

**FOCUS  
ON  
SCIENCE**

# Exploring Ecosystems

Basic Level

Life Science  
Animals and Plants in Their Environment

**FOCUS**curriculum

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## Scientific Inquiry

The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

## Life Science

### **Individual organisms and species change over time.**

In all environments, organisms with similar needs may compete with one another for resources.

### **Organisms maintain a dynamic equilibrium that sustains life.**

All organisms require energy to survive. The amount of energy needed and the method for obtaining this energy vary among cells. Some cells use oxygen to release the energy stored in food.

The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food. Consumers, such as animals, take in energy-rich foods.

Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming wastes and/or dead organisms.

Food provides molecules that serve as fuel and building material for all organisms. All living things, including plants, must release energy from their food, using it to carry on their life processes.

### **Plants and animals depend on each other and their physical environment.**

Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.

Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.

Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the Sun's energy is converted into and stored as chemical energy in the form of a sugar. The quantity of sugar molecules increases in green plants during photosynthesis in the presence of sunlight.



## Life Science *(con't)*

**Human decisions and activities have had a profound impact on the physical and living environment.**

A population consists of all individuals of a species that are found together at a given place and time. Populations living in one place form a community. The community and the physical factors with which it interacts compose an ecosystem.

The environment may be altered through the activities of organisms. Alterations are sometimes abrupt. Some species may replace others over time, resulting in long-term gradual changes (ecological succession).

Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.

Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil. Pollution has cumulative ecological effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.

## English Language Arts

The following is a selective listing of the competencies and indicators addressed in this book.

### Literacy Competencies

#### Word Recognition

- Recognize at sight a large body of high-frequency words and irregularly spelled content vocabulary

#### Background Knowledge and Vocabulary

- Determine the meaning of unfamiliar words by using context clues, dictionaries, glossaries, and other resources

#### Comprehension/Strategies

- Use prior knowledge in concert with text information to support comprehension, from forming predictions to making inferences and drawing conclusions

Exploring  
Ecosystems

Published by FOCUScurriculum  
866-315-7880  
www.focuscurriculum.com

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Order Number: LS-41BL

Written by Thomas Hatch  
Created by Kent Publishing Services, Inc.  
Designed by Signature Design Group, Inc.

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## How to Help Your Students Make the Best Use of This Book

Encourage students to develop nonfiction literacy skills by completing the Active Reader activities. Also encourage them to . . .

- Underline main ideas in paragraphs.
- Circle details that support the main ideas.
- Write down questions as they read.
- Circle key words as well as unfamiliar words.

## Printing Instructions

**Student Book:** print pages 5–26

**Assessments:** print pages 27–30

**Answer Key:** print pages 31–34

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# Exploring Ecosystems

**How are plants and animals in an ecosystem connected?**

Plants and animals live together in an ecosystem. They are connected in many ways. For example, they share the resources of the ecosystem. These include water, sunlight, shelter, and nutrients.

Different ecosystems provide different amounts of these resources. Therefore, they support different types of plants and animals.

Read this book to learn more about how ecosystems work.



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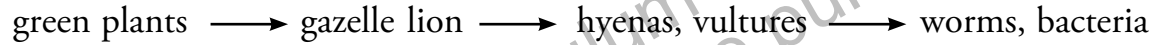
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# Build Background

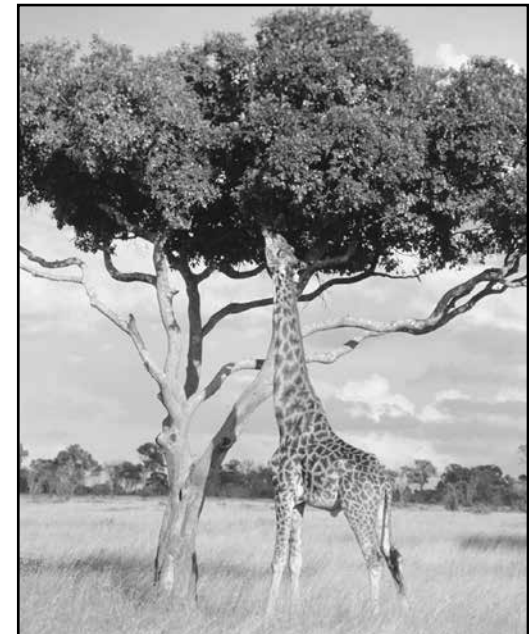
## Food Chains

Below is food chain. It shows how energy flows through a habitat in an African grassland. Energy flow starts with the Sun. Green plants make their own food using the Sun's energy. Gazelles get their energy by eating grass. Lions get energy from eating gazelles and other animals. Hyenas and vultures eat the dead remains after the lions have finished eating. Finally, the decaying plants and animals are eaten by worms and microorganisms in the soil.



List an example or two from the food chain for each type of organism.

- 1. producer \_\_\_\_\_
- 2. consumer \_\_\_\_\_
- 3. predator \_\_\_\_\_
- 4. prey \_\_\_\_\_
- 5. herbivore \_\_\_\_\_
- 6. carnivore \_\_\_\_\_
- 7. omnivore \_\_\_\_\_
- 8. scavenger \_\_\_\_\_
- 9. decomposer \_\_\_\_\_



*Are giraffes herbivores, carnivores, or omnivores?*





# Key Vocabulary

## Rate Your Knowledge

Each word in the list below is important, but some may be new to you. Rate your knowledge of each by putting a check or a few words in the appropriate column. After completing this book, come back to this page and write the definitions of words you did not know.

	I don't know it.	I've seen it, and I think it means . . .	I know it well. It means . . .
microorganism			
producer			
consumer			
abundant			
terrain			
transpiration			
nocturnal			
bog			
fen			
lichen			
carrion			

## Synonyms and Antonyms

Answer the questions below using words from the list above.

