

Ecosystems: Biomes of the World



Terrestrial Ecosystems: The Major Biomes



Biome:

A biome is a complex of terrestrial ecosystems that covers a large area and is characterized by certain soil and climate conditions as well as particular populations of plants and animals.



Biomes

An organism cannot live in just any biome. Every species of organism has particular adaptations that make it well suited to a particular environment.



An adaptation is
....an inherited characteristic that increases an organism's ability to survive and reproduce.

Biomes

All plants and animals also show differences in **tolerance**.

Tolerance is:
the ability to survive and reproduce under conditions that differ from an organism's optimal conditions.

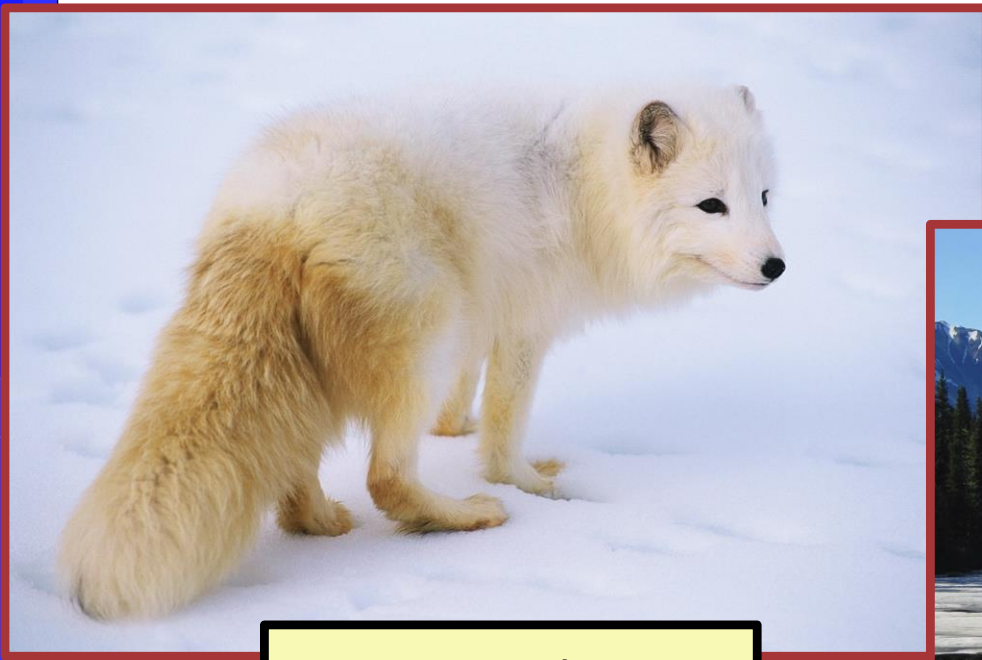
For example, some desert organisms can tolerate temperature ranges from blistering hot to below freezing. But rain forest plants and animals would quickly die if the temperature became too cold.



The Major Biomes

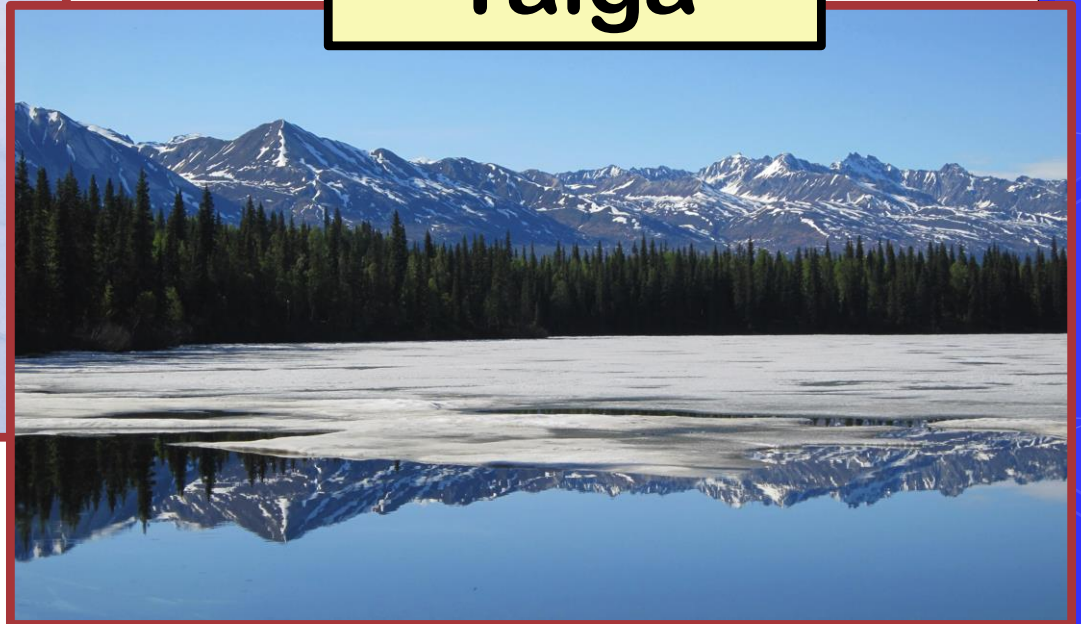
The number of biomes that exist on Earth differ depending on which textbook you are reading.

For our purposes, we will recognize 8 major terrestrial biomes.



