

Red Edition
Grade 3–4
reading level

Purple Edition
Grade 4–5
reading level

Objectives

- Describe the living and nonliving parts of ecosystems.
- Explore Earth’s different ecosystems.
- List the needs of living things.
- Define the words *producer*, *consumer*, and *decomposer*.
- Explain the symbiotic relationships that occur between certain organisms.
- Understand the competition among living things for resources.
- Interpret food chains, food webs, and energy pyramids.

Reading Comprehension Skills

Preview the Book ♦ Main Idea and Details
How to Read Diagrams

Skillbuilders are available for this title.

Supporting English Learners

Use Photographs and Other Visuals Develop background knowledge and support the development of new concepts and science vocabulary by using the photographs and other visuals in *Ecosystems*. Point out and name animals and plants in the photos, such as *elephants* (cover), *turtles* (page 5), *sunflowers* (page 11), and *grass* (page 23). Have students repeat after you.

Summary

The Delta Science Content Reader *Ecosystems* begins by defining what an ecosystem is. Students learn about the living and nonliving parts of an ecosystem and how they interact, with a pond as an example. They explore the diversity of life within ecosystems and how different organisms in an ecosystem meet their own needs and compete for resources. The book concludes by discussing how scientists trace the flow of energy and matter as they move through ecosystems.

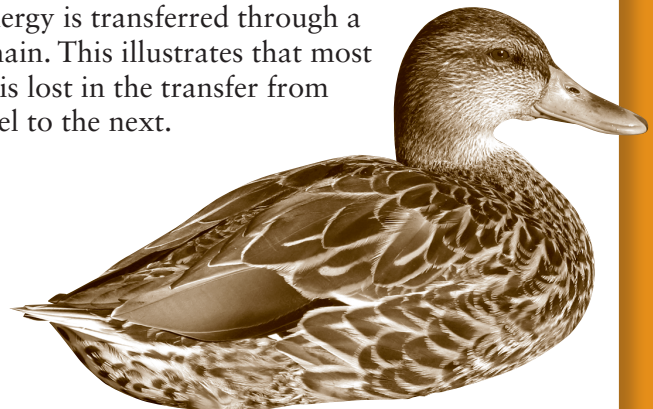
Science Background

An ecosystem consists of all living and nonliving things in one area and the interactions among them. Animals, plants, and microorganisms are part of an ecosystem, as are rocks, water, and sunlight. An ecosystem can be as large as the Pacific Ocean or as small as a drop of water.

Individual organisms of the same type are members of the same species. All members of one species in an environment make up a population. All the populations of organisms living together in an environment make up a community.

Organisms in an ecosystem can be classified according to how they obtain food. Because of their ability to produce their own food, green plants are called producers. Consumers are animals that eat plants or other animals that have eaten plants. Decomposers are organisms that break down dead plants and animals into nutrients, which in turn support the growth of green plants.

A series of organisms that depend on one another for food is called a food chain. Overlapping food chains that link many organisms together form a food web. An energy pyramid shows how energy is transferred through a food chain. This illustrates that most energy is lost in the transfer from one level to the next.



What Is an Ecosystem?

(pages 2–7)

Before Reading

Discuss the Cover

Cover Image Discuss the photograph on the cover of *Ecosystems*. Use the information on the inside front cover to support the discussion.

Science Statement Discuss the science statement. Ask: *Can you name some living and nonliving things in the photo?* (Possible answers: Living: elephants, grass; Nonliving: air, water) *What things in their environment do you think the elephants depend on?*

Build Reading Skills (page 2)

Preview the Book Use Build Reading Skills on page 2 to review how to preview the book. Discuss the steps. Then model previewing the Table of Contents.

Think Aloud *Why are some words in red bold-faced print and others in lighter black print? Maybe the words in red are main sections and the words in black are smaller sections. Let me check. Page 3 has a big heading, “What Is an Ecosystem?” Page 4 has a smaller heading, “Parts of an Ecosystem.” I was right. “Parts of an Ecosystem” is a smaller part of the first main section.*

Guide students as they finish previewing *Ecosystems*. Focus on nonfiction text features.