- Which two words in the list are antonyms? \_\_\_\_\_
- Which word is an antonym for *scarce*? \_\_\_\_\_
- Which word is a synonym for *land*? \_\_\_\_\_
- Which two words in the list both name wetlands? \_\_\_\_\_
- Which word in the list has something to do with nighttime? \_\_\_\_\_

## Photosynthesis

Plants make their own food using photosynthesis. Photo means “light.” *Synthesis* means “put together.” Plants use the energy of sunlight to combine carbon dioxide and water.

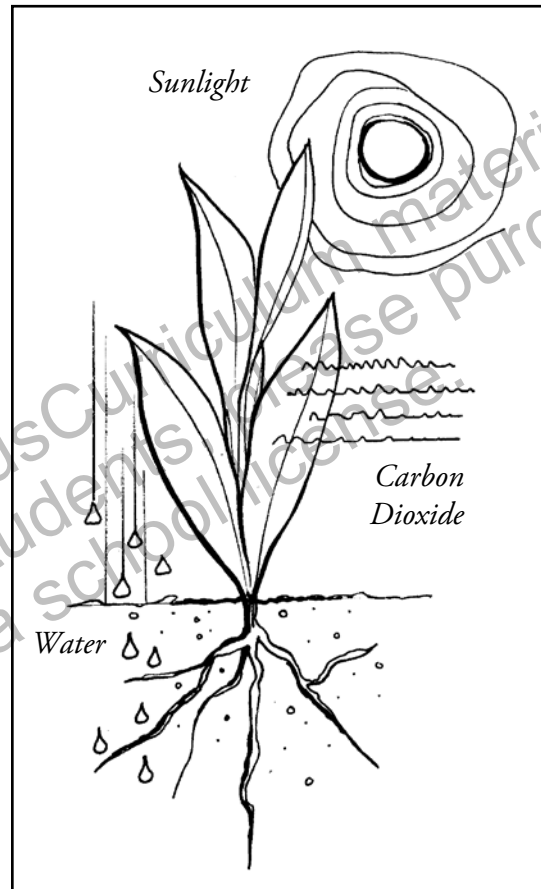
Green matter in leaves, called chlorophyll, traps the sun’s light energy. A chemical reaction using this light energy combines carbon dioxide and water to produce a sugar. This sugar is called glucose.

Glucose is a food rich in chemical energy. Plants use some of this to grow and reproduce. However, some of the chemical energy remains unused. This energy is passed on to the animal that eats the plant.

When an animal eats the plant, its body changes the chemical energy to heat energy. The animal uses heat energy to stay warm, grow, and reproduce.

Photosynthesis produces more than just glucose. It also produces oxygen. This oxygen escapes into the atmosphere. It becomes part of the air we breathe.

Plant photosynthesis is the source of much of the oxygen in our atmosphere.



*Photosynthesizing plants evolved about 3 billion years ago.*

## ACTIVE READER

**1 List** What are the two products of the process of photosynthesis?

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## Good to Know

Pine trees have evolved to be shaped like an upside down cone because of photosynthesis. The tree has developed branches that taper as they go up the trunk so that more of the tree’s leaves (needles) are exposed to the sun. In this way, the tree can produce enough energy to grow taller.



# Chapter 1 Earth's Biomes

## FOCUS

This section explains the differences among a biome, and ecosystem, and a habitat. Look for information about which term refers to a specific species.

## Biomes, Ecosystems, and Habitats

The words biome, ecosystem, and habitat can be confusing. All three words refer to an environment with living things and nonliving things. Nonliving things include air, water, and soil.

What is a biome? A biome is a large area of the Earth's surface. A biome is home to plants, animals, and **microorganisms**. When we think of biomes, we think mostly about the nonliving things and plants. For example, the northern boreal forest has a cold climate, rough terrain, and evergreen trees.

What is an ecosystem? An ecosystem can be large or small. When we think of an ecosystem, we think about how plants, animals, and microorganisms interact. Each ecosystem contains species that are adapted to its water, heat, and soil. For example, penguins thrive in the **Antarctic**. In the desert, cactus plants have needle-like leaves that help preserve water.

No ecosystem can support more organisms than its food, water, and shelter will allow. Each organism has its own role to play—plants as **producers** and animals as **consumers**.



*The cactus is perfectly adapted to its desert habitat.*

## ACTIVE READER

**1 Connect** Did your understanding of biome and ecosystem change as a result of reading this page? If so, tell how it changed.

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**2 Analyze** Which phrase below best tells how the information on this page is presented?

- statement and example
- cause and effect
- events in sequence
- question and answer

What is a habitat? When we speak of habitats, we talk about a single species, or type of plant or animal, and where it lives. So, the habitat of the Mountain Gorilla is the cloudy, misty, and cold forests of central and eastern Africa where certain plants are abundant. These plants provide the Gorillas with food. Habitats can overlap within an ecosystem. Similarly, ecosystems can overlap within a biome.

### More About Biomes

Biomes and ecosystems are Earth's natural communities. Here, living and nonliving things come together. Plants, animals, and other organisms share living space. They live in the same climate and **terrain**. Each species fits into one or more food webs. Food webs explain feeding relationships and show how energy flows through the biome.

Populations of a specific species can grow or decline depending on pollution, natural disasters, and changing climate. Population growth and decline can also be explained by looking at how adaptable a species is to changing conditions.

### ACTIVE READER

**1 Infer** Why aren't Mountain Gorillas native to North America?

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### FOCUS QUESTIONS

1. What term is used to refer to the environment in which a particular population of monkeys lives?
2. When leaving one biome and traveling to a new location in another, what would you expect to be different?