Tundra

Taiga

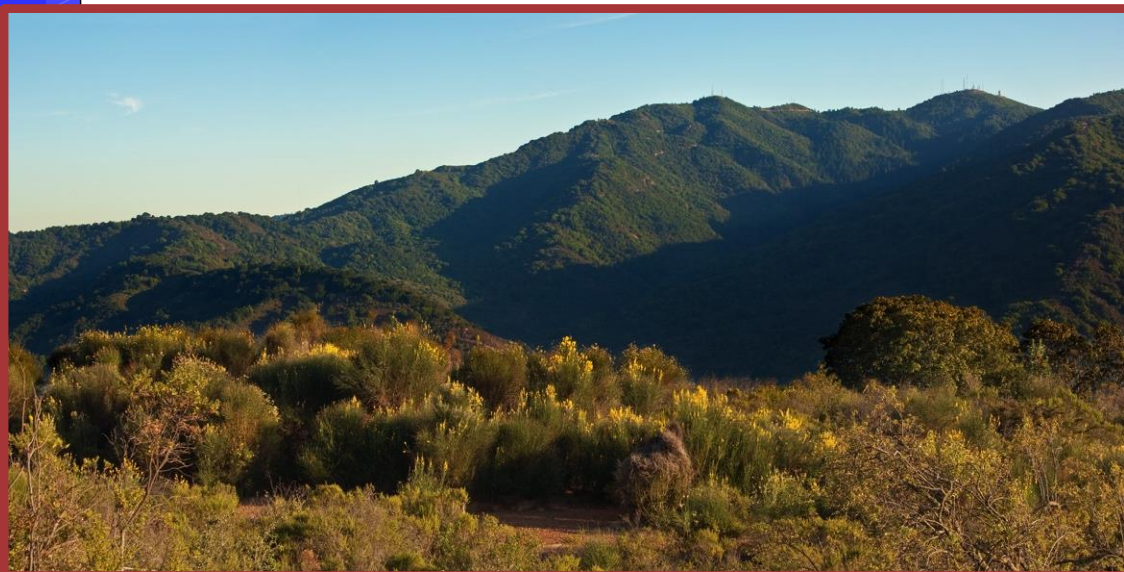
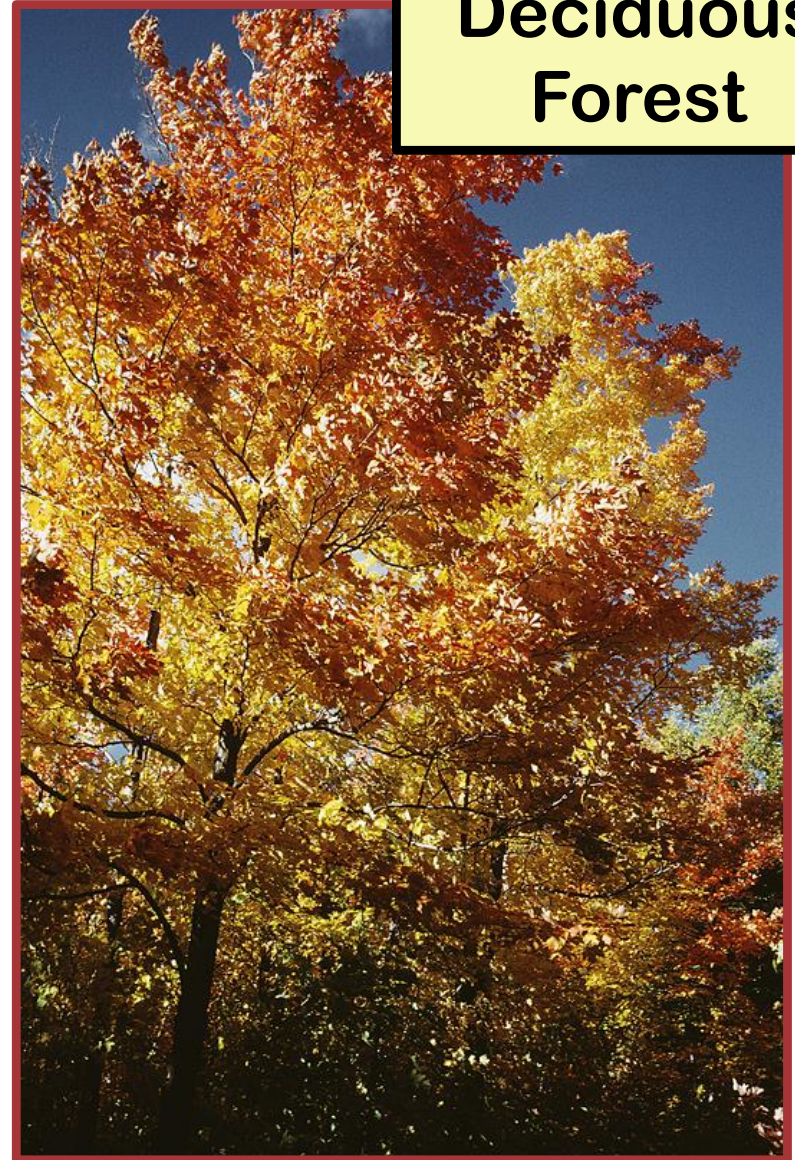


The Major Biomes



Chaparral

**Temperate
Deciduous
Forest**



The Major Biomes



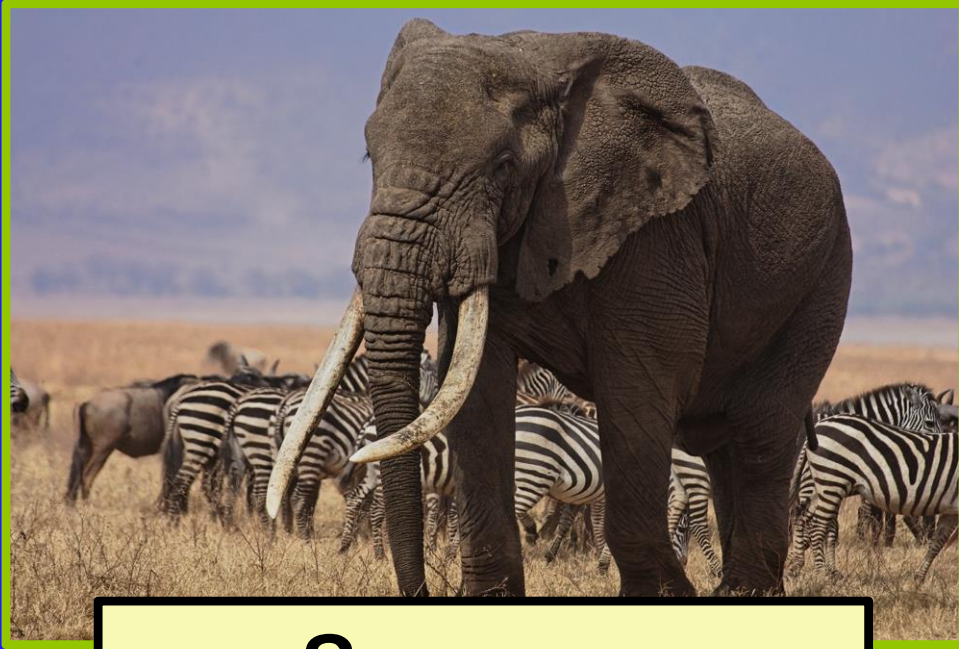
Temperate Grasslands



Desert



The Major Biomes



Savanna

Each of these biomes is defined by....
....a unique set of abiotic factors and a characteristic group of plants and animals.

