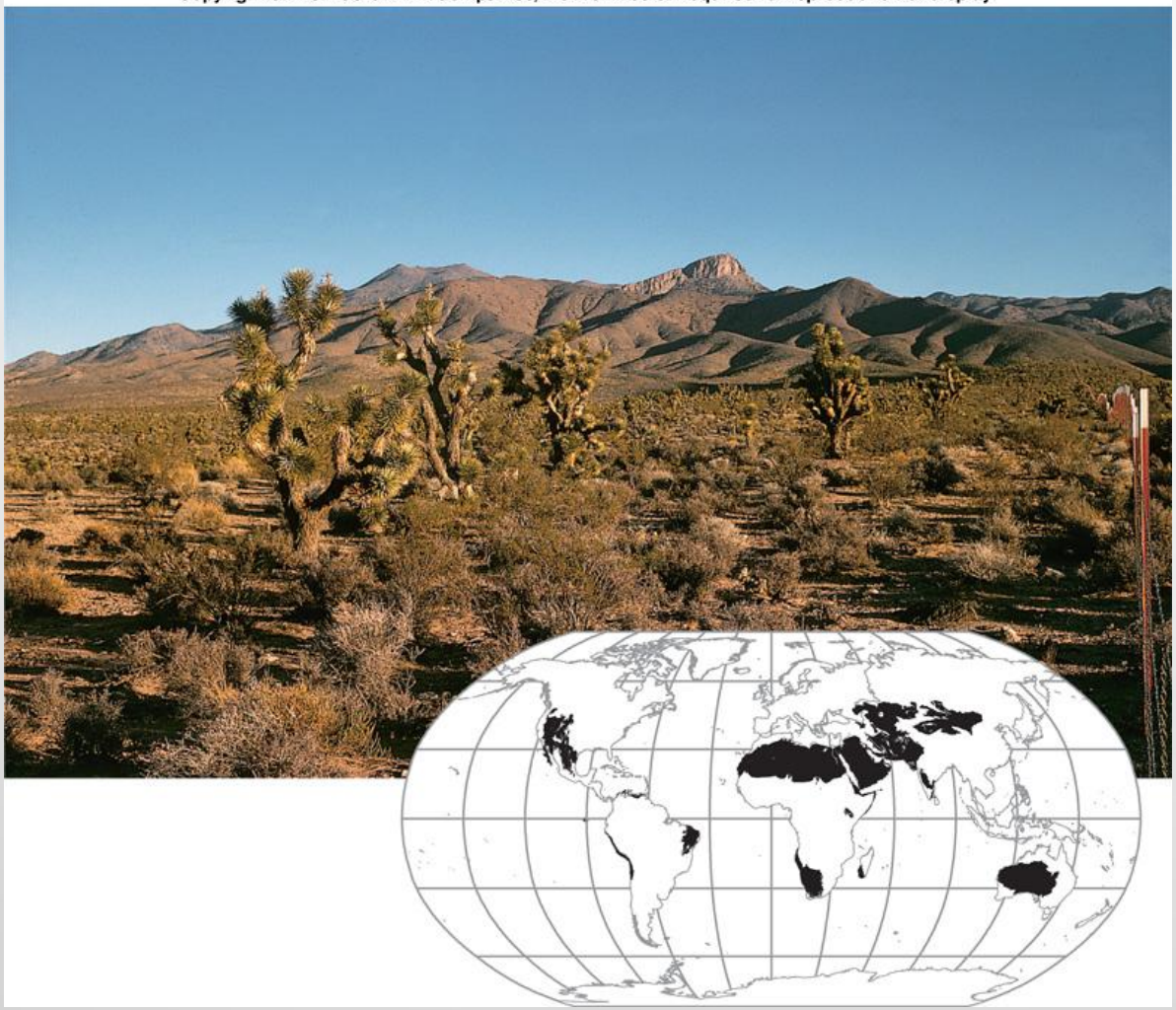
Tundra


Greenland
Asia
Europe
North America
Africa
South America
Australia

Desert

- Precipitation is infrequent and unpredictable
- Wide daily and seasonal temperature fluctuations.
- Often found at 30^0 N and S of equator
- Very dry; hot days, cold nights
- Very hot in summer (40^0 C)
- Annual rainfall less than 250mm