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## FOCUS

In this section you will learn about the six types of biomes. Read to find out what makes them different from one another.

## Major Types of Biomes

There are six major biomes: Tundra, desert, grassland, freshwater, marine, and forest.

Tundra is found in the northern areas of the world. It is the coldest biome. The tundra has short summers, long cold winters and low vegetation such as mosses and lichens. Permanently frozen subsoil, called permafrost, prevents plants with deep roots from growing. The recent warming trend in climate threatens the tundra because the permafrost could melt in some places. Common animals here are insects, voles, arctic hares and squirrels, caribou, bears, falcons, gulls, salmon, and trout.

Hot and dry deserts receive less than 50 centimeters (about 20 inches) per year of rainfall. Plants and animals found in deserts have special adaptations so they can thrive in a harsh climate. For example, the needles on a cactus plant are actually the leaves of the plant. They are small and spiny to reduce **transpiration**, the escape of water from the plant. Many desert animals are **nocturnal** and only active at night. In this way they avoid the scorching sun. Animals found in hot and dry deserts are insects, spiders, reptiles, and birds.

Grasslands are open areas with tall grasses. Some also have low shrubs and a few trees. There is often a dry and a rainy season. Fauna, animal life, include worms, beetles, termites, mice, snakes, owls, and large mammals. You might find lions, leopards, hyenas, buffalo, zebra, wild horses, and elephants. Examples of grasslands are prairies in North America, steppes in Asia, savannas in Africa, and pampas in South America.

Freshwater habitats are ponds, lakes, wetlands, streams, and rivers. These habitats are scattered throughout the globe. They are often surrounded by grasslands or forests. The food chain begins with algae and aquatic plants with access to sunlight for photosynthesis. Egg and larval stages of insects and other small organisms provide food for fish, turtles, snakes, and birds.

Wetlands include **marshes**, **swamps**, **bogs**, and **fens**. Plants in wetlands include cattails. Cattails are adapted to a wet environment. Wetlands support many species of amphibians, reptiles, birds, and small mammals.

## ACTIVE READER

**1 Define** Find out the meaning of the word *terrestrial*. Which of the biomes described here are *terrestrial*?

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Use the Internet to find images of each of the biomes described here. Also find pictures of plants and animals that are typical of each biome. Use the images to create an informational poster display.

Marine biomes are the largest of the six biome types. They have the most diverse group of plants and animals. Oceans, coral reefs, **estuaries**, and salt marshes are marine biomes.

Oceans are organized into levels are home to different plants and animals. The **intertidal zone** is where the land and ocean meet. The **pelagic zone** is open water. Here, **phytoplankton** form the base of the food chain. Pelagic animals include crustaceans, birds, fish such as tuna and sharks, and mammals such as sea otters, dolphins and whales.

Most of the creatures living at the sea floor, the **benthic zone**, are scavengers. These bottom dwellers eat dead and decaying material that has fallen to the sea floor. The **abyssal zone** is the deepest part of the pelagic zone. It is thousands of feet below the surface where no light can reach.

**ACTIVE READER**

*1 Recall* Which biome is Earth's largest and has the most diversity of plant and animal life?

\_\_\_\_\_

\_\_\_\_\_

**FOCUS** QUESTIONS

1. What are the differences between a marine and a freshwater biome?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Complete the food chain below for a desert ecosystem. Tell which organisms in the chain are producers and which are consumers.

cacti → \_\_\_\_\_ → lizards → hawks

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Stop and Think

This page will help summarize what you have read so far.

1. Which term refers to the environment in which a particular group of Canada Geese lives?

- (1) biome
- (2) ecosystem
- (3) habitat
- (4) population

2. In which biome are you most likely to find nocturnal animals?

- (1) tundra
- (2) marine
- (3) freshwater
- (4) desert

Base your answers to questions 3 and 4 on the food chain below and on your knowledge of science.



3. Which biome is best suited to supporting the organisms in this food chain?

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4. What is an example of an adaptation that has helped an animal in this biome succeed?

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Dear Ms. Understanding,

I'm really interested in studying the coral reef marine habitat, but I live in New York City. Where's the nearest coral reef? My family is thinking about taking a trip to the Jersey Shore this summer. Will I find what I'm looking for there?



*Mired in Midtown*

Dear Mired,

Don't get me wrong, the Jersey Shore is great. But it's no place to search for a coral reef. You'll have to travel to a tropical area near the equator to find a coral reef. So, go south. I hear there's a great one off the coast of Belize!



*Ms. Understanding*

# Chapter 1 The Forest Ecosystem

## FOCUS

This section introduces the forest ecosystem and defines the three main types of forest. Look for similarities and differences as you read.

## Types of Forests

Approximately 30 percent of the Earth's surface is covered in forests. Forests play an important role in the health of our planet. They control the water cycle, stabilize soils, store carbon dioxide, produce oxygen, and provide habitats for wildlife. Across the world there are several different types of forest ecosystems each with its own set of unique habitats.

### Tropical Rain Forest

Tropical rain forests cover the Amazon region in South America and regions near the equator in Africa, Asia, and the east coast of Central America. Tropical rain forests support many species of **broadleaf** evergreen trees, vines, ferns, and palms. Rain forest habitats are organized into layers: the emergents, the canopy, the understory, and the forest floor.