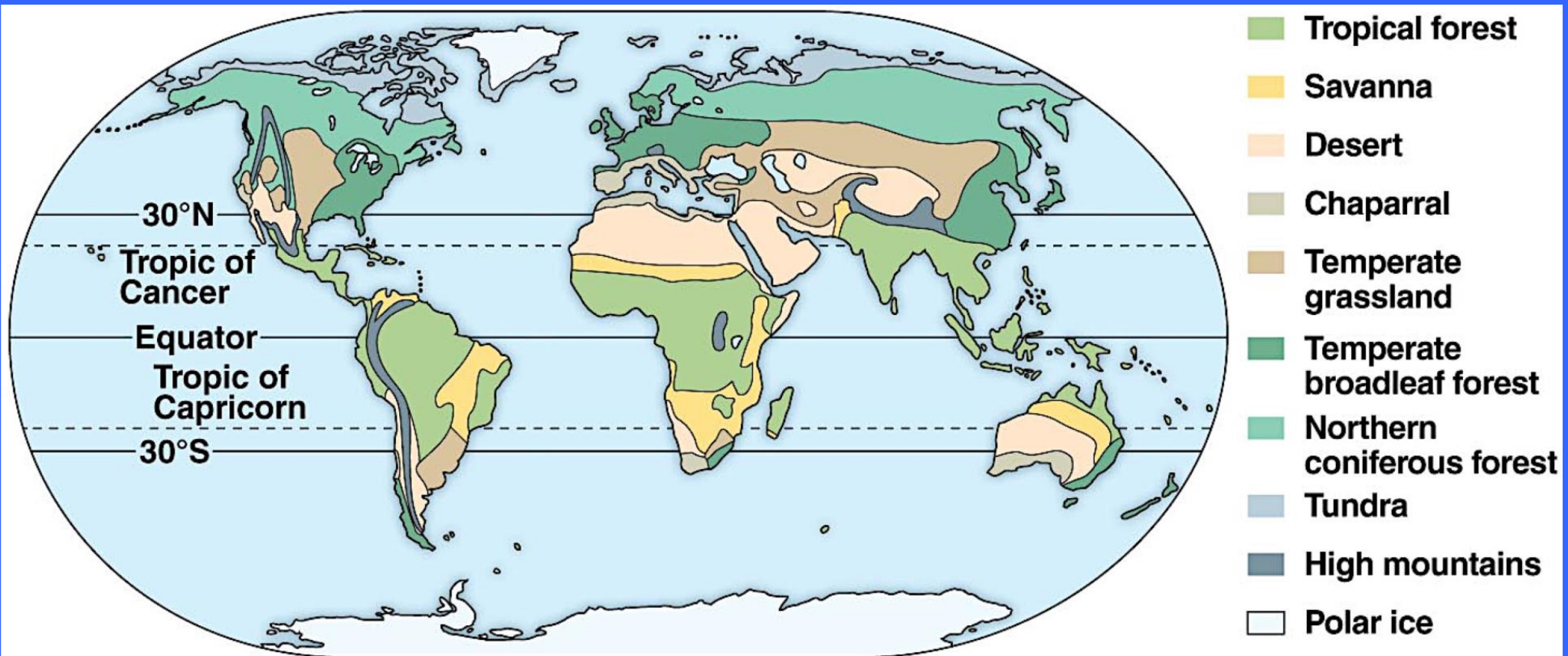


Tropical Rain Forest

The Major Biomes

Note that on the biome map, there appears to be sharp boundaries between each biome.

There will be transitional areas between the biomes where the characteristics of one biome gradually give way to the characteristics of the next biome.



Tundra

The tundra is....
....a cold and largely treeless biome.

It is the **largest and northernmost** biome.

It covers about **1/5th** of the world's land surface.

The geographic distribution is northern North America, Asia and Europe.



**A major characteristic of the tundra is....
....the presence of permafrost, a permanently frozen layer of soil under the surface.**

Tundra



Even the surface soil
above the permafrost
remains:
frozen for all but about 8
weeks of the year.

During the short, cool summer the
ground:
thaws to a depth of a few centimeters
and becomes soggy and wet.

In winter, the topsoil freezes again.

This cycling of freezing and thawing...
..... rips and crushes plant roots.



Tundra



Trees do not grow in the tundra because the winters are long and bitterly cold and because the permafrost prevents: **the roots from penetrating far into the soil.**

The plants that do grow in the tundra are: **small and stunted.**

The tundra receives little precipitation and has a very short growing season.

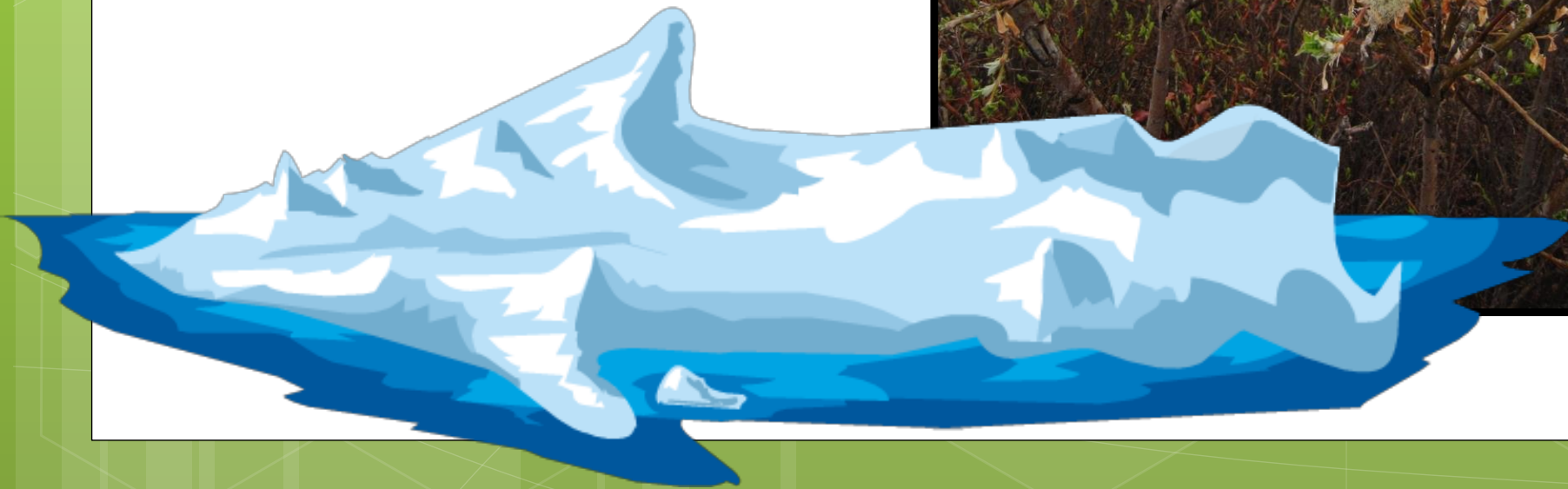


Tundra

Soil conditions are very poor.

Because of the very cold temperatures, there is little:

decay and decomposition to fertilize the soil.



Tundra

Common plants include:
grasses, sedges, lichens and mosses.



