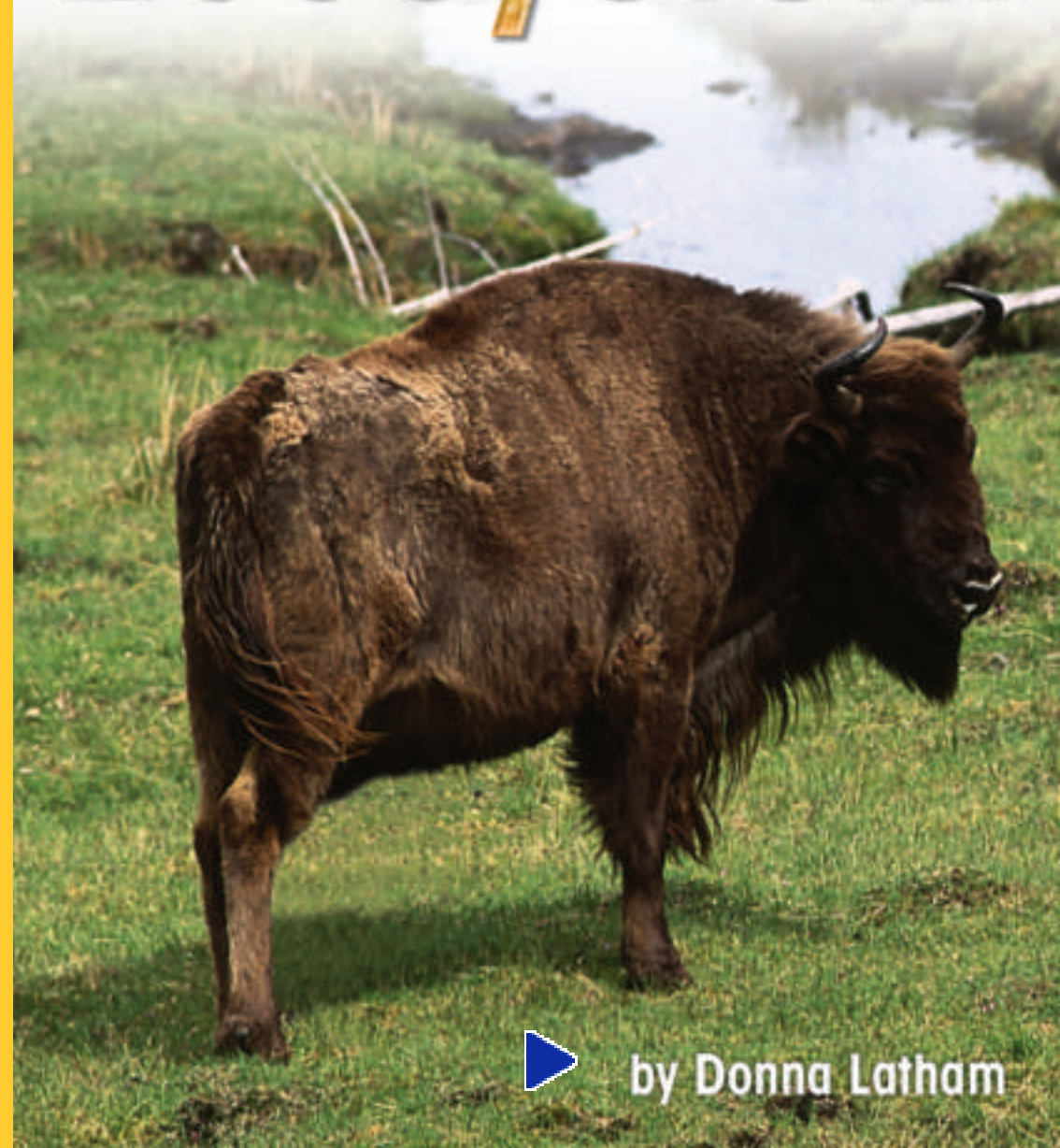


Science

Science

Life Science

Life in an Ecosystem



Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Sequence	<ul style="list-style-type: none"> • Labels • Captions • Diagrams • Glossary 	Ecosystems