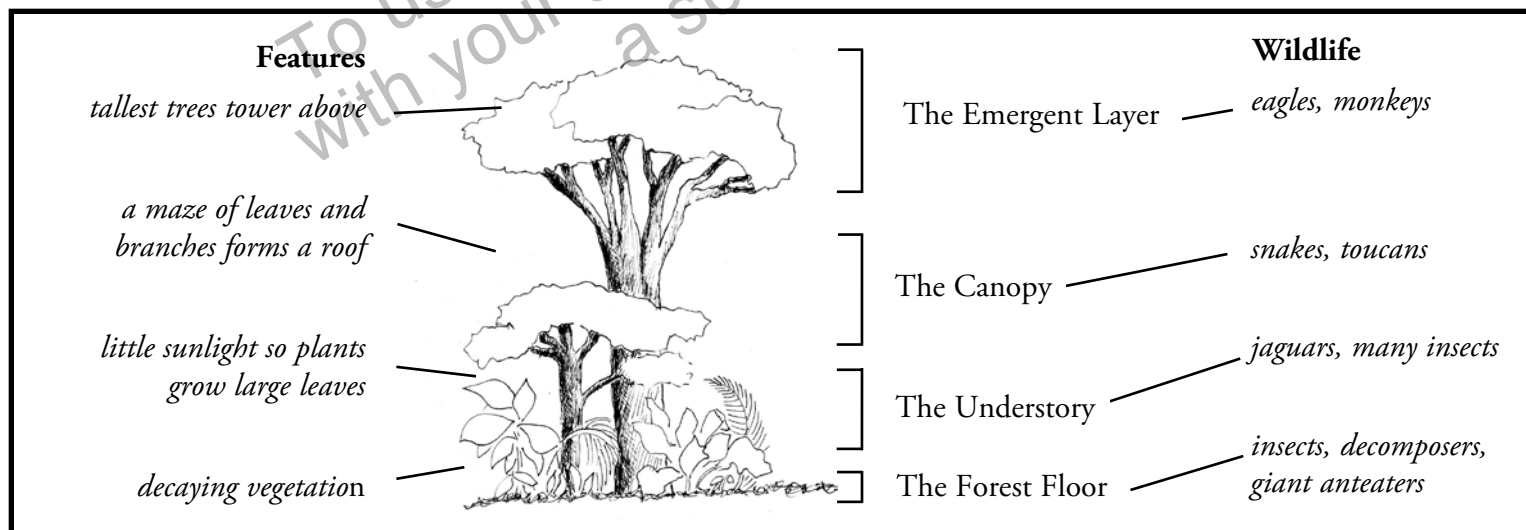
## ACTIVE READER

**1 Infer** According to the chart, which animals are most likely the top consumer in each of the following layers?

Emergent: \_\_\_\_\_

Understory: \_\_\_\_\_

Forest Floor: \_\_\_\_\_





## Temperate Deciduous Forests

Temperate Deciduous Forests are found in North America, Europe, Asia and a few places in Australia and New Zealand. There are four distinct seasons. It is cold in the winter and hot in the summer.

Deciduous trees are common. They lose their broad leaves in winter. Maple, oak, beech, hickory, and chestnut trees have adapted to cold winters. After they drop their leaves they go into a kind of hibernation. Evergreens are also common. Mountain laurel, azaleas, and mosses can live the low sunlight of the forest floor.

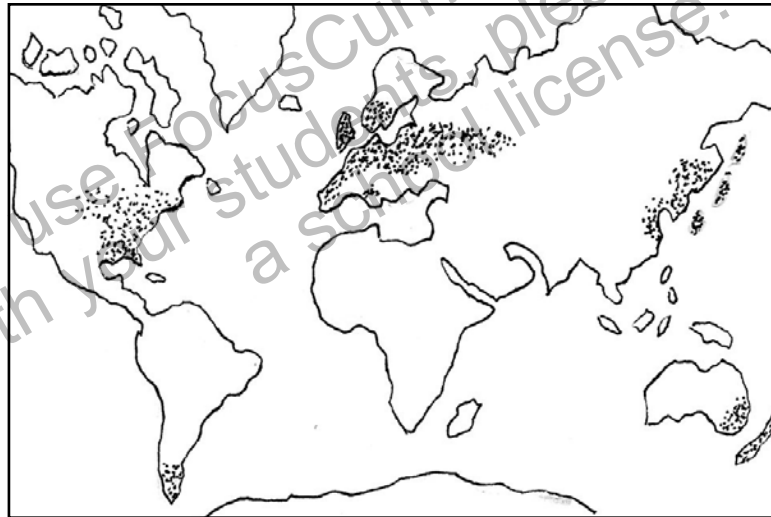
These forests also have different habitats at different layers. The sunny canopy at the top and the dark forest floor is at the ground. Many different animals live in the deciduous forest.

The dormouse, chipmunk, and ground squirrel are omnivores. They eat fruit, seeds, nuts, insects, and bird's eggs. Their predators are snakes, hawks, and owls.

The white-tailed deer prefers farmlands at the edge of the forest. They are herbivores.

Bald eagles live here. They like to build their large nests near wetlands and lakes. The eagle eats fish, reptiles, and small mammals. Eagles also become scavengers. They eat the flesh of dead animals when their prey is sparse.

The weasel lives in the Asian deciduous forest. It is the smallest carnivore. It eats mice, rats, moles, small birds, and rabbits.



*Temperate Deciduous Forests are found in North America, Europe, Asia and a few places in Australia and New Zealand.*

### ACTIVE READER

**1 Recall** *What are some examples of these types of trees?*

Deciduous \_\_\_\_\_

Evergreen \_\_\_\_\_

### Good to Know

The largest deciduous tree in the United States is the American Planetree, also called the Sycamore and Buttonwood. It can grow to 140 - 170 feet tall with a canopy that is 100 feet across. It's trunk can reach ten to eleven feet in diameter. Sycamores often line the banks of streams.