Tundra



**Common animals include:
migratory waterfowl, caribou,
snowy owls, arctic foxes, lemmings,
and snowshoe hares.**



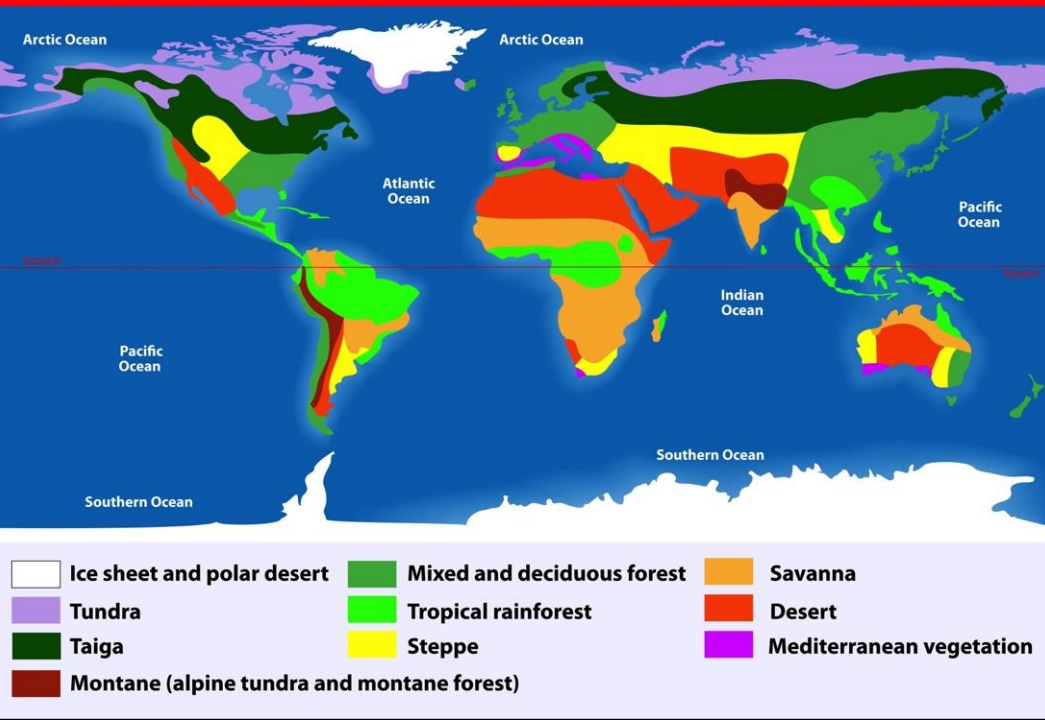
Taiga (Boreal Forest)



The taiga is found:
south of the tundra.

It is a forested biome dominated by:
cone-bearing evergreen trees.

The main biomes in the world



Taiga (Boreal Forest)

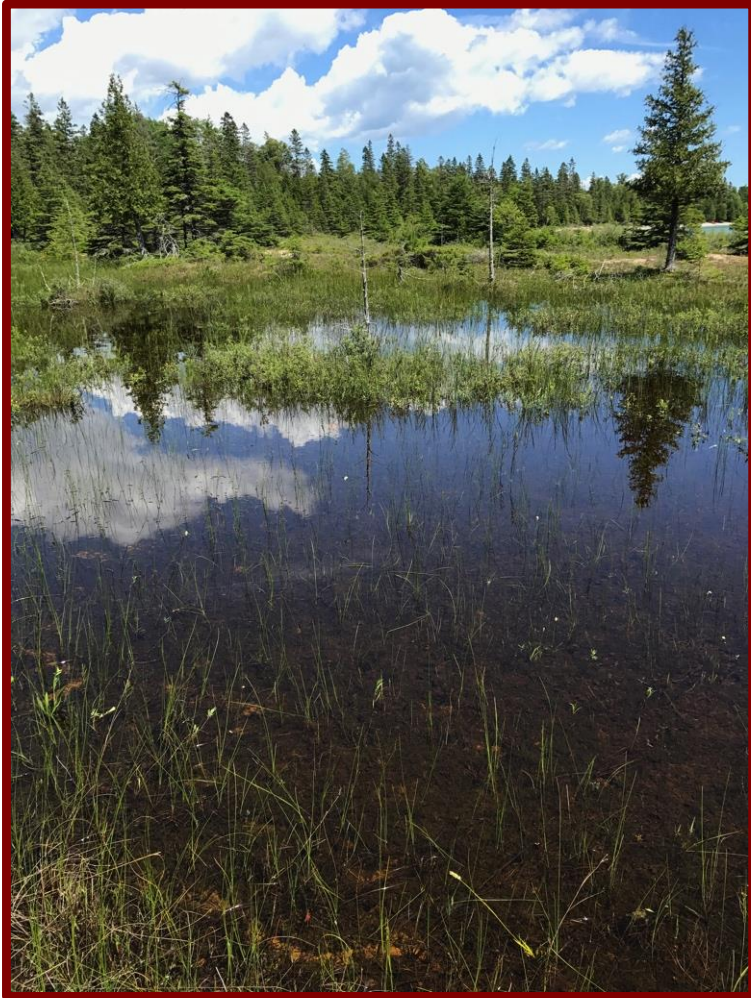
Geographic distribution: Large areas of northern Europe, Asia and North America.

Plants that live in the taiga are adapted to:
long and cold winters,
short summers and
nutrient poor soil.



Taiga (Boreal Forest)

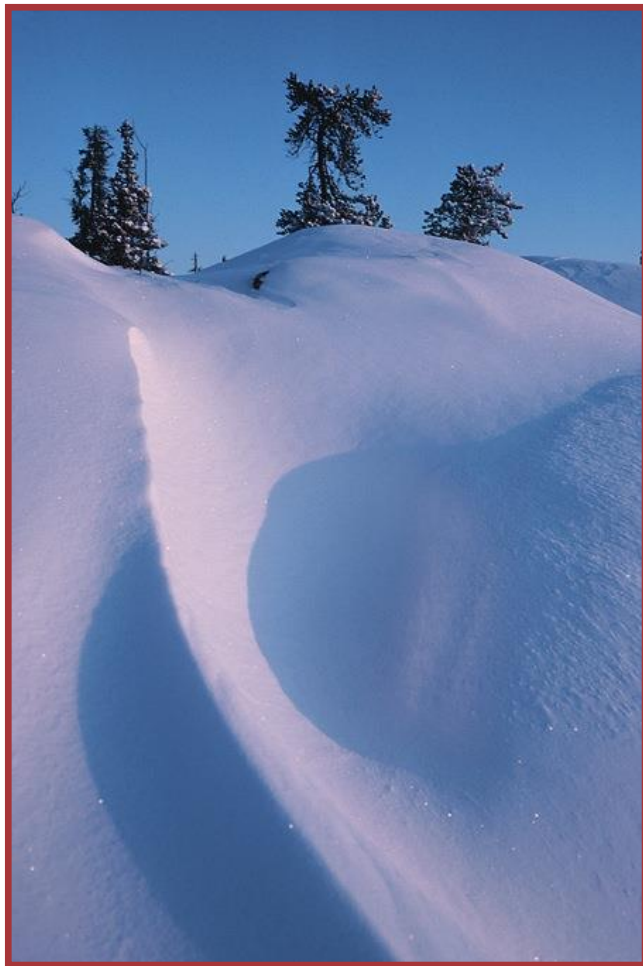
Winters are bitterly cold, but the summers are mild and long enough to allow the ground to thaw.



Taiga (Boreal

Forest)

During the long winter snow covers and insulates the ground, protecting the tree roots against freezing.



There is a moderate amount of precipitation and high humidity.



Taiga (Boreal Forest)

Common plant types include:
Pines, firs, hemlock, spruce.