Scott Foresman Science 4.3



scottforesman.com



by Donna Latham

Vocabulary

carnivores
community
decomposers
ecosystem
herbivores
niche
omnivores
population



Life in an Ecosystem

by Donna Latham

Picture Credits

Every effort has been made to secure permission and provide appropriate credit for photographic material. The publisher deeply regrets any omission and pledges to correct errors called to its attention in subsequent editions.

Photo locators denoted as follows: Top (T), Center (C), Bottom (B), Left (L), Right (R), Background (Bkgd).

1 © Kim Taylor/DK Images; 6 (TR) © Jerry Young/DK Images; 8 Bryan & Cherry Alexander/Photo Researchers, Inc.; 10 (BR) © Darren Bennett/Animals Animals/Earth Scenes; 11 (BR) Tim Fitzharris/Minden Pictures; 15 (BR) © Jerry Young/DK Images; 16 (BL) © Jerry Young/DK Images; 17 (CL) David Wrobel/Visuals Unlimited; 19 (C) Roland Birke/Phototake, (CR) Jeff Rotman/Nature Picture Library; 21 (R) Omni Photo Communications Inc./Index Stock Imagery; 22 (TL) © Kim Taylor/DK Images, (R) Jim Zipp/Photo Researchers, Inc.

Scott Foresman/Dorling Kindersley would also like to thank: 7 (TL) Stephen Oliver/DK Images; 13 (TR) Philip Dowell/DK Images; 17 (BL) Natural History Museum, London/DK Images; 19 (CR) Jerry Young/DK Images.

Unless otherwise acknowledged, all photographs are the copyright © of Dorling Kindersley, a division of Pearson.

ISBN: 0-328-13866-5

Copyright © Pearson Education, Inc. All Rights Reserved. Printed in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permission(s), write to Permissions Department, Scott Foresman, 1900 East Lake Avenue, Glenview, Illinois 60025.

3 4 5 6 7 8 9 10 V010 13 12 11 10 09 08 07 06 05





The Ecosystem and Its Parts



What a view! You are in the forest. From your perch on the hill, you can easily see a pond below you and the Sun shining above you. A frog croaks noisily. You focus your binoculars on the cattails that rustle in the breeze.

You close in on the dragonflies resting on them.

You zoom in on a family of ducks paddling along noisily. The ducklings at the end of the line hurry to keep up. At the edge of the pond, a great blue heron waits patiently in the reeds. You watch quietly as the heron drops its head down into the water. When it jerks back up, you see the wriggling fish in its bill. You may not realize it, but you are watching an amazing system in action.



What is a system?

A system consists of many parts working together for a purpose. In a system, there are both living and nonliving parts. Every part of a system is important. If any part of a system is lost or damaged, the whole system is affected. It does not work as well.

Take another look through your binoculars at the pond in the forest. What living things do you see? The ducks and the heron are birds. The frog is an amphibian. The dragonflies are insects, and the cattails are plants. They are all alive. What nonliving parts can you think of? Air, water, soil, sunlight, climate, and landforms are all nonliving parts. All of these parts of the system are working together. Let's find out how!





Many Ecosystems

One important kind of system is an ecosystem. An **ecosystem** is made of living and nonliving things interacting and working together. They have the same environment, or place, in nature. They interact with each other, and they affect what happens to one another. The ways they interact keep the ecosystem alive.

Ecosystems may be large or small. One large ecosystem is the forest you just visited. The pond is a smaller ecosystem within the forest. A fallen tree is an even smaller one. All these ecosystems are homes to living and nonliving things that work together.

This fallen tree is a small ecosystem. What living things are interacting with it?