## Boreal Forests (Taiga)

Boreal Forests are evergreen forests. They are found in Canada, Europe and Asia just below the tundra. The climate is cold. Winters are long and snowy. Summers are short and cool. Fir trees, pine trees, mosses and lichens are common.

These provide food for animals that live here. The snowshoe hare and the porcupine live here. Reindeer moss, pictured at the right, is actually a lichen.

A lichen is a combination of an algae and a fungus. It is a source of food for reindeer and caribou. Elk and moose live here, too. So do predators such as bobcats, foxes, and grizzly bears.



Reindeer Moss

### ACTIVE READER

**1 Extend** Which term best describes the mutually beneficial relationship between the green algae and the colorless fungus that together make up the reindeer moss lichen?

- \_\_\_ predator/prey
- \_\_\_ symbiosis
- \_\_\_ phytoplankton
- \_\_\_ competition

### Human Impact on Forests

Since prehistoric times, humans have changed forests into farmland. We have domesticated forest plants and animals. We have introduced invasive species. Pollution from human sources has damaged habitats within forests. Climate change and human population growth have changed or destroyed forests around the world.

### FOCUS

### QUESTIONS

1. What is the difference between a deciduous tree and an evergreen tree?

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2. Reindeer and caribou are primary consumers because they eat mostly plants. What term is used for animals that are plant-eaters?

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## FOCUS

Read this section and imagine yourself walking through a forest that separates wetlands from a farmer's field.

## A Walk Through a Forest

More than half of New York State is forested. Most of the forests are temperate deciduous forests. There is some boreal forest on the hills of the Adirondack Mountains. These mountains are in the northern part of the state. Forest ecosystems near towns and cities have been broken up because of farming, growing cities, and logging. Freshwater ecosystems, streams, rivers, and wetlands, are intermingled with forest and grassland.

## Forest and Streambed

The woods form a buffer zone between the stream and the farmer's land. There are trees and shrubs. The forest floor is covered with leaves and branches. The top layer is mostly newly-fallen leaves. Underneath, we find decomposed organic matter. Tiny **microbes** have turned the leaves and branches into soil.

Most of the trees can stand wet conditions. The roots of trees stick out into the water. The roots offer hiding places for frogs, crayfish, and fish. The branches of the trees offer shade. They help keep the water cool. Some creatures prefer the cooler water.

The roots help keep the soil around the stream loose and porous. So, when the stream floods, the soil can absorb the water. This keeps it from flowing onto the farmer's field. It can't wash away the valuable topsoil.

We might see songbirds, herons, wood ducks, and eagles in these trees. If we are quiet and careful, we might see foxes, too.



## ACTIVE READER

**1 Recall** Which large tree might you find growing along the banks of a stream?

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## Web Quest

Use the Internet to find the locations of forested areas in New York State. Draw a map to identify forested areas, freshwater lakes, and urban areas. Write a report describing the ways New Yorkers can use their forests and lakes for recreational purposes.

Now, let's put on our high wading boots. Don't forget the insect repellent, too. Walk with me along this small brook that flows through the woods and into the stream ahead.

There's a willow tree growing where the brook empties into the stream. Its branches and dense roots hang over the water. They shade the pool below. The pool is at the shallow edge of the stream, away from the rushing current.

No doubt that shady pool is a spot where bass like to hang out. They like to hide in quiet areas to save energy. Swimming against a current all day is hard work.

Other fish range in size from small shiners to bluegill to large trout.

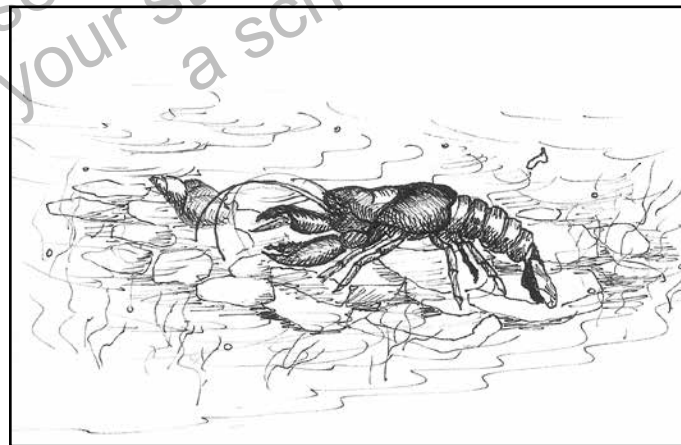
We can hear insects all around. Look closely at the surface of the water. You will see skaters. They are sometimes called water boatmen because they look like they are steering a boat. They can move around on the surface of the water without sinking.

Waterlogged debris at the edge of the stream is crawling with larvae. These are young insects. They eat the decaying wood.

You can also see crayfish in the streambed. Snails crawl on nearby algae-covered rocks. Downstream, the streambed narrows. A beaver is building a dam.

The streambed itself changes all the time. The amount of water changes with rainfall and the seasons. The plants and animals that live there are adapted to this flow of water.

The energy of this ecosystem begins with algae and plant photosynthesis. This is the base of a food web that leads to the fish, birds, and mammals that live in the ecosystem.



crayfish

ACTIVE READER

**1 Identify** *The Kingfisher is a predatory bird that catches fish and other aquatic animals by swooping down from a perch above the water. Which other organisms in the food web below are predators?*

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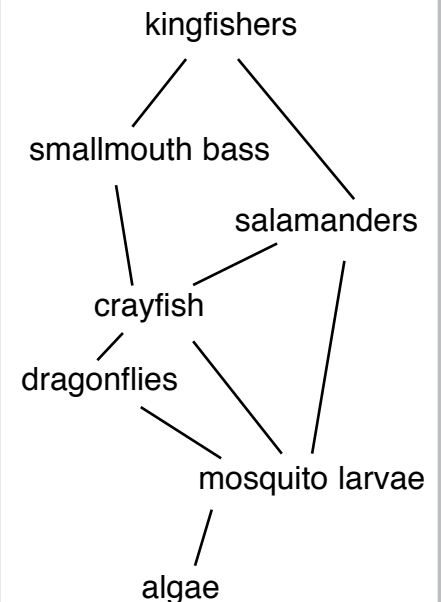
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## A Cattail Marsh

If we follow the stream to its source, we find a marsh in a large clearing with forest beyond. It is summer. The first thing we see in the marsh is a great blue heron standing in the water.