- Prompt them to look at the headings, photographs, captions, and diagrams. Ask questions such as *Why do you think that feature is there? How will it help you understand what you read?*
- Prompt them to look at the bold Vocabulary words. Guide the class in looking up a Vocabulary word in the Glossary.

Students can apply the skill in the Reflect on Reading activity on page 7.

K-W-L Chart Have students begin a K-W-L chart. They should add to it after each section.

What I K now	What I W ant to Learn	What I L earned
Plants and animals live in many places.	What does an animal need to live?	

Make a Connection (page 3)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about ecosystems. (Possible answer: Some fish eat plants or other fish. The reef might be a home for some plants and animals.) Note that a coral reef is a mound or ridge formed from living animals called coral, coral skeletons, and mineral deposits from other organisms.

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a T-chart on the board for examples of *biotic factors* and *abiotic factors*. Have students suggest examples as they read.

During Reading

Parts of an Ecosystem (page 4)

- Note the difference between physical things and conditions in an environment. Give students examples of physical things, such as trees, rivers, birds, and rocks. Then give examples of conditions, such as temperature, amount of sunlight, and amount of rainfall.
- Ask: *What other organisms might you find in a pond ecosystem?* (Possible answers: fish, cattails)
- Ask: *Is a rock a biotic factor or an abiotic factor? (abiotic) What about a fly? (biotic)*
- Discuss the photograph of the frog on page 4. Ask: *What is one way the frog and the lily pad interact?* (Possible answer: The lily pad gives the frog a place to rest.)
- Help students understand the concept of balance among the factors in an ecosystem. Ask volunteers to share some other uses of the word *balance*. (Possible answers: balance beam, a math tool)

- You may wish to provide other examples of species. Explain that all human beings are one species, called *Homo sapiens*.
 - Ask: *How many different species make up a population?* (one)
 - Emphasize that the words *species*, *population*, *community*, and *ecosystem* are all related. Point out that another way to think of an ecosystem is as a community together with its nonliving environment.
- ✔ **Checkpoint** (page 5) (Possible answer: Biotic factors are living things, such as a frog. Abiotic factors are nonliving things, such as sunlight.)

Ecosystems Around the World (page 6)

- Note the difference between weather and climate. *Weather* refers to current conditions, such as temperature and precipitation. *Climate* is the average weather in a place over many years. For example, it might be raining one day in the desert. The weather is rainy. However, deserts receive very little rainfall. The climate is dry.
 - Ask: *What helps plants and animals live well, or thrive, in an environment?* (their physical parts or behaviors)
 - Discuss the map on page 6. Help students identify the different types of ecosystems listed in the key. Ask: *Which type of ecosystem is found in the eastern United States?* (temperate forest)
 - Point out the photos showing ecosystems on page 7 and their captions. Ask: *What are two kinds of trees that often grow in a temperate forest?* (oak and maple trees) *Do you think these trees could live if they were planted in a desert? Explain.* (Possible answer: No, because they have parts and behaviors meant for living in a place with more rain.)
- ✔ **Checkpoint** (page 6) (They can be different sizes, have different climates, and have different kinds of living things.)

After Reading

Reflect on Reading (page 7) Before students answer the question, remind them to think about their experience previewing the book. Ask: *Which features most helped you understand what you were about to read? Are these the same features that helped most when you were reading?* (Answers will vary.)

Apply Science Concepts (page 7) This activity applies a concept from Find Out About on page 3. Help students plan their collages. They may wish to separate biotic factors from abiotic factors in their collages. Or they may prefer to show them as parts of a whole, as they exist in the actual ecosystem. (Possible answers: Biotic factors: squirrels, grass, people; Abiotic factors: soil, roads, sunlight)

How Do Parts of an Ecosystem Interact? (pages 8–15)

Before Reading

Build Reading Skills

Main Idea and Details Use Build Reading Skills on page 8 to review how to identify main idea and details. Read and discuss the tips. Then read aloud the last paragraph on page 10 and model identifying the main idea and details in a paragraph.

Think Aloud *What is this paragraph mostly about? I know the topic sentence is often the first sentence of a paragraph. The first sentence of this paragraph states that plants depend on animals. That must be the main idea. How do plants depend on animals? I read that plants are helped when animals carry their seeds to new places. This is one detail that supports the main idea.*

Then read aloud the second paragraph on page 11 and guide students to identify the main idea and details. Students can apply the skill in the Reflect on Reading activity on page 15.

