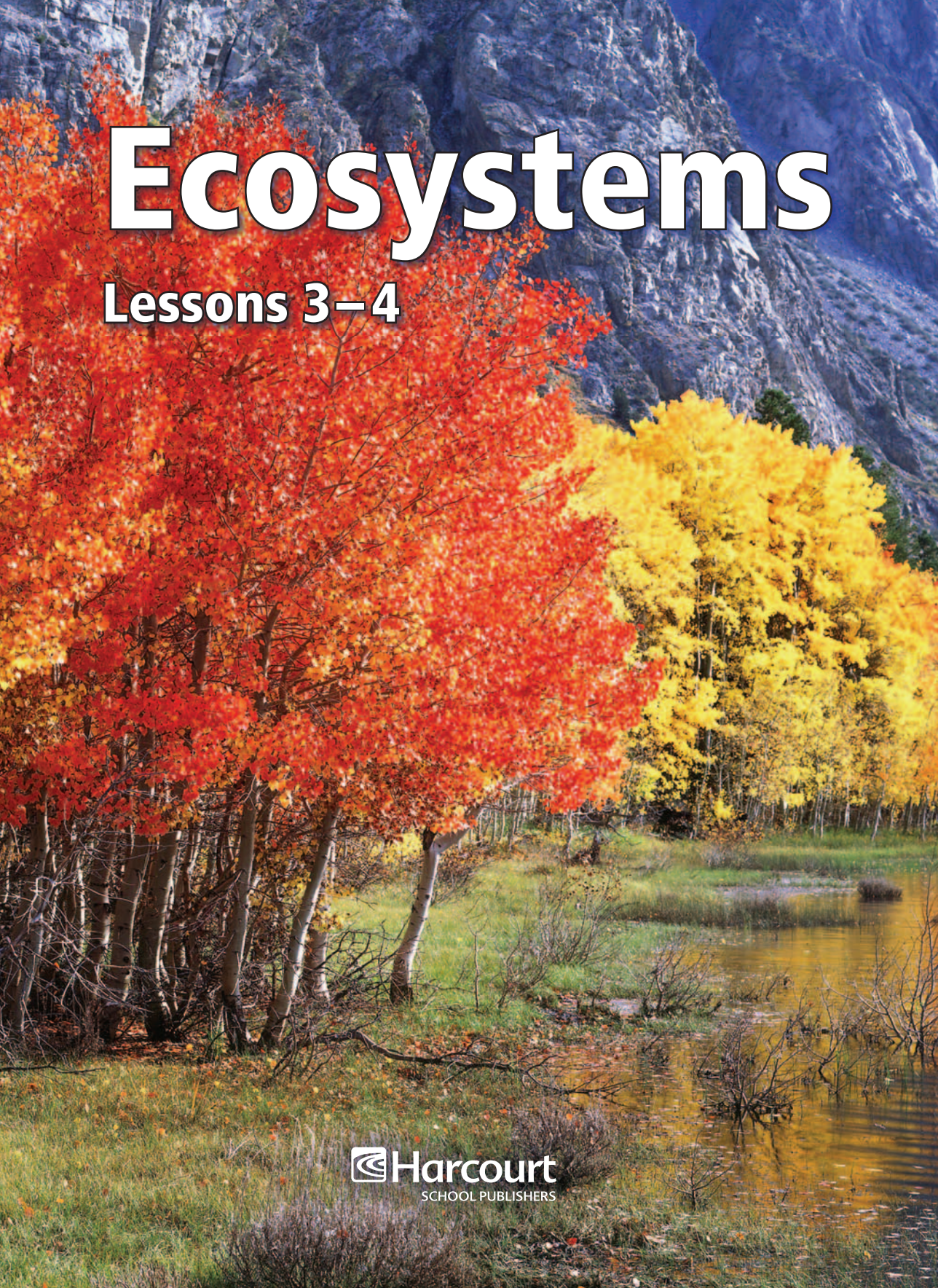




Ecosystems

Lessons 3–4

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Printed in the United States of America

ISBN-13: 978-0-15-349211-2

ISBN-10: 0-15-349211-2

1 2 3 4 5 6 7 8 9 10 179 15 14 13 12 11 10 09 08 07 06

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Ecosystems

Lessons 3–4

Lesson 3

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www.harcourtschool.com

VOCABULARY

succession
organic
carbon cycle
nitrogen cycle

How Do Natural Cycles Affect Ecosystems?