Cattails are growing behind the great blue heron. Red-winged blackbirds live in them. They use the cattails to make their nests.

The blackbirds fly around the heron trying to scare it away. They are fierce defenders of their territory. The heron pays them no attention. He looks for a small fish to catch for lunch.

The heron stays away from the geese in the middle of the marsh. He is a loner and doesn't like the company of other birds.

The sun is out. The snapping turtles sun themselves on a log. They are cold-blooded turtles. They need the sun to warm their bodies.

The turtles blend in well. They are all covered with algae and their skin looks warty. They look more like logs than animals. This helps them surprise their prey. Turtles feed on fish, and usually hunt the sick and wounded ones. They are easier to catch.

We watch a muskrat dive under the water and then emerge nearby. She hops onto a spot at the edge of the marsh. The muskrat built an underwater tunnel to her nest. She eats cattails, small turtles, fish, and frogs.

There are tiny organisms in the marsh. If we look at surface water under a microscope, we might find tiny single-celled creatures called amoebas.

Like the stream, the energy of the wetland begins with photosynthesis. Algae and plants make their own food using energy from sunlight. They use it to combine carbon dioxide from the air with hydrogen from water. This produces a type of food called glucose. During this process oxygen is given off as well. The algae and plants form the base of a food web that leads to microscopic organisms, fish, reptiles, birds, and mammals that live in the marsh and nearby forest.

### ACTIVE READER

**1 Infer** According to the text, what are two techniques the snapping turtle uses for protection?

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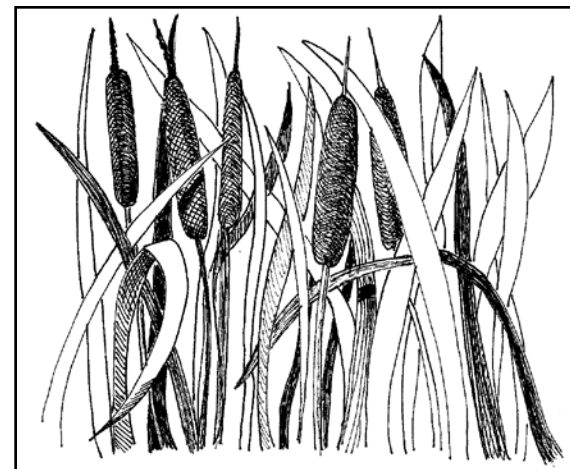
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**2 Recall** Which term best describes the muskrat?

\_\_\_\_\_ carnivore

\_\_\_\_\_ herbivore

\_\_\_\_\_ omnivore



cattails

## A Farmer's Cornfield

We walk back to the farmer's cornfield. I think about the many different plants and animals we have seen in the marsh and stream.

But the cornfield is different. At first, we see only a few insects and no animals. The only plant we see is corn. Then, we look closer. The corn ears have tassels. The ears look full. Some of the leaves have a reddish-brown dusty growth. This is common corn rust. It's a type of fungus.

Another type of fungus that lives on the corn plant is called smut. You can find smut on the stalk, ears, or leaves. Perhaps more things live here than we thought.

If we pick an ear and strip off the leaves, we might find insects. The larvae of armyworms, earworms, and corn borers eat the kernels. We also find grasshoppers. Some are eating the edges of leaves.

We hear a noise. We see a flash of white. It's a white-tailed deer running away from us. Deer eat the corn. They find places to lie down and hide or rest.

Then we notice that birds are all around, too, especially crows. Crows can eat huge numbers of young corn plants. That's why farmers build scarecrows.

But crows are very smart. The crows quickly figure out the scarecrows are not real. Scarecrows have to be moved around every couple of days for them to work.

After the corn plant has had time to grow, crows are less of a problem. Crows eat weeds and insects. They eat grasshoppers that feed on the corn plant.

### ACTIVE READER

**1 Analyze** Which phrase below best tells how the information on this page is presented?

- \_\_\_\_\_ statement and example
- \_\_\_\_\_ cause and effect
- \_\_\_\_\_ events in sequence
- \_\_\_\_\_ question and answer



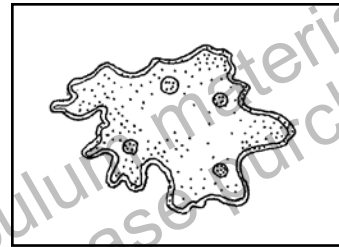
We come upon a low, wet place. It's a mud puddle. It is filled with rotting leaves. They are covered with yellow, slimy, moldy stuff. This is slime mold.

Slime mold is made of amoeba-like cells that feed on microorganisms. These micro-organisms live in the soil and on decaying wood. Slime mold, microorganisms, and larger organisms such as worms and vultures are important in an ecosystem because they eat dead or decaying matter.

Even though the cornfield ecosystem seems simpler than a marsh or stream, many different life forms depend on each other for growth, development, and reproduction.

Each ecosystem we have visited has nonliving and living things. The nonliving elements include water, air, sunlight, and soil. The living inhabitants include animals, plants, and fungi.