Make a Connection (page 9)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how parts of an ecosystem interact. (Possible answers: Plants need sunlight to grow. Sunlight helps keep animals warm.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web on the board with *How Animals Get Food* in the center. Have students suggest examples as they read.

During Reading

Needs of Living Things (page 10)

- Ask: *What are three things that both plants and animals need to live?* (air, water, space to live)
- Ask: *When have you seen an animal using a plant as a resource?* (Possible answer: I saw a bird making a nest in a tree.)

✓ **Checkpoint** (page 10) (air, water, food, shelter, space to live)

Producers, Consumers, and Decomposers (page 11)

- Ask: *Why do organisms need food?* (for energy to live and grow)
- Ask: *What do green plants need for photosynthesis?* (carbon dioxide gas from air, energy from sunlight, water from soil)
- Be sure students understand that producers are plants, while consumers are animals.
- Read the caption under the photograph of the great white shark on page 12. Point out that great white sharks eat seals. Ask: *Which animal is the predator, and which is the prey?* (Predator: great white shark; Prey: seal)
- Ask: *What are three examples of decomposers?* (Possible answers: earthworms, insects, fungi, bacteria) *What happens to the nutrients not used by a decomposer?* (They go into the soil, where plants can use them.)

✓ **Checkpoint** (page 13) (All animals depend on producers for food. Some consumers eat plants, and others eat animals that have eaten plants. Plants also give off oxygen, which animals need to breathe.)

Symbiosis (page 14)

- Emphasize that symbiotic relationships are not brief interactions. They often last a long time, sometimes for the entire life of one of the organisms.
- ✓ **Checkpoint** (page 14) (a relationship between two living things of different species that helps at least one of them meet its needs; Possible answer: A cleaner shrimp eats bacteria and dead skin off a fish. The shrimp gets food and the fish stays clean.)

Competition (page 15)

- Review the lists on page 10 of resources that plants and animals need. Discuss how plants and animals might compete for resources other than food and water. (Animals might compete for shelter, and plants might compete for space to live.)
- Ask: *When populations grow, is there more or less competition for resources?* (more)

✓ **Checkpoint** (page 15) (Competition is the struggle among living things that share the same resources. It happens when there are not enough resources for all living things in an ecosystem.)

After Reading

Reflect on Reading (page 15) Make sure students' webs show both a main idea and supporting details. (Possible answers: Main idea: Consumers are living things that eat other living things; Details: get energy and nutrients from food; three main kinds—herbivores, carnivores, omnivores; help keep ecosystem in balance)

Apply Science Concepts (page 15) This activity applies a concept from Find Out About on page 9. Before they write, help students recall where the resources they use every day come from. (Possible answers: Nonliving: air, water, sunlight; Living: trees (fruits, paper), plants (vegetables), other animals (meat, dairy products))

How Do Energy and Matter Move Through Ecosystems? (pages 16–23)

Before Reading

Build Reading Skills

How to Read Diagrams Use Build Reading Skills on page 16 to review how to read diagrams. Discuss the tips. Discuss with students that arrows, numbers, keys, legends, symbols, and color coding can be important features of diagrams. Then model how to read the energy pyramid diagram on page 22.

Think Aloud *First, I read the title. I learn I am looking at an energy pyramid for a desert food chain. I see that the arrows point up, so I start reading from the bottom. The bottom label says that desert plants are producers. I see that desert plants make up the whole base of the pyramid.*

Guide students to read and interpret the rest of the diagram. Students can apply the skill in the Reflect on Reading activity on page 23.

Make a Connection (page 17)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how energy and matter move through ecosystems. (Possible answer: The fish's energy came from its food, such as smaller fish, plants, or insects.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web with *Ways to Show How Energy Moves* in the center. Have students suggest examples as they read.