Organisms are only able to live in environments that give them what they need to survive. In any environment, some animals and plants can survive. Others cannot survive. Plants and animals adapt in order to stay alive. This means that the way they look and act helps meet their needs in their surroundings.

Ecosystems vary depending on the climate. The world is made of many different climates, so there are many ecosystems. Different plants and animals make their homes in different kinds of ecosystems. Let's learn about each type.





Arctic Tundra

The ground is frozen under the surface in an Arctic tundra.

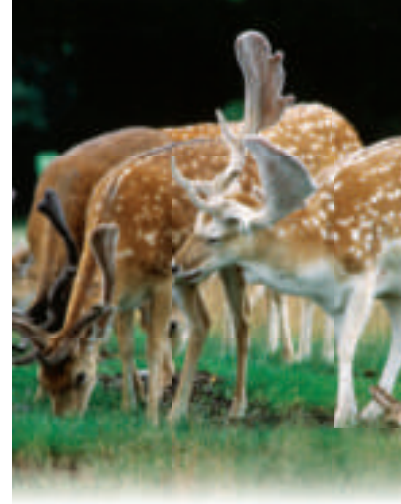
No trees can grow there.

Arctic foxes, polar bears, and wolves have adapted to live in the cold weather of the Arctic tundra.



Grassland

Covered in tall grasses, grasslands have a moderate amount of rain. Pronghorn sheep, bison, and coyotes are found in the grasslands of the United States.



Forest

Rich with trees, wildflowers, and many animals, forests usually get more rain than grasslands. Deer, raccoons, foxes, and many birds interact in this ecosystem.

Desert

Very dry and often hot, deserts see almost no rain. Some plants, including cacti and some grasses, are adapted for life with nearly no water.

So are some animals, including lizards, snakes, and kangaroo rats.



Rain Forest

There is rain all year in a tropical rain forest. Palms, ferns, and vines can grow there. Colorful birds, bats, monkeys, and snakes are some of the animals that live there.





Organisms in Their Ecosystem

There are many different species that live in ecosystems. A **population** is all the members of one species living in a part of an ecosystem. In the pond, you saw two different bird populations. In a desert, you might see a population of prairie dogs. Different populations in an ecosystem interact with one another and form a **community**. All the organisms that live in the forest ecosystem are a community.



Habitats

A habitat is the place where an organism lives within an ecosystem. The tundra is an ecosystem. During the winter months, a polar bear in the tundra digs a den into the side of a hill. The den is its winter habitat.



Finding a Niche

The job an organism does is its niche. A **niche** is the role an organism has in its habitat. A niche is also the food an organism eats and how it gets that food. It even includes the species that will use that organism for food.

The cape ground squirrel, the scorpion, and the tortoise share a desert habitat but have different niches. The cape ground squirrel uses its bushy tail to shade itself from the Sun. It eats grasses, seeds, and nuts. The scorpion hides from the day's heat by burrowing. It eats insects, lizards, and small animals. The tortoise finds shade during the hottest part of the day. It eats plants.





Energy in Ecosystems

Sunlight is the main source of energy for all life on Earth. Plants change sunlight energy into chemical energy through a process called photosynthesis. Since plants make their own food, they are called producers.

Many organisms cannot make their own food. Organisms that eat other living things to get energy are called consumers. **Herbivores** are consumers that get energy from eating plants. Deer, zebras, and moose are herbivores. **Carnivores** get energy from eating animals. Predators such as sharks, lions, and coyotes are carnivores. **Omnivores**, such as bears and raccoons, eat both plants and animals. Some consumers, such as vultures, are known as scavengers. Scavengers feed on the bodies of dead plants and animals.



The Food Chain

All living things must have food to stay alive. Energy moves from one living thing to another through a food chain. Energy transfers through the food chain when organisms eat and are eaten.

Food chains begin with energy from the Sun. This energy goes to producers, and from there it is passed to consumers.