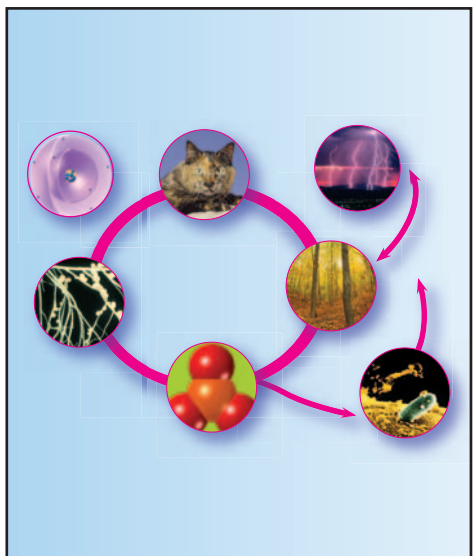
Over time you can see **succession** of different plant species in an area. Some kinds of plants come in, others die out.



A substance that contains carbon is **organic**. These vegetables all contain carbon.



Carbon compounds move through Earth's ecosystem as solids, liquids, and gases. This movement is known as the **carbon cycle**.



Nitrogen in different forms moves between living organisms and the nonliving parts of the ecosystem. The **nitrogen cycle** involves plants, animals, and decomposers.



READING FOCUS SKILL

SEQUENCE

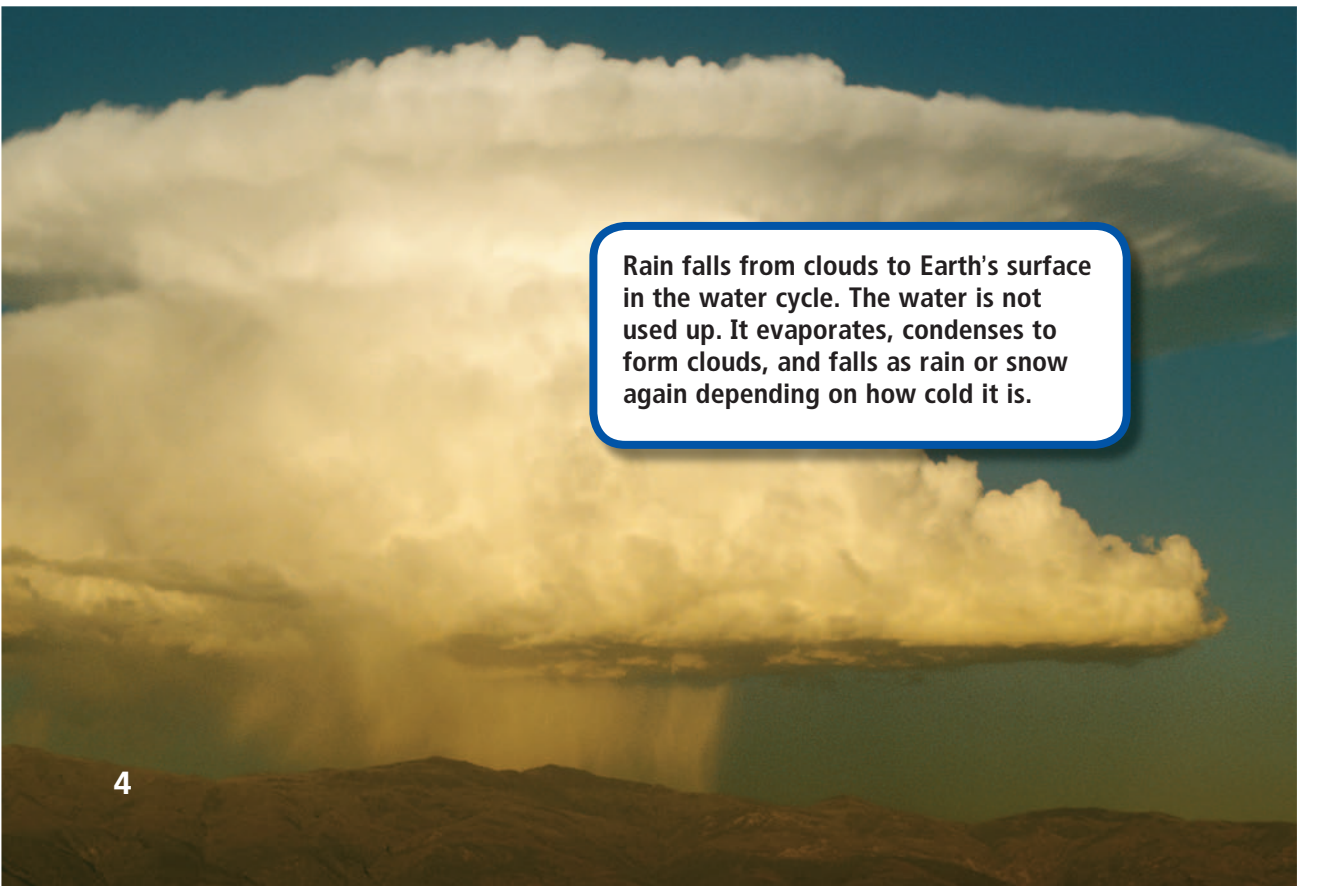
When you **sequence** things, you put them in order.

