

Science

Science

Life Science

# Biomes

by Natalie Goldstein

Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Main Idea and Details	<ul style="list-style-type: none"> <li>• Captions</li> <li>• Charts</li> <li>• Diagrams</li> <li>• Glossary</li> </ul>	Biomes

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## Vocabulary

abiotic factor  
biome  
biotic factor  
community  
ecosystem  
environment  
population



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by **Natalie Goldstein**



**Illustration:** 8 Adam Benton

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# How are organisms on Earth connected?

## Connections in the Biosphere

Living things are everywhere, from the highest mountains to the bottom of the ocean. There is a large variety of living things on Earth, from tiny insects to huge whales. The biosphere is the part of Earth where living things are found. The biosphere extends from about 10 kilometers below the ocean's surface to about 10 kilometers above Earth's surface.

Different living things may live in different parts of the biosphere, but they all share Earth's resources. So when something happens to one living thing, it often affects other living things too. Humans are part of the biosphere, so what humans do affects other living things.

All living things interact with other living things and with Earth. Ecology is the study of how living things interact with each other and their environment.



All living and nonliving things are part of this biosphere.



## Organization of the Biosphere

You probably interact with many living things every day. Do you have a pet? Did you walk your dog or pet your cat today? How many people did you talk to today? It's almost impossible to go through a whole day without interacting with living things.

You also interact with the nonliving things around you. You breathe air, drink water, and are warmed by sunshine. You could not live without any of these things.

Living things, including humans, are called organisms. All the organisms that live together in an area interact with each other. They also interact with the nonliving things in their area. An organism's **environment** is anything that can affect the organism. The environment includes living things and nonliving things.







An individual is a single organism that belongs to one species. A species is one type of living thing. A **population** is a group of individuals that belong to the same species. A population of organisms lives together in the same area. For example, look at the zebras in the picture. All these zebras make up a population of zebras that live together in the same place.

Other animals, such as giraffes and elephants, may live in the same area as the zebras. Giraffes and elephants are different species. There is a population of giraffes in this area. There is also a population of elephants in this area. When scientists talk about a particular population, they define the area in which it lives.

Individuals within a population compete for the resources in the environment. For example, they compete for food and water. If resources become limited, some individuals may die. Then the population gets smaller.



Single populations do not live alone. In any environment, many populations live together and interact with each other. A **community** is a group of populations that interact with each other in a particular area. Zebras, giraffes, and elephants are all part of the same community on an African plain.

If your family has pet dogs, cats, fish, or birds, several populations live in your house. Your house contains a population of humans and a population of each different species of pet. All these different populations are part of the community that is your house.

Communities need the nonliving things in their environment to live. They need air, water, and shelter, among other things. Together, the living and nonliving parts of an environment are called an ecosystem. An **ecosystem** is a community of organisms living together along with the nonliving parts of the environment.

An ecosystem may be as small as a crack in a sidewalk or as large as a huge forest or desert. Earth's biosphere is made up of many ecosystems. Every ecosystem interacts with other ecosystems.





## Meeting the Needs of Organisms

All organisms in a community depend on their environment to meet their needs. **Abiotic factors** are the nonliving parts of an ecosystem, such as air, soil, water, sunlight, and temperature. All living things need water to survive. The amount of water in an environment can limit the number of organisms that can live there. Few organisms are able to survive in desert areas.

Plants need sunlight to make their food in the process of photosynthesis. Most organisms cannot make their own food. They depend on plants. Some animals eat plants directly; others eat animals that eat plants. The amount of sunlight an environment gets also affects what kinds of plants and animals that can live there.

An area's temperature is another factor that affects what types of animals and plants can live there. Each species can live only in a particular range of temperature. Polar bears live where it is very cold. Cacti live in desert areas, where it is very hot.

Most organisms need gases in air to live. Land animals breathe oxygen from the air. Organisms that live in water get oxygen that has dissolved in water. Plants need carbon dioxide to make food through photosynthesis.



**Biotic factors** are the living organisms in an ecosystem. Some biotic factors are too tiny to see without a microscope. These include bacteria that live in the soil and algae in the ocean. Mites and protists that live in or on animals are also biotic factors.



**Polar bears are adapted to live in a cold environment.**

## Adaptations

An environment's biotic and abiotic factors shape the communities that live in an ecosystem. All organisms in an ecosystem have adaptations that help them survive there. An adaptation is a characteristic that helps an organism live and reproduce in a particular environment. A polar bear has thick fur that keeps its body warm. Its thick skin absorbs sunlight to warm its body. It has large paws and claws to help it move over the ice and catch food. All these characteristics are adaptations that help the polar bear survive in its cold environment.







# What are Earth's biomes?

## Climate and Biomes

Different parts of Earth have similar communities. This occurs when places have similar climates and landforms. A **biome** is a large group of ecosystems with similar climates and organisms. Scientists group ecosystems into biomes to help them describe the world.