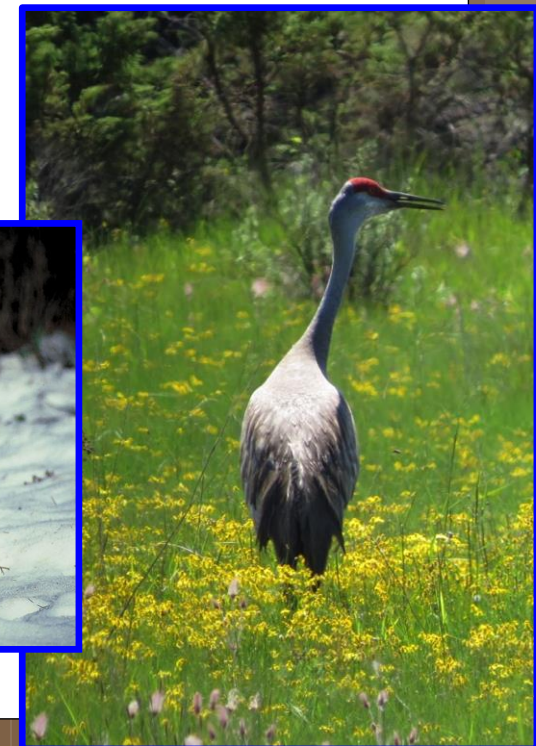


These trees have leaves that have been reduced to needles to prevent against: water loss from the stomata.

Taiga (Boreal Forest)



Common animals include:
Moose, bears, wolves, lynx,
weasels, and beaver.



Taiga (Boreal Forest)

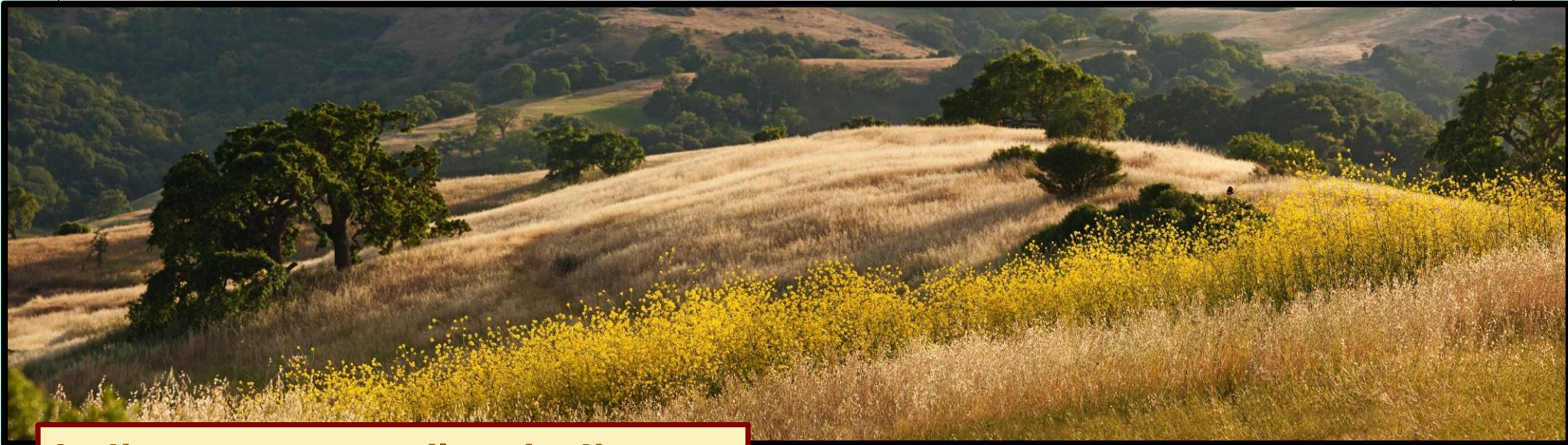
Some species of animals migrate to warmer climates during the winter and return to the taiga in the spring and summer.



Other animal species may....
....hibernate 6 to 8 months of the year.

Chaparral

This is a semiarid biome characterized by a mixture of: shrubs and open woodlands.

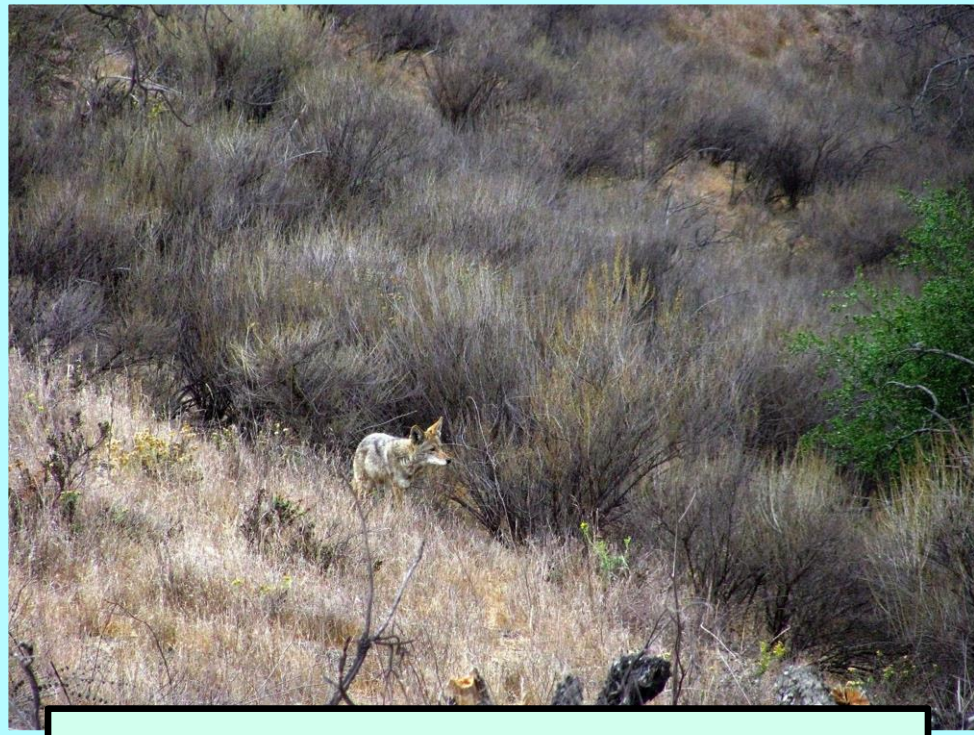


In the open woodlands, there are large areas of grasses and wildflowers, mixed with a few large trees.

Communities that are dominated by shrubs are referred to as chaparral.