Look for the **sequence** in natural cycles and how they affect ecosystems.

The Importance of Natural Cycles

Earth has natural cycles. You know the cycle of night and day. Some cycles are not as easy to see. Cycles show how organisms and matter interact with the environment.

The water cycle is important to us. There is a limited amount of water on Earth. The sun's energy causes some water to evaporate from the surface. This water condenses to form clouds. Then gravity causes rain to fall on Earth and the cycle goes on.



Rain falls from clouds to Earth's surface in the water cycle. The water is not used up. It evaporates, condenses to form clouds, and falls as rain or snow again depending on how cold it is.



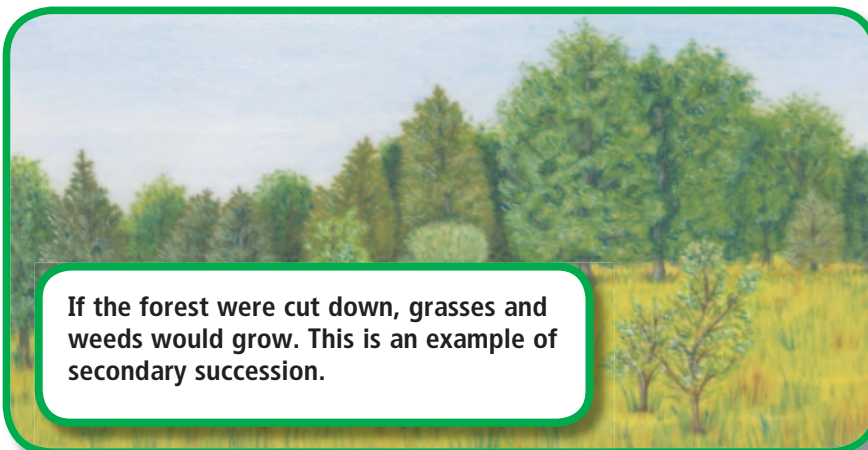
Tides are cycles. This is a picture of low tide.

Ecosystems also go through a cycle of succession. **Succession** is the gradual, long-term change of plant species. Conditions for a plant may change, causing a certain species to die out. New plants will take its place.

There are two types of succession, primary and secondary. Primary succession occurs when plants first take root in an area that has no plants. Secondary succession is more common. It takes place when most, but not all, of the vegetation in an area has been removed. There is some soil on which new plants can grow.



What are the steps in the water cycle?