In the food chain you see here, the arrows show how the energy is transferred from the “eaten” to the “eater.” The Sun gives energy to the grass. The jackrabbit receives this energy when it eats the grass. The energy flows to the coyote when it eats the jackrabbit. The mountain lion eats the coyote and gets energy.





Why is the food chain important?

Imagine an ecosystem that had only producers and consumers. What would happen? In time, plants would take all the minerals from the soil. With no minerals left, these plants would die. With no plants to eat, herbivores would starve. Omnivores and carnivores would then have no food and would also starve.

You can see how one missing piece in the chain affects all the others. When minerals are not replaced, new organisms cannot grow. This is why decomposers are important in the food chain.

Decomposers eat the wastes and remains of dead plants and animals. Those remains still have food energy stored inside them.

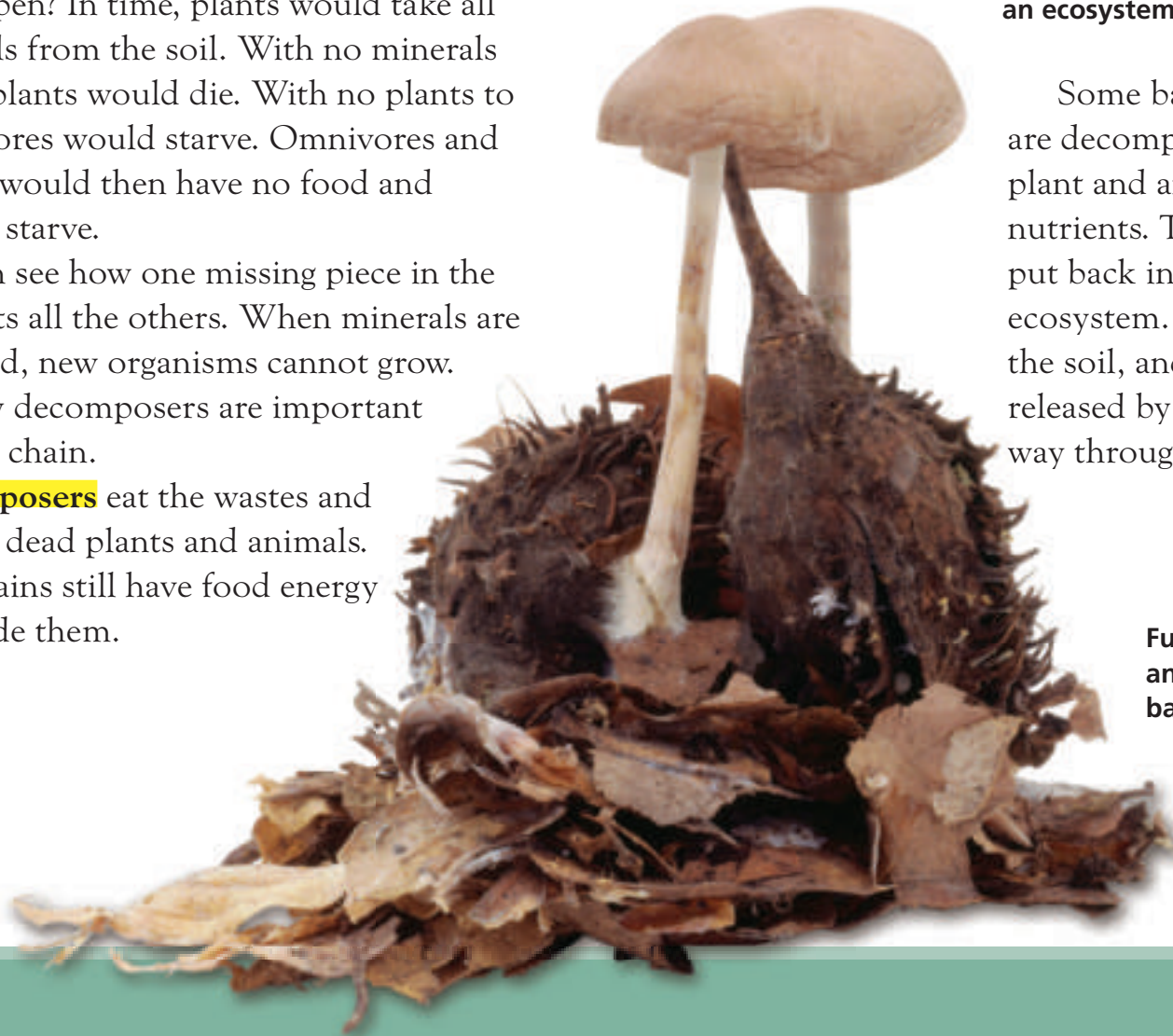


Decomposers improve the soil in an ecosystem.



Some bacteria, insects, and fungi are decomposers. They break down dead plant and animal tissues into minerals and nutrients. The minerals and nutrients are put back into the air, water, and soil of the ecosystem. Plants take these nutrients from the soil, and the chain keeps going! Energy released by decomposers transfers all the way through a food chain.

Fungi break down dead plants and animals. They put nutrients back into the soil.





Food Webs

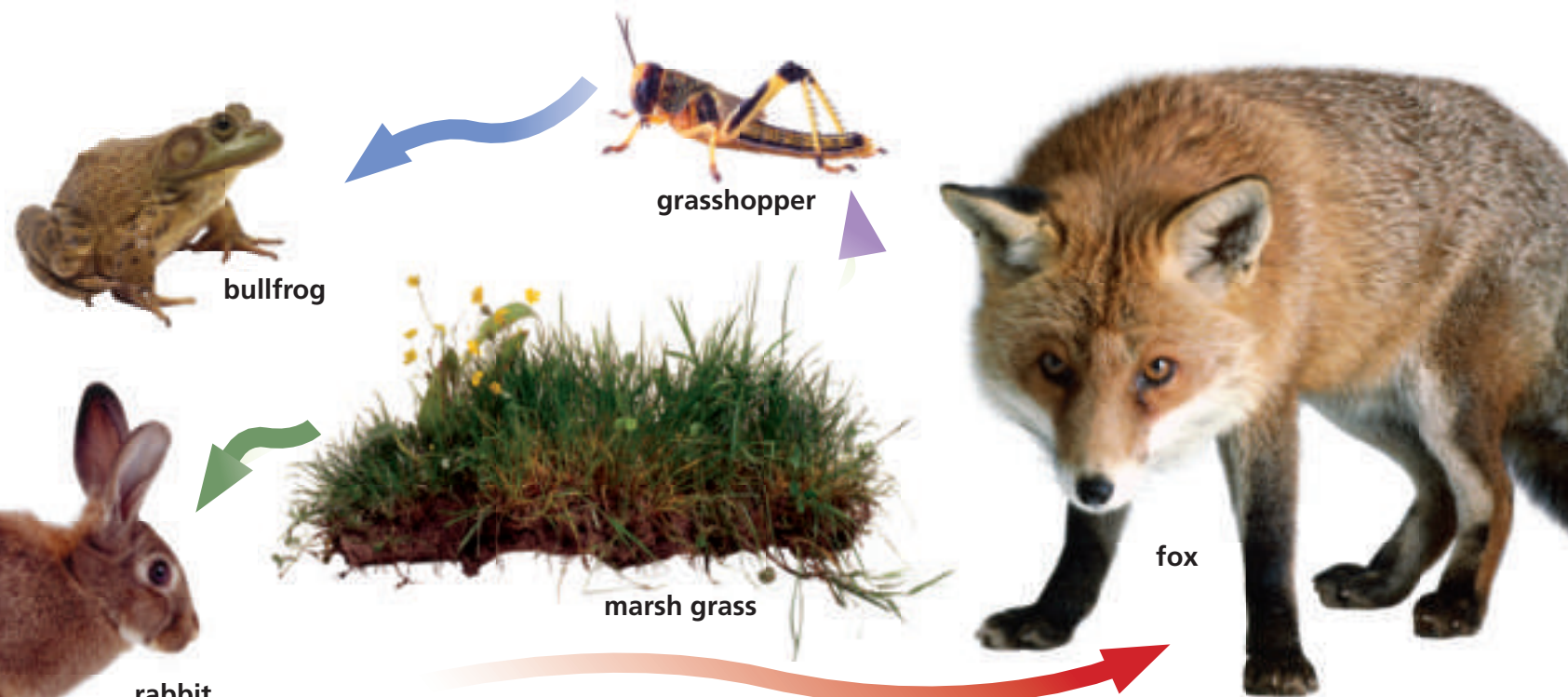
You have seen how a food chain operates. One form of life eats another, which eats another, and so on. An ecosystem can have many food chains. The same source of food can be part of more than one chain. These chains overlap and form a food web. A food web shows how many food chains interact.