Chaparral



**Chaparral has:
hot and dry summers and
cool, moist winters.**

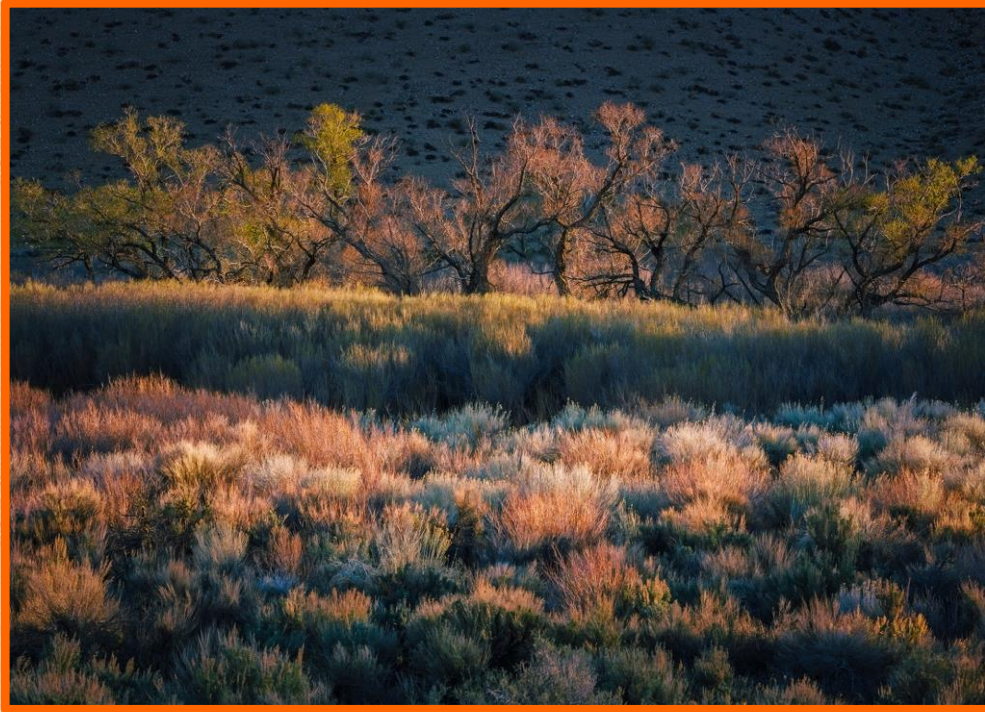
The growth of dense,
low plants and the hot,
dry summer makes the
risk of fire high in this
area.



**Geographic distribution:
The western coasts of
North and South America,
areas around the
Mediterranean Sea, South
Africa and Australia.**



Chaparral



**Common plants include:
low growing shrubs.....**

... and fragrant, oily herbs.



Chaparral

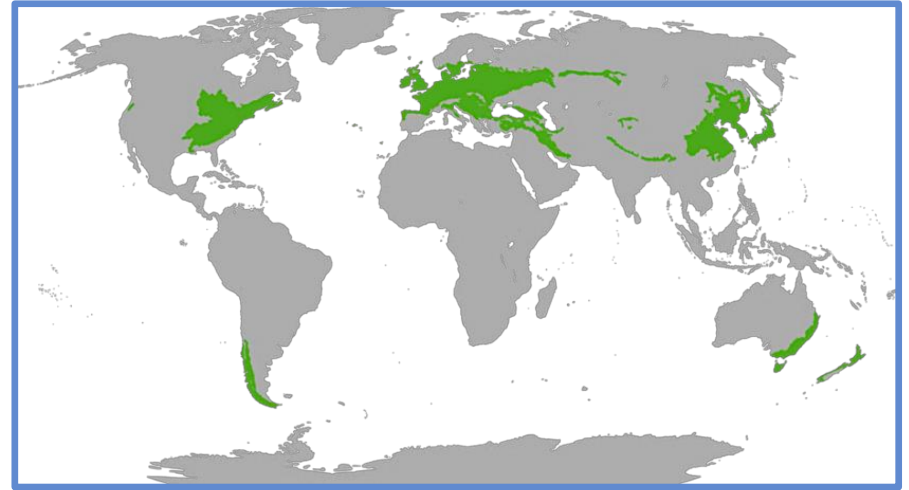
Common animals include: Coyotes, mountain lions, bobcats, deer, rabbits, squirrels, hawks, numerous songbirds, many reptiles and insects.



Temperate Deciduous Forests



This biome is characterized by deciduous trees, meaning: that the trees lose all of their leaves in the fall.



Geographic distribution:
Eastern North America, much of Europe, and parts of Asia and the Southern Hemisphere.



These regions have definite seasons, with precipitation distributed evenly throughout the year.

Temperate Deciduous Forests

Compared to the taiga, the temperate deciduous forests have warmer winters and longer summers. They also receive more precipitation.



Deciduous trees have broad, thin leaves with a large surface area that permits maximum light absorption.

Temperate Deciduous Forests

Common types of plants include: birch, beech, maple, oak, hickory, elm and cottonwood.

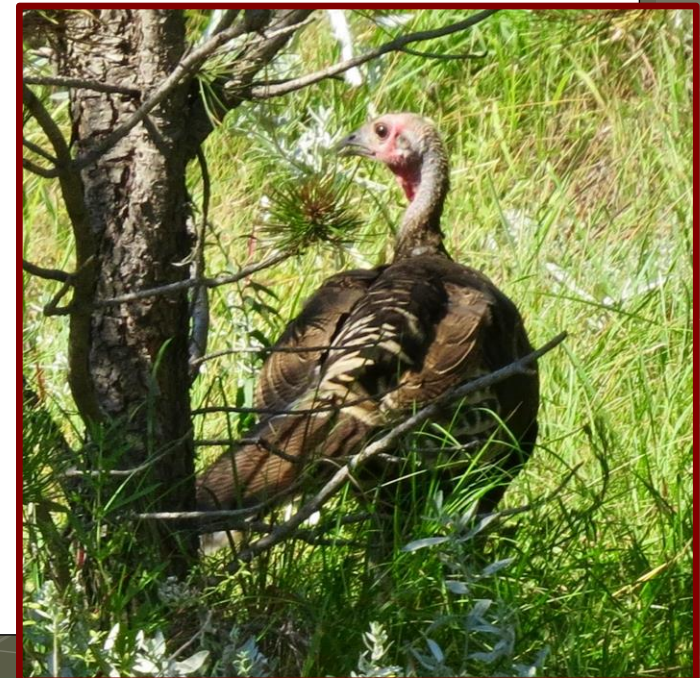


Ground cover plants would include: ferns and mosses.



Temperate Deciduous Forests

Common animals include:
Deer, foxes, raccoons,
squirrels, black bears,
songbirds, and turkeys.



Temperate

Temperate grasslands are dominated by grasses.



**Grasslands usually form in the:
interior of continents where rainfall patterns
makes these areas too dry to support trees.**



Temperate Grasslands



Grasslands are known by other names depending on their location.

They are known as prairies in North America and veldts in southern Africa.



Temperate Grasslands

Temperate grasslands have rich, fertile soil.



In areas undisturbed by humans, grasslands support: large herds of grazing animals, such as bison.

Because of the rich soil, much of the world's grasslands have been converted into ...
... farmland for growing food crops.



In the United States, there are only small fragments of undisturbed prairie left.

Temperate Grasslands

Common types of
plants:
lush, perennial
grasses and herbs.



Temperate Grasslands

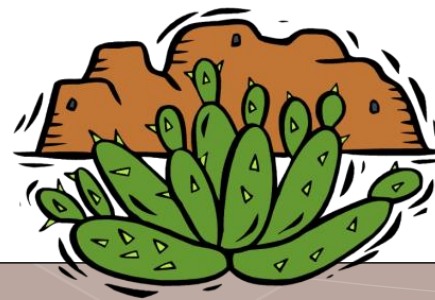
Common types of animals:
Coyotes, badgers, rabbits,
prairie dogs, cattle, bison,
hawks, owls, small rodents,
many reptile and insect
species.



Desert

Deserts are areas that receive less than 10 inches of rain a year.

Geographic distribution includes large parts of North Africa, central Australia, southwestern United States, and eastern Asia.



Desert



Contrary to popular belief, not all deserts are hot.