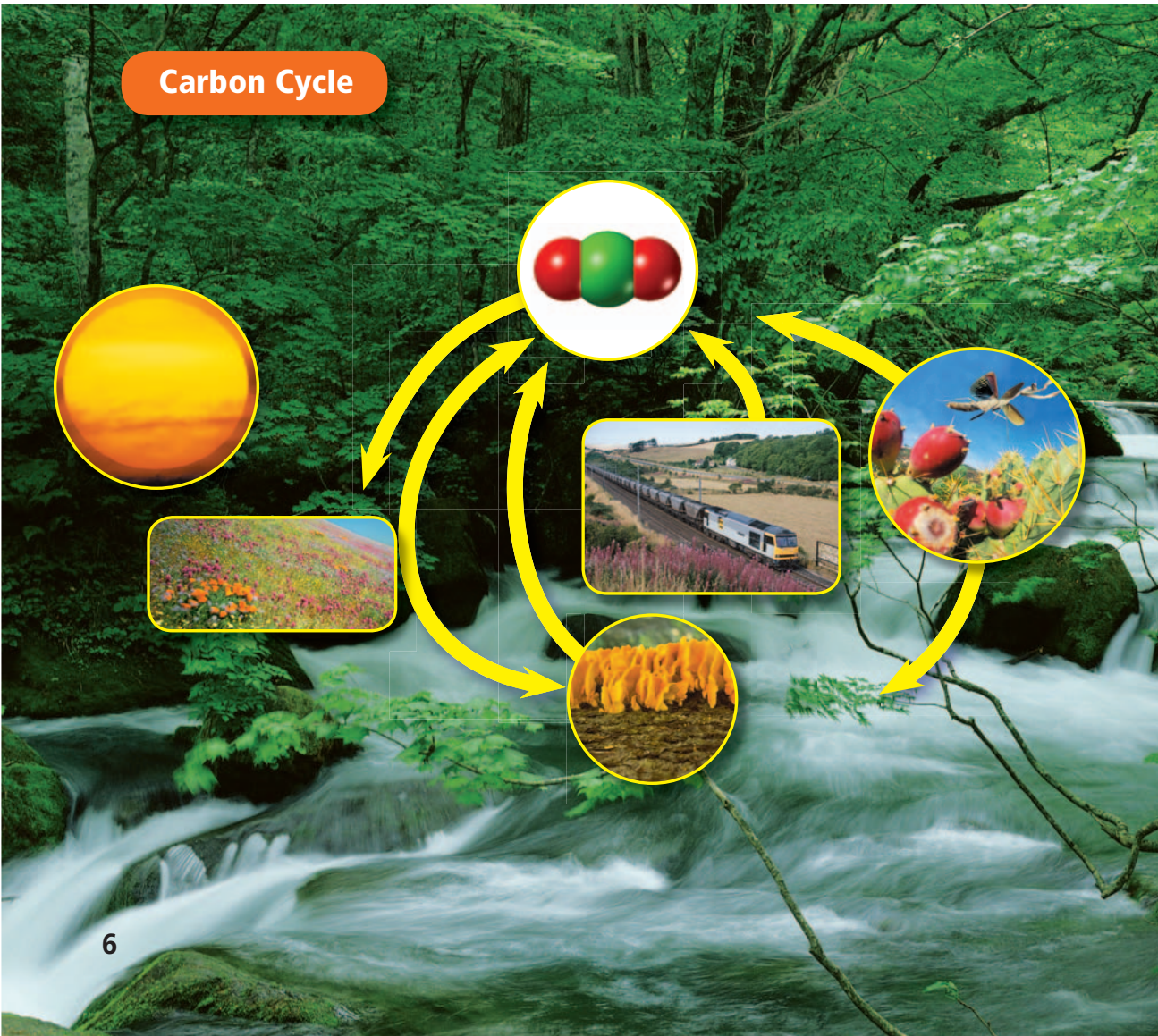


If the forest were cut down, grasses and weeds would grow. This is an example of secondary succession.