During Reading

Energy in Ecosystems (page 18)

- Explain that energy is what makes things go or grow.
- Ask: *What do ecologists study about ecosystems?* (how energy moves from one living thing to another in a community)

- Emphasize that the major source of energy in most ecosystems is sunlight. The Sun's energy is transferred from plants to animals within food chains.
- Ask: *What is a food chain?* (a series of organisms that depend on one another for food)
- Discuss the food web on pages 20–21. Ask: *Which two food chains include berries and the lynx?* (berries→vole→lynx, berries→grouse→lynx) *Name one part of the fox's niche.* (Possible answers: to eat grouse, to eat voles, to eat hares)
- Discuss the energy pyramid diagram on page 22. Ask: *What happens to most of the energy made by desert plants?* (The plants use it up.) *What happens to the rest of the energy?* (It gets passed up the food chain to lizards that eat the plants.)

✓ **Checkpoint** (page 22) (the amount of energy moving through a food chain)

Matter in Ecosystems (page 23)

- Review the definition of *matter*. If students do not believe that gases take up space, remind them that a balloon gets bigger when air is blown into it.
 - Point out that the decomposers, such as bacteria and fungi, release nitrogen into the soil when they break down dead organisms and animal wastes.
- ✓ **Checkpoint** (page 23) (Nitrogen moves from the air into the soil. Next, it moves into living things. Then, it moves back into the soil. Finally, it moves back into the air.)

After Reading

Reflect on Reading (page 23) Have students review the food chain diagram on pages 18–19 before they begin their own. (Sun→grass→mouse→cat)

Apply Science Concepts (page 23) This activity applies a concept from Find Out About on page 17. Help students plan their paragraphs. Encourage them to complete a food chain for their chosen food before writing. (Possible answer: Energy moves through ecosystems in a path. I drank a glass of milk yesterday. The energy in the milk first came from the Sun. Plants such as grass used the Sun's energy to make their own food. Then, a cow ate the plants to get energy. After that, the cow made milk. Last, I drank the milk from the cow and got energy.)

➡ **Continued on last page**

Name: _____

Date: _____

Test: Ecosystems

Part A: Vocabulary

biotic	competition	ecosystems	food webs
niche	photosynthesis	prey	species

Choose the correct vocabulary word for each sentence. Write the word on the line.

1. Desert and temperate forest are types of _____.
2. Mosses and bears are _____ factors in a forest.
3. A place with a diversity of living things has many different _____ living there.
4. Plants use energy from sunlight for _____, which is how they make food.
5. A predator eats _____ that it hunts.
6. When there are plenty of resources in an environment, there is not as much _____.
7. Ecologists use _____ to study how energy moves through ecosystems.
8. Part of a snake's _____ may be to eat lizards and to become food for a coyote.

Part B: Science Concepts

Mark the best answer to each question.

9. All the beavers in one area make up _____.

(A) an environment	(C) a habitat
(B) a community	(D) a population
10. An animal that eats only other animals, such as a great white shark, is called _____.

(A) a carnivore	(C) a scavenger
(B) a herbivore	(D) an omnivore

Test: Ecosystems (continued)