Some deserts (Gobi Desert) are hot in summer and cold in the winter.

Even in the hot deserts, the temperature may drop by as much 50-55 degrees at night.



Desert

Vegetation is sparse and consists of plants that have: adapted to the very dry climate.



Plant adaptations are designed to: reduce water loss.



Desert



Some desert plants have a very thick, waxy cuticle, some open their stomata only at night, and some are especially well adapted at storing large volumes of water.



Many desert plants have protective thorns and spines to deter thirsty herbivores.



Desert

Desert animals tend to be nocturnal and avoid the heat of the day.



Desert



Common types of plants:
Cacti and other succulents



Desert



Common types of animals:
Mountain lions, foxes, bobcats,
bighorn sheep, rats and rodents,
insects, and many types of reptiles.



Savanna



Savannas are...
... tropical or subtropical grasslands with scattered trees and shrubs.

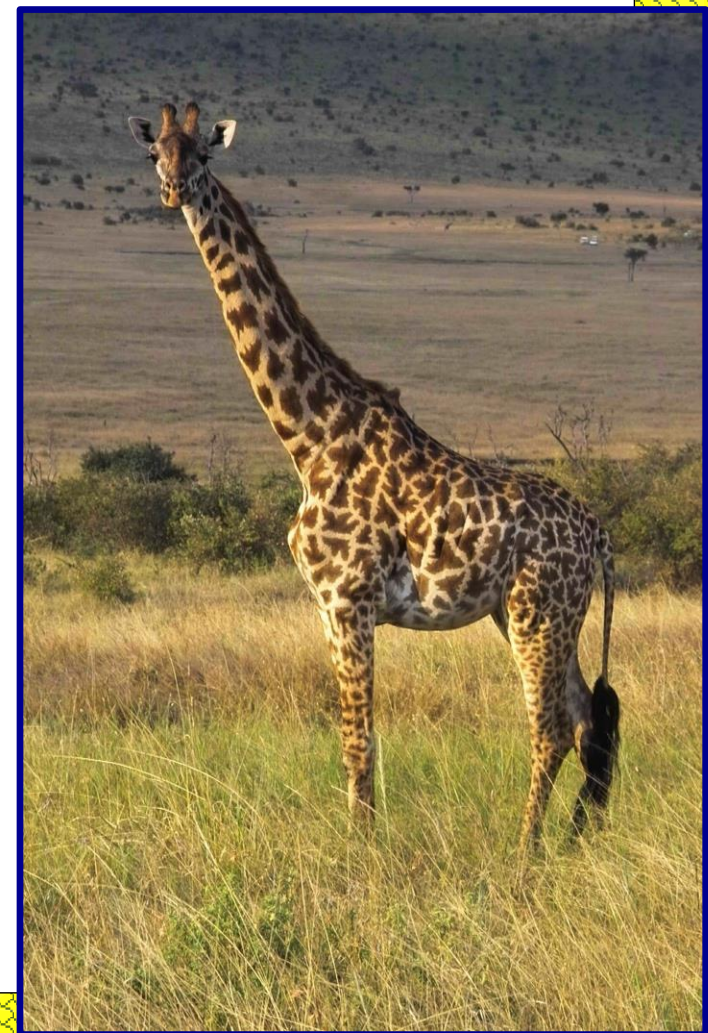
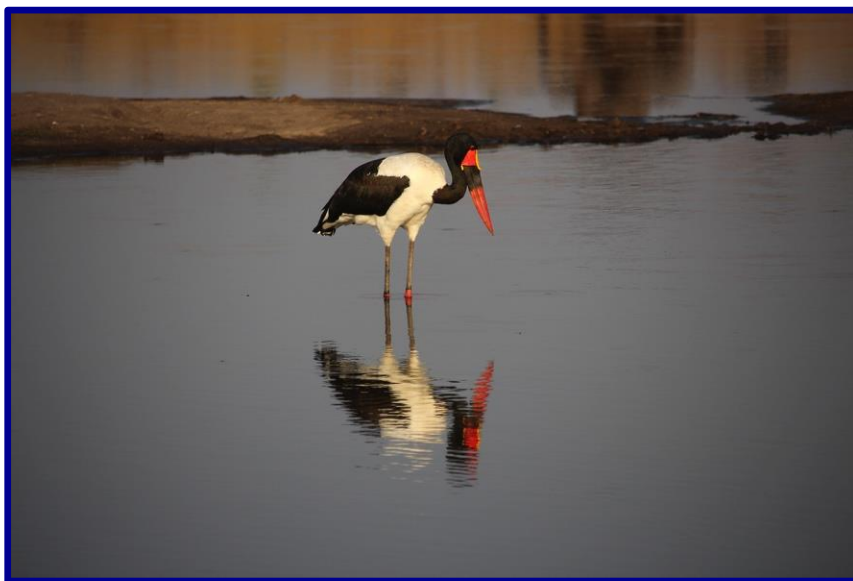


Savanna

A savanna receives more **rainfall** than a **desert**, but less than a **tropical rain forest**.



Savannas have alternating:
wet and dry seasons.



Savanna

Savannas support large numbers of: herbivores, such as zebras, wildebeest, giraffes, elephants, and gazelles



Savanna



Because of the large herbivores,
there are also large:
carnivores, such as lions,
leopards and cheetahs.



Savanna

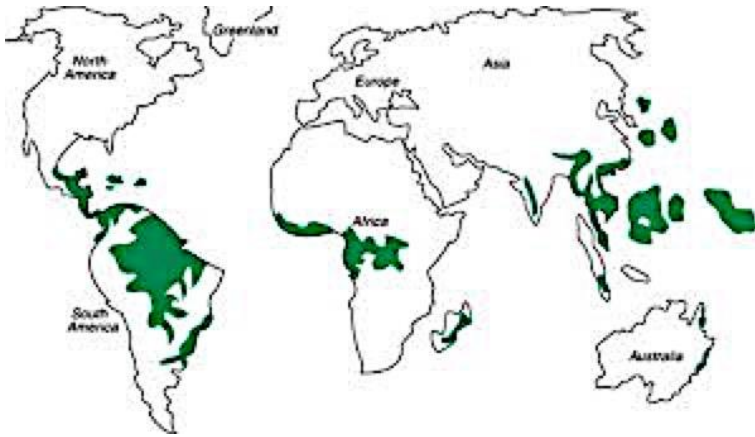


Because most of the rain falls during the wet season, the plants and animals of the savanna must be able to withstand prolonged periods of drought.