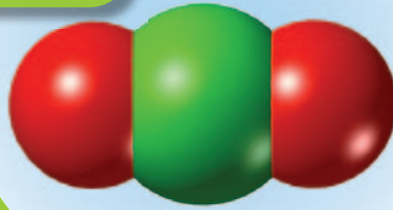
The Carbon Cycle

Carbon is a part of every organism on Earth. Any substance that contains carbon is called **organic**.

Carbon never runs out, because it is constantly recycled in the carbon cycle. The **carbon cycle** is the movement through Earth's ecosystems of carbon compounds as solids, liquids and gases. The picture below shows the carbon cycle.



The balance of gases in our atmosphere is about 0.03 carbon and 21 percent is oxygen.

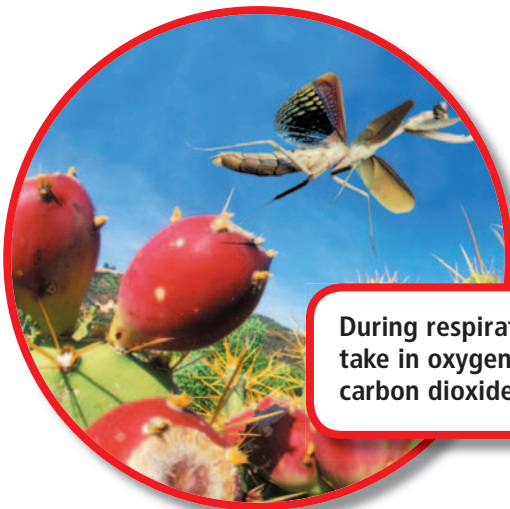


Plants make their own food. But they still need to be able to use stored energy for food. At times plants take in oxygen from the air to release this energy. This process returns carbon dioxide to the air.

Respiration is the process of using energy to maintain cells. This process cycles the carbon from living things back into the air and water. When we take in oxygen from the air we return carbon dioxide to the air.



What does an organism do after it gets energy from food?



During respiration, consumers take in oxygen and release carbon dioxide.

The Nitrogen Cycle

The **nitrogen cycle** is the movement of nitrogen between living and nonliving parts of ecosystems. Plants and animals need nitrogen to make proteins. Proteins help build and maintain cells. Antibodies are animal proteins that help the body fight disease.

Nitrogen is not hard to find. However, most organisms cannot use nitrogen gas straight from the air. *Nitrogen fixation* changes nitrogen into a form that plants and animals can use. Bacteria in the roots of some plants change nitrogen gas into a form that the plants can use. Follow the nitrogen cycle in the picture below.



What must happen to nitrogen before plants can use it?

Nitrogen Cycle

Living things, such as plant leaves, contain nitrogen compounds. When the living things decay, these compounds return to the soil.



How Humans Affect Cycles

Human activities can change Earth's chemical cycles. When fossil fuels are burned, carbon dioxide is given off in large amounts. Too much carbon dioxide keeps heat from escaping into the atmosphere. This causes a warming effect on Earth that affects the kinds of plants and animals that live there.

The nitrogen cycle can also change because of things people do. Nitrogen is a main ingredient in the fertilizers we use. It can run off into lakes and streams. Too much nitrogen can cause algae to grow, which upsets the flow of oxygen. An increase in nitrogen can affect an ecosystem's food web.



What series of activities can change habitats?

Fertilizers have nitrogen. When it rains, high levels of nitrogen can enter streams, rivers, and lakes.



Review



Complete each **sequence** statement.

1. Ecosystems go through a cycle of _____, which is a long term change of plant species.
2. Any substance that contains carbon is _____.
3. The _____ is the movement of carbon compounds through Earth's ecosystems.
4. The _____ is the movement of nitrogen in different forms between living and nonliving things.