A food web is more complex than a food chain. It lets you see how different food chains in an ecosystem are related.



Let's go back to the pond you visited earlier. This food web shows you how the food chains in the pond overlap. Start with the marsh grass. Both rabbits and grasshoppers eat this food source.

Which consumers eat grasshoppers? Which consumers eat rabbits? By looking at the web, you can see that bullfrogs eat grasshoppers. And both hawks and foxes eat rabbits. This means that hawks and foxes compete for rabbits. Can you see how food energy flows in many directions?





Matter in Ecosystems

You know that all organisms need energy to survive. They also need matter. Matter includes minerals, oxygen, and carbon dioxide. When organisms die and decay, this matter goes back to the ecosystem.

Water Ecosystems

Nearly three-fourths of Earth's surface is covered with water. This means many organisms live in water ecosystems. Let's find out what those ecosystems are like!

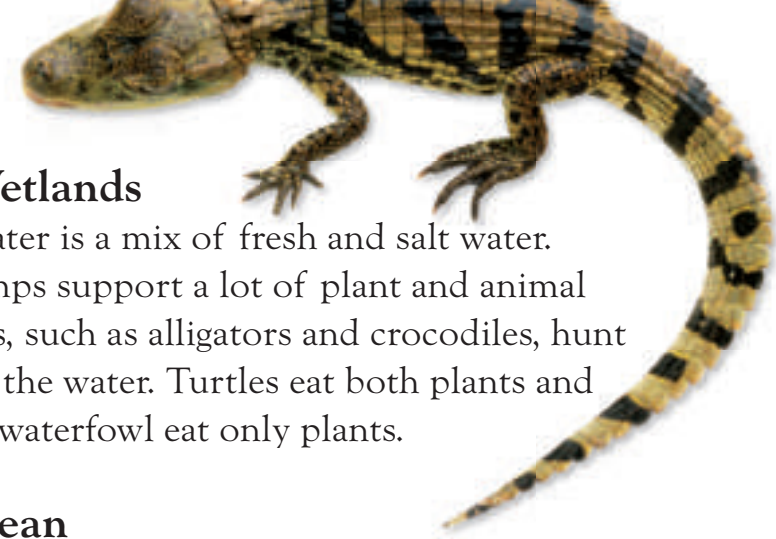
Freshwater Wetlands

The shores of freshwater ecosystems, such as ponds, can have many habitats. Many other habitats are below the surface of the water. Water plants live in the water. Fish, which live underwater, eat the water plants. Egrets and cranes can go fishing from the shore!



Brackish Wetlands

Brackish water is a mix of fresh and salt water. Saltwater swamps support a lot of plant and animal life. Carnivores, such as alligators and crocodiles, hunt on land and in the water. Turtles eat both plants and animals, while waterfowl eat only plants.