These living inhabitants interact with each other. They use the nonliving parts of the ecosystem as they grow, develop, and reproduce.



an amoeba

## FOCUS QUESTIONS

1. A scavenger is an animal that feeds on carrion, the carcasses of recently-dead animals. What two scavengers are mentioned on this page?

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2. In which habitat would you be most likely to find a muskrat?

\_\_\_\_\_ forest floor \_\_\_\_\_ cornfield \_\_\_\_\_ forest canopy \_\_\_\_\_ marsh \_\_\_\_\_ puddle \_\_\_\_\_

## ACTIVE READER

**1 Analyze** Which phrase below best tells how the information in paragraph 4 is presented?

- \_\_\_\_\_ statement and example
- \_\_\_\_\_ cause and effect
- \_\_\_\_\_ events in sequence
- \_\_\_\_\_ question and answer



**Explore a Forest** Even though you may live in a city, a suburb, or far away from a forest, you can still explore a forest ecosystem using books, videos, and various online resources. Start by looking for a website devoted to a forest in your state. Use the questions below to guide your exploration. Work with a group to create a presentation about your findings.

### Location

- What are the latitude and longitude coordinates of the forest?
- What county is the forest in?
- How far do you live from the forest?
- What major roads would you take if you could drive to the forest?

### Area

- How many square miles does the forest cover?
- What counties border the forest?
- What geological formations (lakes, rivers, mountains) are a part of the forest?
- What is the weather like during each season?

### Wildlife

- What plants and animals are native to this forest?
- What threatened, endangered, or sensitive species are found here?
- What invasive species are found here?
- What mammals, raptors, or fish are carnivores (top consumers) in this forest?
- What animals are herbivores (primary consumers) in this forest?
- What animals are scavengers in this forest?

### Human Impact

- What roads are open to the public in the forest?
- What recreational activities are available to the public?
- What rules are in place to control human impact?
- What special passes or permits are required?
- How does farming in the area affect the forest?
- Are there any special problems caused by pollution, such as acid rain?

### Natural Resources

- What natural resources are available in the forest?
- Is lumbering allowed?
- How are the available water resources used by visitors?

### Natural History

- What is the geologic history of the forest?
- How and when were the local landforms created?
- What is the history of the Indian population in this part of the state?
- How has this land been used by people over its history?

### Conservation and Preservation

- What plans are in place to keep this forest habitat healthy and in balance?



## Stop and Think

This page will help summarize what you have read so far.

Base your answers to questions 1–3 on the food web at the right and on your knowledge of science.

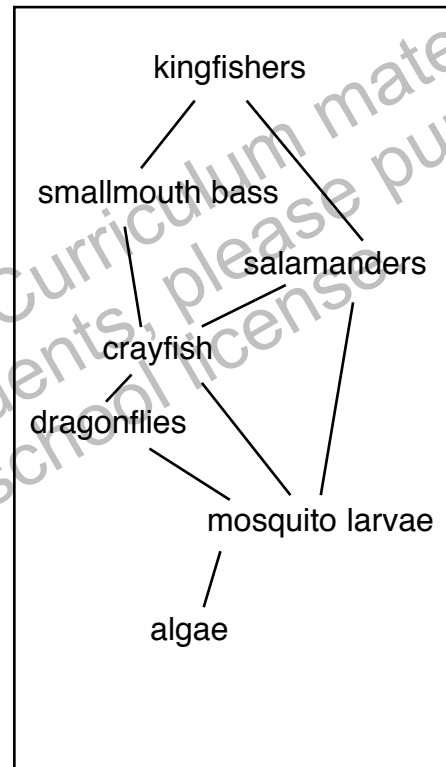
**1. According to the food web, smallmouth bass and salamanders**

- (1) are both producers
- (2) may mate with each other
- (3) live in habitats that don't overlap
- (4) compete for food

**2. Dragonflies are**

- (1) herbivorous
- (2) carnivorous
- (3) microorganisms
- (4) carrion

**3. Mosquito larvae also eat bacteria that they filter out of the water they live in. Add bacteria to the food web to show this feeding relationship.**



**Dear Ms. Understanding,**

I've heard that the soil in a rainforest is very poor and lacks nutrients. If that's so, how come the rainforest is so lush and packed with so many different kinds of plants?



*Jungle-less in Jamestown*

**Dear Jungle,**

The soils in a rainforest are poor because all of the nutrients are contained in the trees and other vegetation.



Because the soils are poor, only plants well-adapted to the rainforest ecosystem can thrive here.

*Ms. Understanding*

# Glossary

**abundant** – plentiful; existing in large quantities

**abyssal zone** – the deepest part of the ocean found at depths of 2,000 to 6,000 meters

**Antarctic** – the region around Earth’s South Pole including the continent of Antarctica

**benthic zone** – the region of a lake or ocean along the floor including sediments and subsurface layers where organisms live

**bog** – a wetland in which deposits of dead plant material accumulate and become peat and whose water chemistry is acidic

**broadleaf** – the leaves of deciduous trees and other garden plants and weeds that have flat leaves rather than spiky needles

**buffer zone** – a natural area that separates two other areas, such as a stream and an open field or meadow

**carrion** – the carcass of a dead animal

**consumers** – animals that get their energy by eating plants and other animals

**estuary** – a body of water along a coast that is fed by rivers and streams and open to the sea at one end

**fauna** – animal life

**fen** – a wetland that is rich in dissolved minerals and whose water chemistry is alkaline or neutral

**intertidal zone** – the area of a marine ecosystem that is exposed at low tide

**lichen** – an organism that is a composite of an algae and a fungus

**marsh** – a shallow-water wetland that supports grasses, reeds, mosses, and other similar plants

**microbes** – a living organism that is microscopic, too small to be seen without magnification, such as bacteria or fungi