Lesson 4

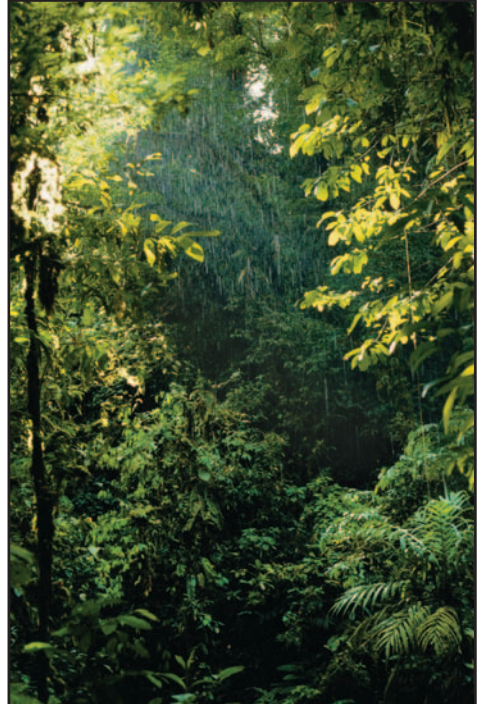
VOCABULARY

biome
tropical rain
forest
temperate
deciduous forest
desert

What Roles Do Organisms Play in Biomes?



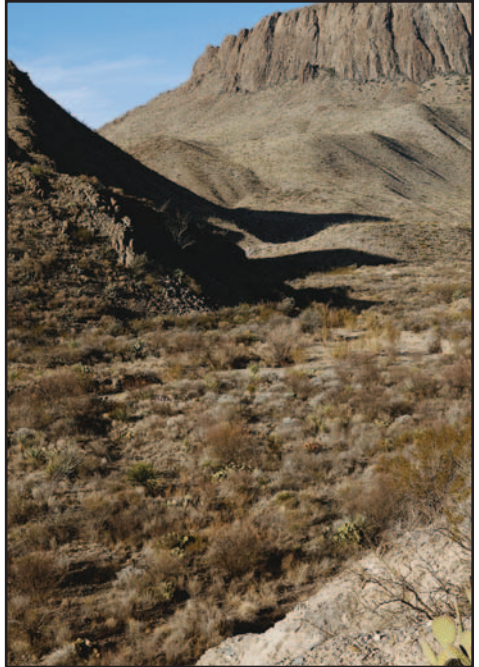
The desert is a dry **biome**.



The **tropical rain forest** is a biome that is green and lush.



In a **temperate deciduous forest**, leaves turn color and fall off.



In a **desert** biome organisms survive with very little water.



READING FOCUS SKILL

COMPARE AND CONTRAST

You **compare** things by looking for the ways things are similar. You **contrast** things by looking for the ways things are different.

Compare and **contrast** how biomes are alike and different.

Biomes

If you have traveled to an area that has different plants, animals, and temperatures, you've gone into a different biome. A **biome** is an area of Earth that has its own climate, plants, and animals that live there.

World Biomes

This map shows the world's major biomes. In which biome do you live?



Grassland covers a large area in South America. The grassland's dry climate doesn't provide enough water for the growth of large trees.



The most important factors that tell where a biome is located are the climate and patterns of precipitation.