Climate is the average temperature and precipitation of an area. Climate is very important in determining the characteristics of a biome. For example, the growing season of plants is mainly determined by temperature. Plants can only survive in a biome if they are adapted to its yearly temperatures. Animals depend on plants for food. So when plant populations get larger, animal populations get larger as well.

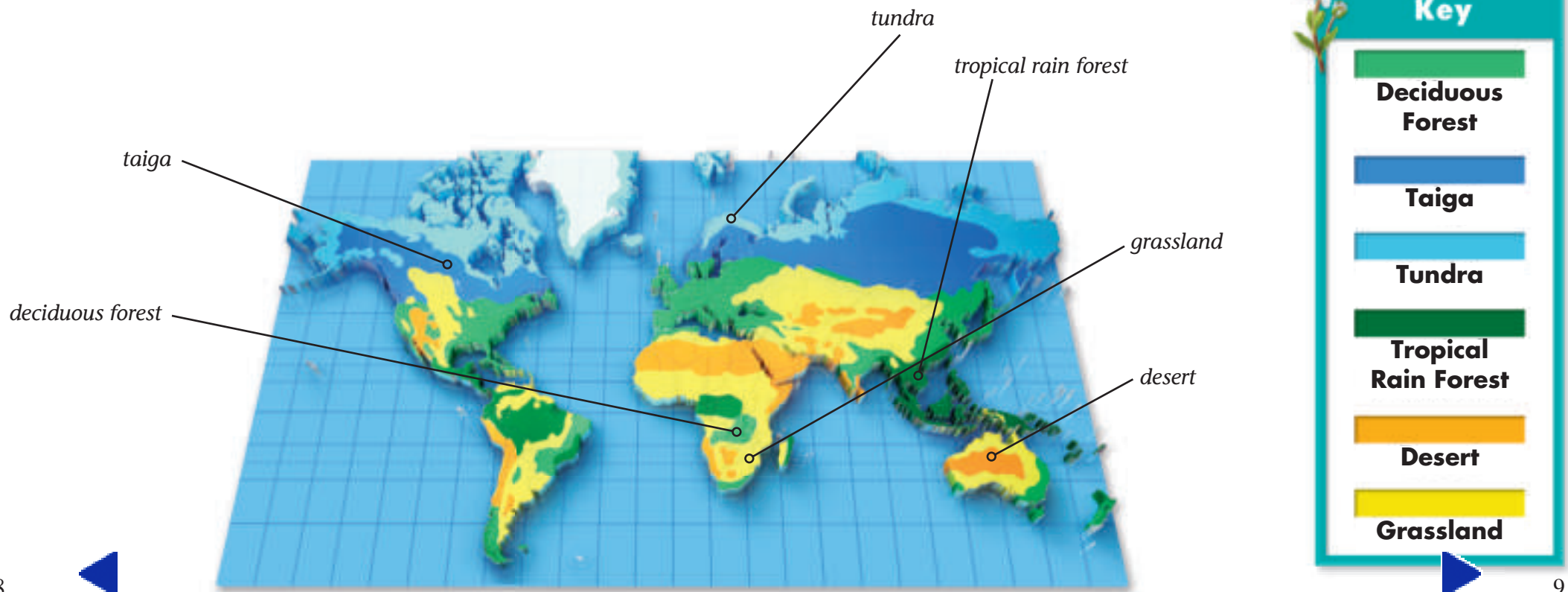
A tropical rain forest is hot and gets lots of rain. Tropical rain forests have many, many plants. They also have a large variety of animals. Tropical rain forests are one of the richest biomes on Earth.



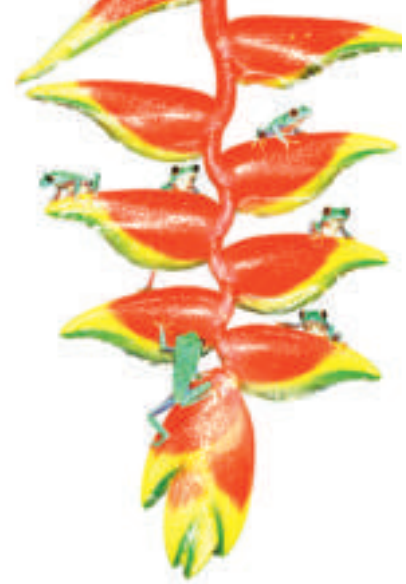
## Characteristics of Biomes

Soil is another important factor in defining biomes. Different types of soil occur in different places. The type of soil an area has determines what plants can grow there. Some soils hold water near the surface. These areas have plants with shallow roots. Plants with deep roots could not survive in these soils.