11. What kinds of organisms break down dead plants and animals?

- (A) producers
- (B) decomposers
- (C) scavengers
- (D) consumers

12. Owls eat voles and hares. If the population of voles gets smaller, what will most likely happen next?

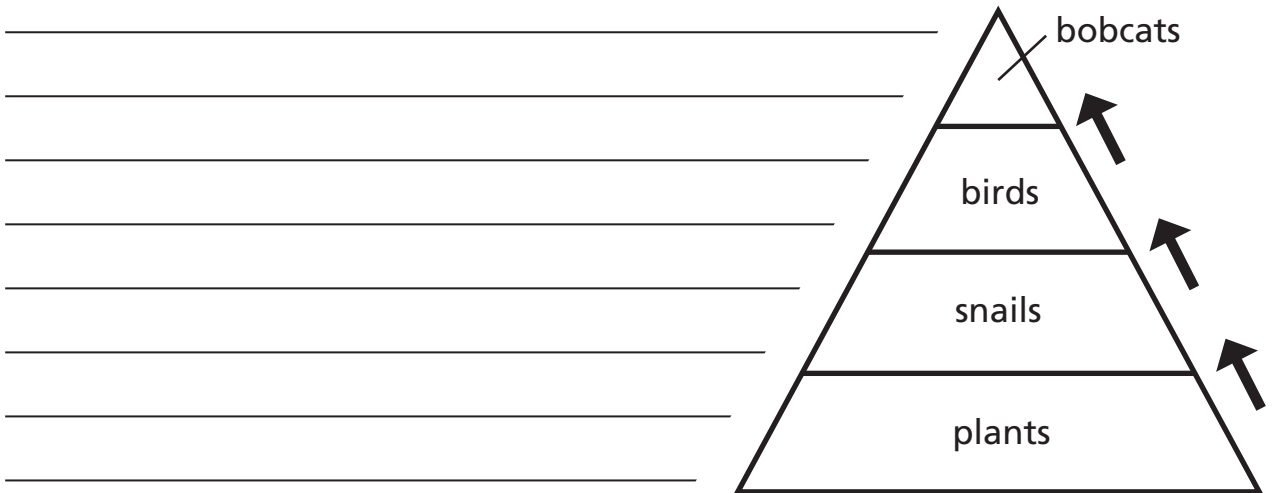
- (A) owl population will grow
- (B) more competition among owls
- (C) no other changes likely
- (D) hare population will grow

Write the answer.

13. Explain the difference between producers and consumers.

14. Describe one kind of special, or symbiotic, relationship organisms can have.

15. Look at the energy pyramid. Tell what the arrows show. Then show the energy pyramid as a food chain.



Let's Review

(inside back cover)

Have students complete their K-W-L charts before answering these questions. Possible answers are shown.

- 1. Cover Connection** (Living things depend on one another for food. For example, consumers eat other animals and plants. Living things also depend on the nonliving parts of their environment. For example, producers need the Sun so they can make food through photosynthesis.)
- 2.** (A desert gets very little rain. It has short grasses, owls, and snakes. A temperate forest gets a medium amount of rain and has seasonal weather changes. It has maple trees, bears, and rabbits. Both contain living things that depend on one another and on nonliving things. They are different in their climates and in what organisms live there.)
- 3.** (When there are plenty of resources, there is not much competition. Populations might grow. But when populations get larger, there is more competition. This can make populations stop growing or get smaller.)
- 4.** (I would expect to find more producers. Producers use most of the energy they get from the Sun, so consumers must eat many producers to meet their energy needs.)
- 5. Main Idea and Details** (Main idea: Decomposers break down dead plants and animals to get food. Details: earthworms, insects, fungi, bacteria are decomposers; break down dead organisms into

nutrients; use some nutrients; other nutrients go into soil and are used by plants)

- 6. Write** (The populations of animals these predators used to eat probably grew because fewer animals were eating them. Maybe some populations got so big that there was competition for resources, and then the populations got small again.)

Try It! Students may observe interactions such as plants growing in the sunlight, fungi growing on a tree, animals breathing air, one animal eating another, or insects or other animals eating plants.

Science at Home Have students do this activity at home with a family member. Students should identify fruits, vegetables, beans, and grains as coming from producers and meat and dairy products as coming from consumers. They should identify that energy moves from producers to consumers.

Answers to Test

(Teacher's Guide pages 6–7)

1. ecosystems 2. biotic 3. species 4. photosynthesis 5. prey 6. competition 7. food webs 8. niche 9. D 10. A 11. B 12. B 13. Producers are organisms, such as green plants, that make their own food. Consumers are organisms that eat other living things, such as plants or animals, for food. 14. One kind of symbiotic relationship is when one organism is helped and the other is not affected. 15. The arrows show how energy moves through the food chain. Food chain: plants → snails → birds → bobcats

ADDITIONAL ASSESSMENT OPPORTUNITIES Use the Checkpoints, Reflect on Reading, and Apply Science Concepts features and Let's Review questions as additional assessment opportunities.

Delta Science Content Readers are 24-page nonfiction student books with informative, engaging text and full-color photos and illustrations. The readers present key science content and vocabulary found on state tests, present key reading skills and strategies useful for reading informational text, support and extend the experiences and content of hands-on activities, promote scientific inquiry, and serve as a home-school link. They are available in two editions: Red Edition for Grades 3–4 and Purple Edition for Grades 4–5.

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Ecosystems
Teacher's Guide
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