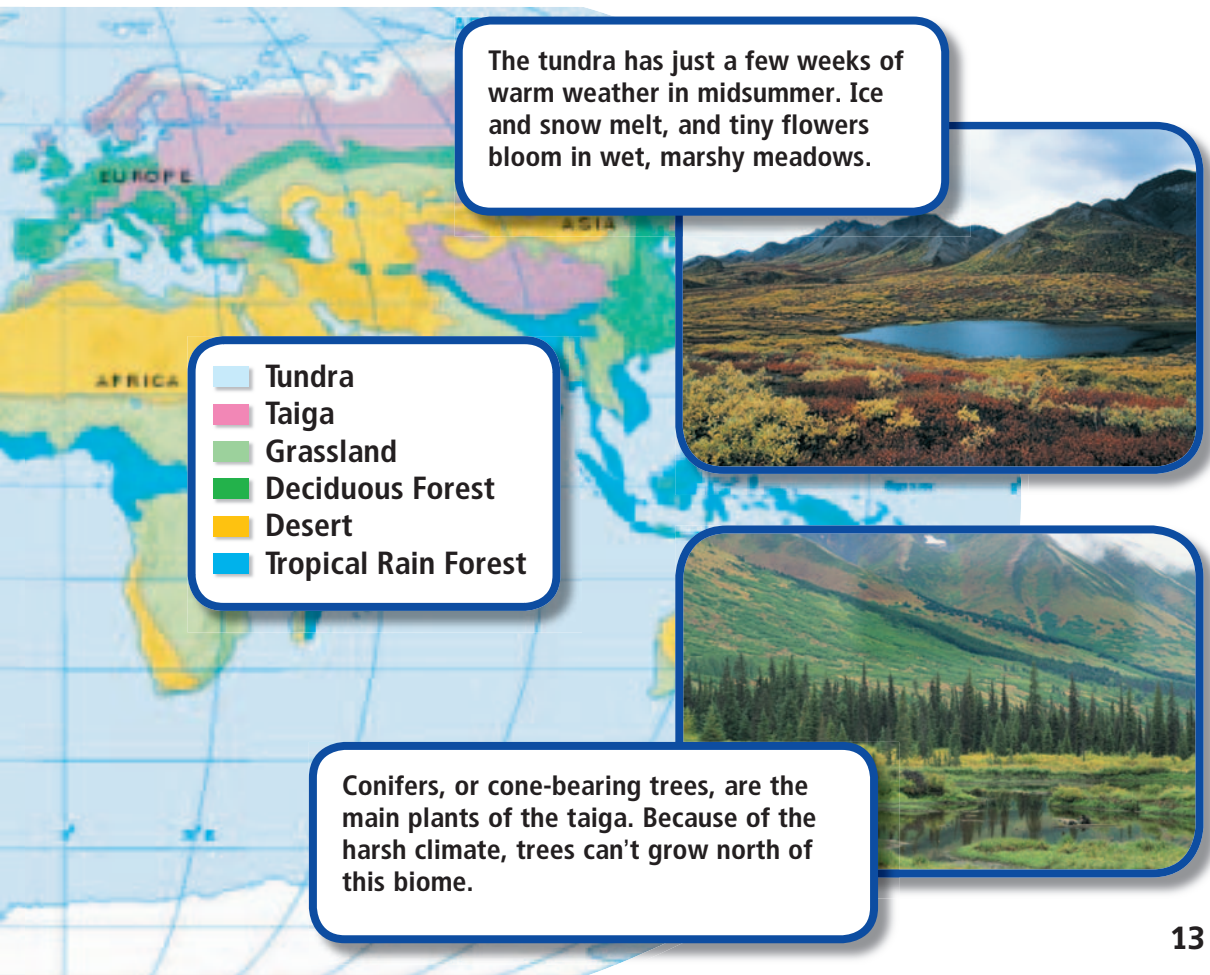
Latitude affects a biome's climate. The climate near the equator is warm and wet. These are perfect conditions for tropical rainforest plants and animals.

Elevation also helps determine a biome's climate. The higher you go, the colder it gets. Different biomes may exist at different elevations.

There are similar biomes all over the world. The world map on these pages shows where six biomes are located. They are Tundra, Taiga, Grassland, Deciduous Forest, Desert, and Tropical Rain Forest.



What causes biomes to be different?



Tropical Rain Forests

The **tropical rain forest** is a biome where very tall trees grow close together. The temperature is always warm. There is plenty of rainfall.

The plants of the tropical rain forest grow in layers. The top layer, the canopy grows plants that need sun. Plants that need shade grow on the forest floor. The average temperature is 78 degrees Fahrenheit (26°C). More than 100 inches of rain fall in a year.

Australian Rainforest Consumers



The bandicoot is an omnivore. It eats plants, worms, lizards, and small mice.

The tree kangaroo is a consumer that lives on leaves found in the canopy of the rain forest.

South American Rainforest Consumers

The capybara is a rodent that swims and is a herbivore and lives on the forest floor.

Marmosets are small monkeys that live in the canopy of the rain forest and eat fruits and insects.

There is great diversity of species in a tropical rain forest. It is more diverse than any other biome. Different consumers and producers live in certain areas of the rain forest. There is also a wide variety of decomposers. Rain forests in Australia and South America have very different animals that have similar roles.