Desert



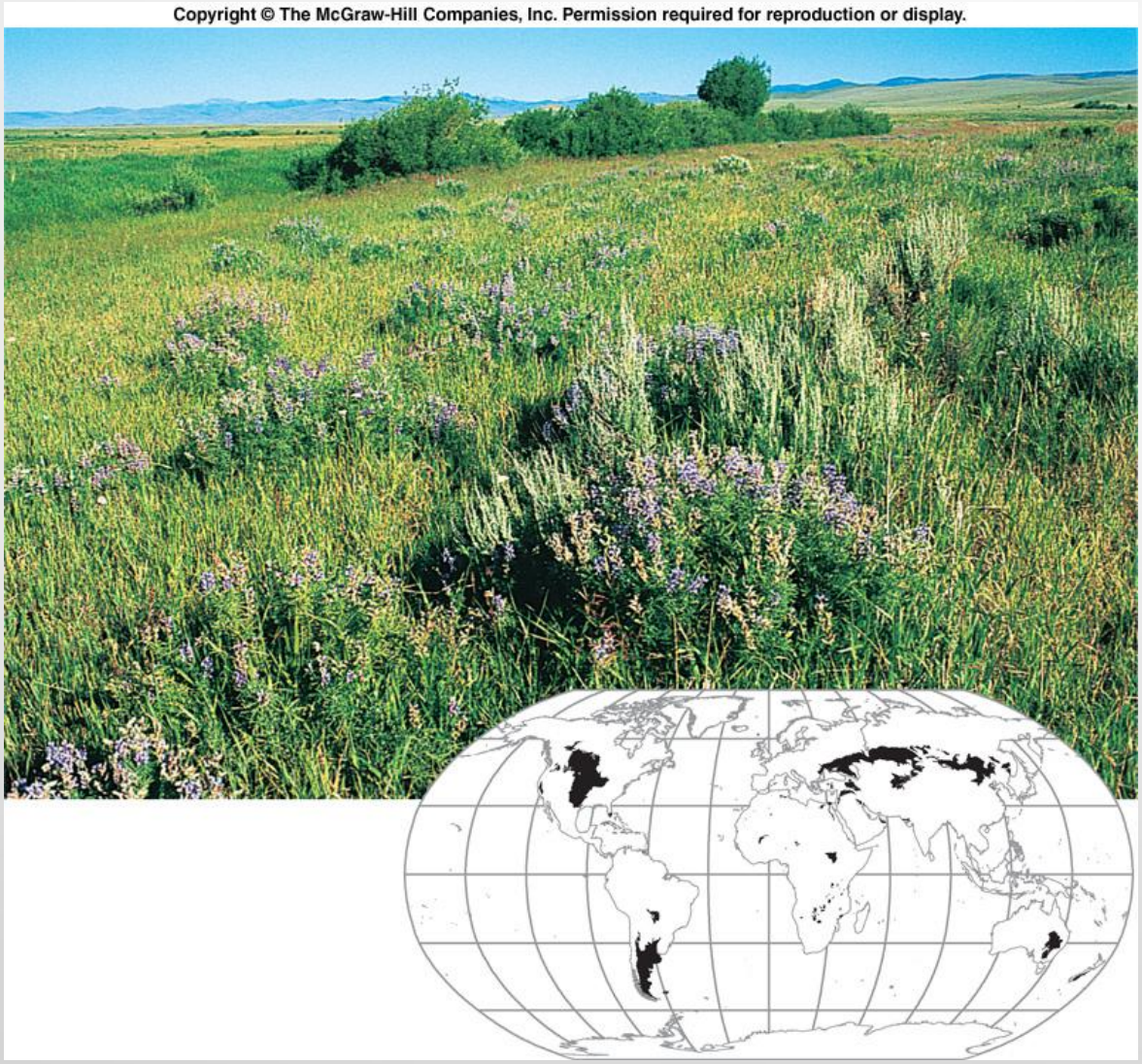
Grassland

- Grasslands are characterized as lands dominated by grasses rather than large shrubs or trees.
- The climate is dry, hot and warm.
- Annual rainfall is 50-120cm.

There are two main divisions of grasslands:

- Tropical (Savanna)
- Temperate (North America- Prairie, Eurasia- Steppes/Chaparral)
- Savanna is grassland with scattered individual trees.
- Temperate grasslands are characterized as having grasses as the dominant vegetation

Grassland



Aquatic Biomes

Life on earth is not possible without water regions

- 75% of the earth's surface is covered with water
- Aquatic regions house numerous species of plants and animals, both large and small
- Water temperatures can vary widely.
- **The aquatic biome can be divided into two :**

Fresh water

Marine

PRESERVATION OF BIOME

Biomes have changed and moved many times during the history of life on Earth. More recently, human activities have drastically altered these communities. Thus, conservation and preservation of biomes should be a major concern to all.

- Control pollution
- Protect forests
- Preserve fresh water

By educating people about the consequences of our actions, we can all gain a better understanding of how to preserve the Earth's natural biomes.

THANK YOU