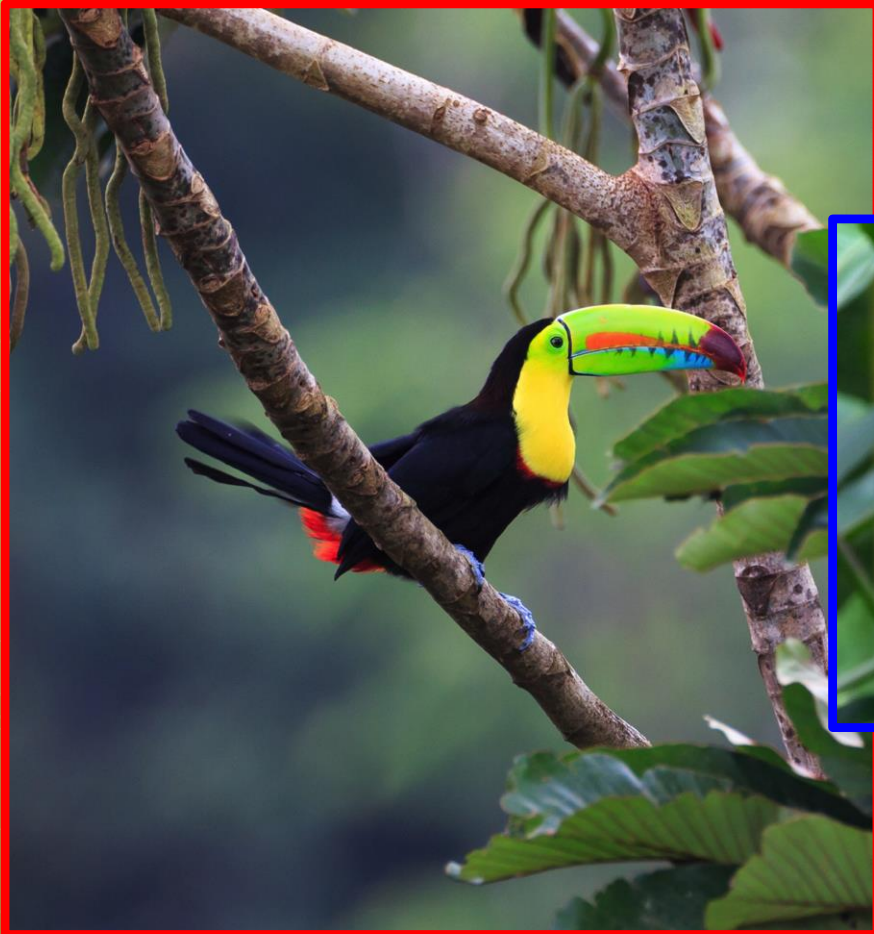
Geographic distribution: Large parts of eastern Africa, southern Brazil, and northern Australia.



Tropical Rain Forest



Tropical rain forests are found near the equator in Asia, Africa, South America, and Central America.



Tropical Rain Forest

Tropical rain forests are characterized by tall trees.



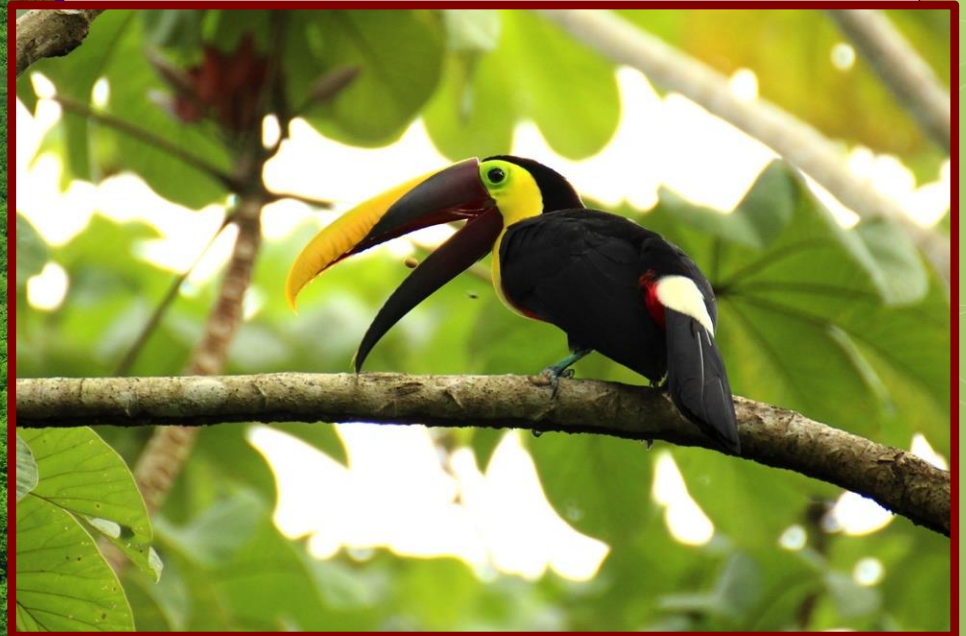
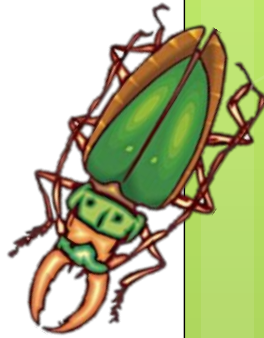
The stable, year-round growing season and abundant rainfall makes the rain forest the most abundant of all biomes.



Tropical Rain Forest

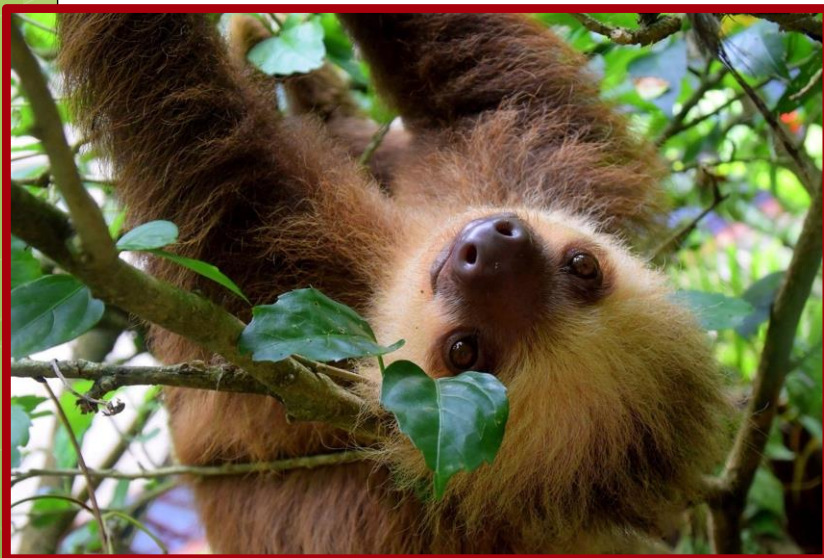
There is intense competition for light amongst the plants in the rain forest.

The treetops form a continuous layer of leaves called the canopy.



Tropical Rain Forest

Trees have evolved to grow very tall in order to reach sunlight.



Much of the forest floor is relatively **free of vegetation** because so little **sunlight** reaches the ground.

Tropical Rain Forest

Epiphytes are found in large numbers in a rainforest.



Epiphytes are
....small plants, such as
mosses and orchids, that live
on the branches of trees.



Tropical Rain Forest

They cannot survive on the forest floor due to the lack of **sunlight**.



Even though epiphytes live on other plants, they are not parasites.

They make their own food through photosynthesis.



Tropical Rain Forest

Tropical rain forests have the highest species richness of all the biomes.

Plant and animal life is extremely diverse.

The variety of insects is particularly diverse in the rain forest.