How are South American rain forests similar to Australian rain forests.?

Deciduous Forests

A **temperate deciduous forest** has trees with leaves that drop off in the fall. Temperatures are warm in the summer. Winters are cold and often snowy. There is less rainfall than in a tropical rain forest.

The trees are adapted for changes in temperature during the year. In fall, the leaves stop making food for the plant. They drop off the trees. Decomposers break down the leaves and the nutrients return to the soil.

Temperate Deciduous Forest Consumers

A photograph of a temperate deciduous forest scene. In the foreground, a deer stands on a grassy bank, looking towards the camera. Behind it, a stream flows over rocks, surrounded by trees with yellowing autumn leaves. In the upper right, a hawk is shown in flight, its wings spread wide, hunting for prey in the forest canopy.

A hawk eats chipmunks and squirrels.

Deer are consumers that eat forest grasses and leaves. They are a food source for predators like the cougar.



Australian Deciduous Forest Consumers

Many deciduous forest plants die off during the winter. This means that fewer consumers can find enough food to survive. The number of organisms that a deciduous forest can support depends on the season. Many animals must migrate or move to a different area to find food in order to survive.



Why is there less diversity in a temperate deciduous forest than in a tropical rain forest?

North American Desert Consumers

Javelinas eat cactus.
They are predators for
coyote.

Desert

A **desert** is a biome that gets less than 25 cm (10 in.) of rainfall in a year. It supports organisms adapted to dry conditions.

Deserts are not always hot. Some deserts get cold at night. Some deserts even have below freezing temperatures during the day!

Many desert plants have leaves that hold in moisture. Some have deep root systems that reach down for water. Others have very shallow roots that spread out. The roots quickly store any rainwater before it soaks into the ground.

The coyote survives
in the desert because
of the wide variety of
food it will eat.

To survive in hot deserts animals must find ways to avoid overheating. Most stay quiet during the day. Instead, they hunt for food at night, when it is cooler.

There is diversity in the desert despite of high temperatures and little rainfall. Many different desert plants provide energy to primary desert consumers. This indirectly provides energy to predators.

In desert biomes, termites and bacteria break down waste from animals and plants.



How are desert animals alike and different from tropical rainforest animals?



Desert

Review



Fill in the **compare** and **contrast** statements.

1. A _____ is a region of the world defined by its climate and by the types of plants and animals that live there.
2. In a _____ many different organisms live in great diversity.
3. In the fall, trees drop their leaves in the _____.
4. A _____ biome supports organisms adapted to dry conditions.

GLOSSARY

biome [BY•ohm] A region of the world defined by its climate and the types of plants and animals that live there.

carbon cycle [KAR•buhn SY•kuhl] The movement through Earth's ecosystems of carbon compounds as solids, liquids, and gases.

desert [DEZ•ert] A biome that gets less than 25 cm (10 in.) of rainfall in a year, which supports organisms adapted to dry conditions.

nitrogen cycle [NY•truh•juhn sy•khul] The movement of the nitrogen in different forms between living organisms and the nonliving parts of ecosystems.

organic [awr•GAN•ik] Containing carbon.

succession [suhk•SESH•uhn] The gradual, long-term change of plant species in an ecosystem.

temperate deciduous forest [TEM•per•it dee•sij•OO•uhs FAWR•ist] A biome that usually has four seasons, as well as trees with broad leaves that drop off in the fall.

tropical rain forest [TRAHP•ih•kuhl RAYN FAWR•ist] A biome that has warm temperatures, plenty of rain, and trees that grow tall and close together.

Think About the Reading

1. What can you do to help you remember what you have learned about ecosystems and cycles?
2. What questions do you have after reading this book?
How can you find the answers to your questions?

Hands-On Activity

1. To better understand the carbon and nitrogen cycles draw a picture of what happens and label it.
2. Make picture cards of each biome that you learned about. On the back of each picture card write descriptions of each biome. Be sure to list some producers and consumers for each biome.

School-Home Connection

Discuss with a family member what biome you reside in. Describe your biome and what you know about the organisms that live with you. Decide what the producers and consumers are.