As you read about different biomes, think about the type of soil found in each. Think about how organisms are adapted to live in a biome. Remember that a biome is not one particular place. A biome is a group of similar ecosystems, which may occur in many places on Earth.







Tree frogs such as these are common in tropical rain forests.



## Tropical Rain Forest

Tropical rain forests contain more species than any other biome. Tropical rain forests once covered about 14 percent of Earth's land. Today more than half of these tropical rain forests have been destroyed.

Dead organisms decay quickly in hot, wet tropical rain forests. Plants quickly take up their nutrients. In tropical rain forests, most nutrients are found in plants. The soil is poor in nutrients.

Trees grow very tall in tropical rain forests. Their leafy tops form a dense covering called the canopy. Little sunlight filters through this covering. Though some shrubs grow beneath the trees, few plants grow on the forest floor. Most rain forest animals live in the treetops, where they eat leaves and fruit.



## Deciduous Forest

Deciduous forests grow where summers are warm and winters are cold. Deciduous trees shed their leaves in autumn. They grow new leaves each spring. Oak, maple, and beech trees are common in deciduous forests. Conifers, such as pine trees, also grow here. Shrubs and ferns grow on the forest floor.

Songbirds, deer, bears, and porcupines are common animals in deciduous forests. Because winters are cold, some animal species hibernate to avoid the cold. Many bird species migrate to warmer climates for the winter.

The leaves shed by deciduous trees decay on the forest floor. They add nutrients to the forest soil. The soil beneath deciduous forests is rich in nutrients.



*Porcupine*







## Taiga

The taiga is a biome with long, cold, dark winters. Most trees that grow in the taiga are conifers. These include fir and spruce trees. A few deciduous trees and some shrubs also grow in this harsh, cold biome.

Many taiga animals, such as squirrels and birds, eat the seeds and berries of conifer trees. Large animals, such as elk, deer, caribou, and moose, eat tree bark and plant shoots. Wolves, grizzly bears, and hawks hunt and eat the small animals of the taiga.

The long, thick hair of this caribou helps keep it warm during long taiga winters.



## Grassland

Grasslands get too little rain to support many large trees. Yet grassland soil is very rich in nutrients. Many grasses in this biome have deep roots. The roots add nutrients to the soil.

Grassland soil is excellent for farming. Every year millions of tons of wheat, corn, and soybeans are grown on grasslands in the United States.

Some of the largest animals on Earth live on grasslands. These include bison, rhinoceros, and giraffes. Coyotes, as well as prairie dogs and other rodents, are smaller animals of the grasslands. Insects, such as grasshoppers, are common grassland animals too.

The grassland biome provides plentiful food for grasshoppers.







## Tundra

The tundra has a very cold climate. Just beneath the surface, the soil is frozen solid all year long. This frozen layer of soil is called permafrost. Water cannot seep through permafrost, so when the topsoil thaws in summer, it turns soggy. During the short summer, mosquitoes and other insects hatch from surface pools. The insects are food for many birds that fly to the tundra in summer to breed. The tundra is so cold and windy that few plants grow there. Short shrubs, moss, and very few short trees grow on the tundra. Animals of the tundra include foxes, hares, many types of birds and lemmings.

The dark feathers of this ptarmigan turn white in winter, which helps it hide from predators in the snow.



## Desert

The main feature of a desert is its lack of precipitation. Most deserts are hot and dry. The driest hot deserts get almost no rainfall. But some deserts can be very cool, especially at night.

Desert plants have adaptations, that help them to live with little water. Cacti have short periods of growth. They have a waxy coating that keeps them from losing water. Many desert animals are active only at night, when it is cooler. Desert birds, snakes, turtles, and other animals have adaptations that enable them to live on little water.

This Sonoran kingsnake lives in Utah, Arizona, New Mexico, and Nevada.





## Glossary

<b>abiotic factor</b>	nonliving part of an ecosystem, such as water or rocks
<b>biome</b>	a large group of ecosystems with similar climates and organisms
<b>biotic factor</b>	living part of an ecosystem, such as a plant or animal
<b>community</b>	a group of populations that interact with each other in a particular area
<b>ecosystem</b>	a community of organisms living together along with nonliving parts of the environment
<b>environment</b>	anything that can affect an organism, including living and nonliving things
<b>population</b>	a group of individuals that belong to the same species and live in the same area

## What did you learn?

1. What makes up a population of organisms? What makes up a community?
2. What is the difference between a biotic factor and an abiotic factor in an ecosystem? Name one example of each.
3. In what way are the taiga biome and the tundra biome similar?
4. **Writing in Science** The length of a biome's growing season has a huge effect on the number and variety of organisms living there. Explain why a biome with a long growing season has more organisms living in it than a biome with a short growing season.
5. **Main Idea and Details** Plants and animals are adapted to survive in the biome in which they live. Choose one plant or animal you read about and describe the adaptations it has that help it survive in its environment.