Shallow Ocean

All ocean water is salty. Coral reefs are found in shallow ocean areas. Coral reefs are made of coral skeletons. Lots of sunlight reaches this ecosystem, so many plants and animals make their homes here.

Deep Ocean



The organisms that can survive in the dark, deep ocean have adapted to do so. Many, such as this viperfish, have large eyes. They take in what little light there is. They have a big jaw and long teeth. This is so they can open their mouths wide and hold on tightly to their prey.





A Coral Reef Food Web

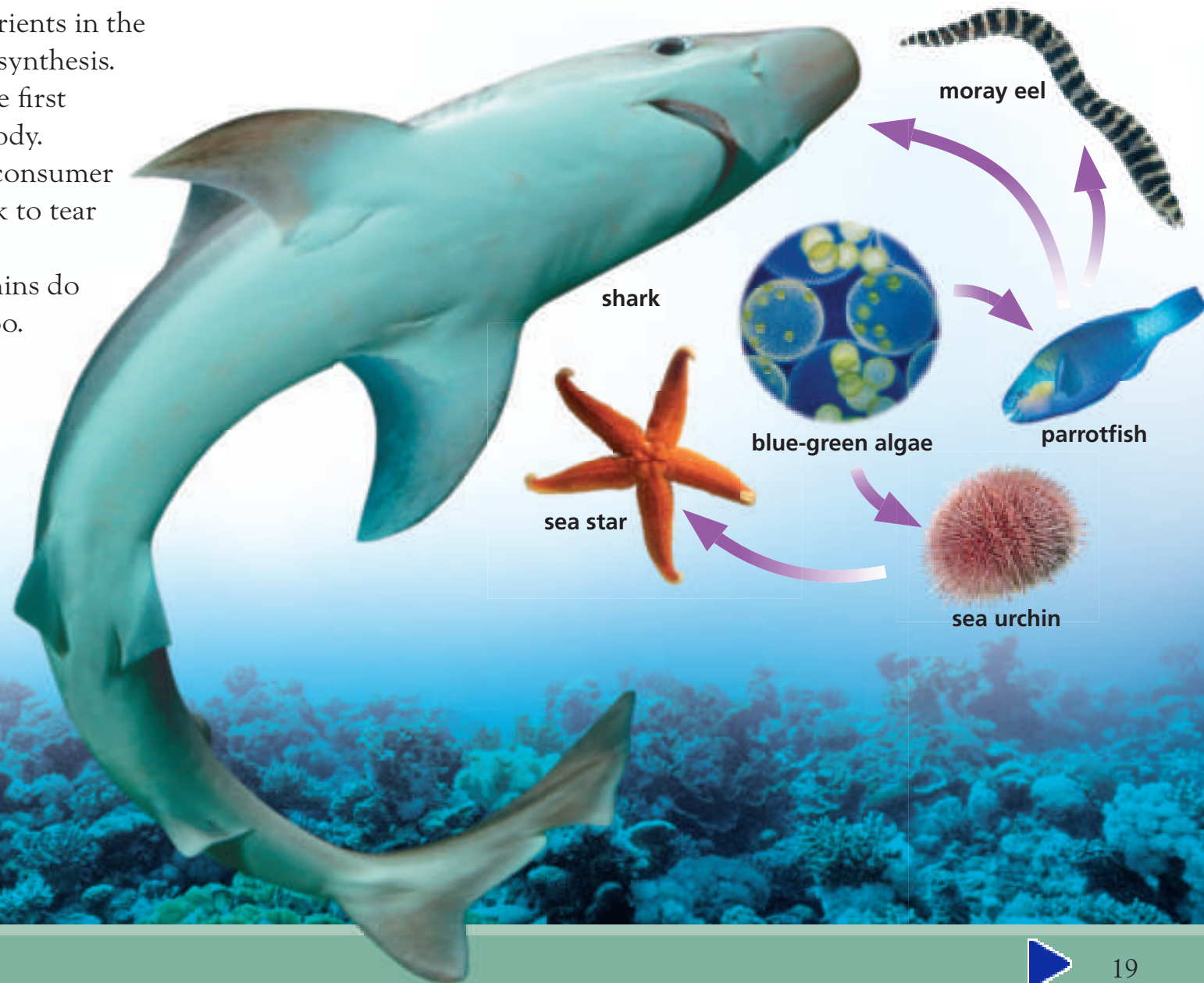
You know that a food web shows the connection of several food chains. In a coral reef, a food web might look like this.