**microorganisms** – microbes

**nocturnal** – active at night

**pelagic zone** – the open water away from coastal areas in a marine ecosystem

**phytoplankton** – photosynthesizing microorganisms that form the base of the marine food web

**producers** – organisms that produce their own food, chiefly through photosynthesis

**swamp** – a shallow-water wetland that, unlike a marsh, supports trees and other woody plants

**terrain** – land, especially the topography of the surface of land

**transpiration** – the loss of water vapor from plants through evaporation

**FOCUS  
ON  
SCIENCE**

# Exploring Ecosystems

Assessments

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# Check Understanding



In the Answer Document on this page, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

1. Microorganisms on the forest floor

- (1) decompose dead plant material
- (2) produce their own food
- (3) are primary consumers
- (4) are responsible for photosynthesis

2. A ground squirrel eats nuts, seeds, spiders and insects. Based on its feeding behavior, which term describes the ground squirrel?

- (1) producer
- (2) herbivore
- (3) carnivore
- (4) omnivore

3. Where does the flow of energy begin in a forest ecosystem?

- (1) microorganisms and microbes
- (2) leaves and twigs from a buffer zone
- (3) plant photosynthesis
- (4) rainfall and snowmelt

## Answer Document

1.    ①    ②    ③    ④                    3.    ①    ②    ③    ④
2.    ①    ②    ③    ④

# Check Understanding



The organisms listed below were found in a forest and a nearby lake. Base your answers to questions 4 and 5 on the list and on your knowledge of science.

- algae
- ants
- bear
- deer
- dragonflies
- eagles
- ferns
- fish
- frogs
- mice
- mosquitoes

4. Sketch a likely food chain using at least four of the organisms.

A large, empty rectangular box provided for the student to draw a food chain using the organisms listed above.

5. Bears and eagles are both predators who hunt for fish. What kind of relationship develops between bears and eagles when their habitats overlap?

A series of horizontal lines provided for the student to write their answer to question 5.

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# Exploring Ecosystems

**Answer Key**

# Answer Key

Page 8: Starting Points

Build Background

Food Chains: Sample answers: 1. green plants; 2. hyena; 3. lion; 4. gazelle; 5. gazelle; 6. lion; 7. hyena; 8. vulture; 9. worms

Page 9: Starting Points

Key Vocabulary

Rate Your Knowledge: Answers will vary according to the student's prior knowledge.

Synonyms and Antonyms:

1. producer, consumer; 2. abundant; 3. terrain; 4. bog, fen; 5. nocturnal

Page 10: Starting Points

Key Concepts

Active Reader: 1. glucose and oxygen

Page 11: Chapter 1

Active Reader: 1. Answers will vary.; 2. question and answer

Page 12: Chapter 1

Active Reader: 1. Answers should suggest that a habitat that would support Mountain Gorillas doesn't exist in North America. Focus Questions: 1. habitat; 2. Answers should suggest that a different terrain and climate would be encountered when traveling from one biome to another.

Page 13: Chapter 1

Active Reader: 1. Terrestrial means land. Terrestrial biomes are tundra, forest, desert, and grassland.

Page 14: Chapter 1

Active Reader: 1. marine

Focus Questions: 1. marine biomes are salt-water environments; 2. insects or spiders; cacti are producers and the other animals are consumers.

Page 15: Chapter 1

Stop and Think

1. (3); 2. (4); 3. desert; 4. Many animals are active at night. Plants have spiky leaves to reduce transpiration.

Page 16: Chapter 2

Active Reader: 1. eagles; jaguars; giant anteaters

Page 17: Chapter 2

Active Reader: 1. Deciduous: oak, beech, maple; Evergreen: pine, fir

Page 18: Chapter 2

Active Reader: 1. symbiosis

Focus Questions: 1. Deciduous trees lose their leaves in the fall and go into a kind of dormancy during the cold months. Evergreens stay green all year long; 2. herbivores

Page 19: Chapter 2

Active Reader: 1. sycamore

Page 20: Chapter 2

Active Reader: 1. smallmouth bass, salamanders, crayfish, dragonflies

Page 21: Chapter 2

Active Reader: 1. camouflage that makes them blend into their surroundings and strong snapping jaws; 2. omnivore

Page 22: Chapter 2

Active Reader: 1. events in sequence

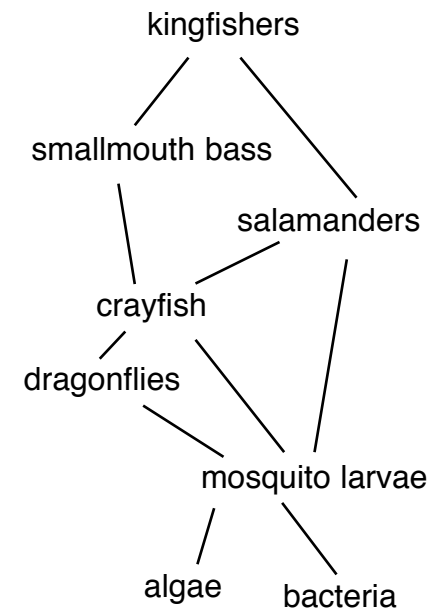
Page 23: Chapter 2

Active Reader: 1. statement and example Focus Questions: 1. raccoons and vultures; 2. marsh

Page 25: Chapter 1

Stop and Think

1. (4); 2. (2); 3.





# Answer Key

Page 29

Check Understanding

1. (1); 2. (4); 3. (3)

Page 30

Check Understanding

4. Sample answer:

algae > mosquito larvae > dragonflies > frogs > eagles; 5. Bears and eagles are in competition for food, such as fish and frogs.

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