The coral reef food web begins with producers, such as blue-green algae. They use nutrients in the water and sunlight to carry out photosynthesis. Then two consumers eat the algae. The first consumer, the sea urchin, has a soft body. A spiny shell protects it. The second consumer is the parrotfish. It uses its strong beak to tear algae off coral.

Despite their spiky armor, sea urchins do get eaten on the reefs! Parrotfish do too. Which consumers eat sea urchins and parrotfish? By looking at the web, you can see that sea stars eat sea urchins. The moray eel, with its very sharp teeth, eats parrotfish. The shark, a fierce predator on the reef, also eats parrotfish. Can you see how the flow of food energy branches out? It goes in many directions.



In this web, the algae use sunlight and matter to grow. Their environment gives them what they need to live. The sea urchin and the parrotfish eat algae to grow. Carnivores, in turn, eat them. This is how the energy flows through the food web.





Decay

Every living thing dies. It then rots, or decays. Decay is a very important process in an ecosystem. Without decay, there would be too many dead organisms, and wastes would pile up. The habitats of living things would suffer.


How does decay happen? A scavenger, such as a vulture, may feed on the remains of a dead animal. Then decomposers, such as fungi and bacteria, break down what is left. They put minerals and nutrients back into the ecosystem.

Did you know that dead organisms decay in different ways? In heat, decay is quick. In colder temperatures, decay slows down. Think of an apple. Would it rot faster in the refrigerator or outside in the sunlight?


Oxygen and moisture also affect decay. Decomposers need these things to live and grow. So the presence of oxygen and moisture speeds decay.




The Process of Decay



Scavengers feed on the remains of a dead animal.



Decomposers further break down the dead animal into minerals and nutrients.



These minerals and nutrients return to the soil, allowing new plants to grow.





Seeing the Pond with New Eyes

You're back! Once again, you have settled in on the hill to watch the action in the pond below.

Now you realize you are watching an ecosystem. As you look up at the Sun, you know that it is the energy source in the forest. All around you, the food chain is under way.

You wonder which consumers might be eating the cattails swaying in the breeze. You search for grasshoppers that are eating grass. Now a frog snatches a fly from the air. You are relieved when the frog hops away before the hawk in the tree above you spots it.



As you look at the fallen tree near the pond, you know that it could be an ecosystem too. The organisms living in it could be interacting in a food chain. They could be in the process of decay.


You have learned that an ecosystem is made of living and nonliving things that work together. They fit together like parts of a puzzle. Each part of the puzzle helps keep the ecosystem alive.



What did you learn?

Glossary

carnivores	consumers that get energy from eating animals
community	different populations that interact with each other in an ecosystem
decomposers	organisms that break down dead organisms
ecosystem	an environment in which living and nonliving things interact
herbivores	consumers that get energy from eating plants
niche	the special role or job of an organism in its habitat
omnivores	consumers that get energy from eating both animals and plants
population	all the members of one species in an ecosystem

1. How are plants important to most food chains?
2. What are some examples of nonliving things in an ecosystem?
3. How does the shallow ocean ecosystem differ from the deep ocean ecosystem?
4. **Writing in Science** There are many kinds of ecosystems. Write to explain how they differ from each other. Include details from the book to support your answer.
5.  **Sequence** Use sequence words such as *first*, *next*, and *last* to explain the food chain.

