

Chapter 10 Ecosystems • Section 1 Summary

Living Things and the Environment

Key Concepts

- What needs are met by an organism's environment?
- What are the two parts of an organism's habitat with which it interacts?
- What are the levels of organization within an ecosystem?

A prairie dog is one type of **organism**, or living thing. Different types of organisms live in different types of environments. **An organism obtains food, water, shelter, and other things it needs to live, grow, and reproduce from its environment.** Other living things depend on plants and algae for food. An environment that provides the things the organism needs to live, grow, and reproduce is called its **habitat**.

An organism interacts with both living and nonliving parts of its habitat. The living parts of a habitat are called **biotic factors**. The nonliving parts of a habitat are called **abiotic factors**. Abiotic factors include water, sunlight, oxygen, temperature, and soil. Some organisms make their own food in a process called **photosynthesis**.

A **species** is a group of organisms that are physically similar and can mate with each other and produce offspring that can also mate and reproduce. All the members of one species in a particular area are referred to as a **population**. All the different populations that live together in an area make up a **community**. The community of organisms that live in a particular area, along with their nonliving surroundings, make up an **ecosystem**. **The smallest level of organization is a single organism, which belongs to a population that includes other members of its species. The population belongs to a community of different species. The community and abiotic factors together form an ecosystem.**

The study of how living things interact with each other and with their environment is called **ecology**. Ecologists are scientists who study ecology. They study how organisms react to changes in their environment.

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This section describes what organisms need and how their environments provide for their needs. The section also describes how organisms live together in populations and communities.

As you read the “Habitats” section, write the main idea—the biggest or most important idea—in the graphic organizer below. Then write three supporting details that give examples of the main idea.

Habitats (p. 393)

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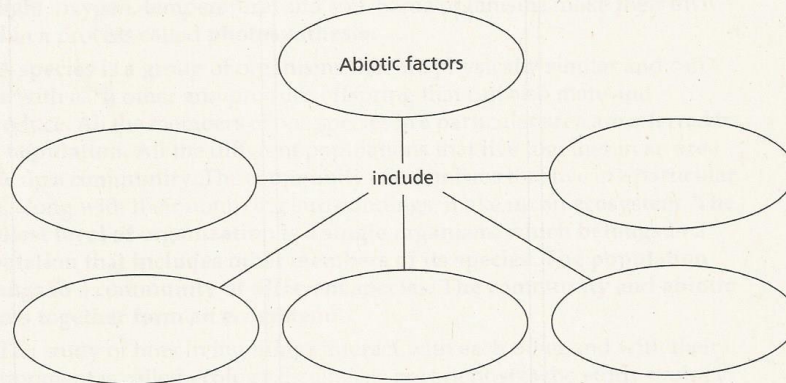
Living Things and the Environment (continued)

Biotic Factors (p. 393)

5. The living parts of a habitat are called _____.
6. Circle the letter of each choice that is a biotic factor in a prairie dog ecosystem.
 - a. Grass and other plants that the prairie dog eats
 - b. Hawks, ferrets, and other animals that hunt the prairie dog
 - c. The soil that provides the prairie dog with a home
 - d. Worms, fungi, and bacteria that also live in the soil

Abiotic Factors (p. 394)

7. The nonliving parts of a habitat are called _____.
8. Complete the concept map.



9. Circle the letter of each sentence that is true about water.
 - a. It is needed by all living things.
 - b. It makes up 95 percent of the human body.
 - c. It is needed by algae and plants to make food.
 - d. It is an abiotic factor only for organisms that actually live in the water.
10. The process in which plants and algae make food using water, sunlight, and carbon dioxide is called _____.

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11. Circle the letter of each sentence that is true about oxygen.

- a. Humans can live only a few hours without it.
- b. Organisms that live on land get it from the air.
- c. It makes up about 40 percent of air.
- d. Fish get it from the water around them.

Levels of Organization (pp. 395–397)

12. What is a species?

13. Circle the letter of each choice that is an example of a population.

- a. all the prairie dogs in a prairie dog town
- b. all the bees in a hive
- c. all the pigeons in New York City
- d. all the trees in a forest

14. Is the following sentence true or false? All populations live in the same-sized area.

15. All the different populations that live together in an area make up a(n)

16. Circle the letter of the choice that lists the levels of organization in an ecosystem from the smallest unit of organization to the largest.

- a. population, organism, community, ecosystem
- b. organism, population, ecosystem, community
- c. organism, community, population, ecosystem
- d. organism, population, community, ecosystem

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Living Things and the Environment *(continued)*

17. Is the following sentence true or false? To be considered a community, populations must live close enough together to interact.

18. In addition to a community of different species, what else does an ecosystem include?

Chapter 10 Ecosystems ▪ Section 2 Summary

Populations

Key Concepts

- What causes populations to change in size?
- What factors limit population growth?

Ecologists study populations to determine how a population may be changing. This is done by observing population changes over several years.

Populations can change in size when new members join the population or when members leave the population. The main way in which new individuals are added to a population is being born in it. The **birth rate** of a population is the number of births in a population over a certain amount of time. The major way that individuals leave a population is by dying. The **death rate** is the number of deaths in a population over a certain amount of time. If the birth rate is greater than the death rate, the population will generally increase in size. If the death rate is greater than the birth rate, the population size will generally decrease. The size of a population can also change when individuals move into or out of the population. **Immigration** means moving into a population. **Emigration** means leaving a population. Graphs are useful to show changes in the size of a population over time.

A **limiting factor** is an environmental factor that causes a population to stop growing. **Some limiting factors for populations are food and water, space, light, soil composition, and weather conditions.** The largest population that an environment can support is called the **carrying capacity**. A population usually stays near its carrying capacity because of the limiting factors in its habitat.

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Populations (pp. 399–403)

This section describes how scientists study population density, size, and growth. The section also explains how factors such as food, space, and weather limit how large populations can become.

Use Target Reading Skills

Complete the first column in the chart by filling in the red headings. Then in the second column, ask a what, how, or where question for each heading. As you read the section, complete the third column with the answers.

Section 2: Populations

Heading	Question	Answer

Introduction (p. 399)

1. How do ecologists determine if a population is changing?

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Changes in Population Size (pp. 400–401)

2. How can populations change in size?

3. What is the main way in which new individuals join a population?

4. The number of births in a population over a certain amount of time is the _____.

5. What is the main way that individuals leave a population?

6. The number of deaths in a population over a certain amount of time is the _____.

7. Is the following sentence true or false? If the birth rate is greater than the death rate, population size decreases.

Match the term with its definition.

Term	Definition
____ 8. immigration	a. Leaving a population
____ 9. emigration	b. Moving into a population
10. Is the following sentence true or false? Population density is the number of individuals in a specific area.	

11. How can a graph be used to show population changes?

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Populations (continued)

Limiting Factors (pp. 402–403)

12. An environmental factor that causes a population to decrease is called a(n) _____.

13. What are some limiting factors for populations?

14. The largest population that an area can support is called its _____.

15. Is the following sentence true or false? Space is often a limiting factor for plants.

16. Which of the following is NOT a limiting factor in soil composition?

- a. mineral content
- b. acidity
- c. humus
- d. litter

17. What are some ways weather conditions can limit population growth?

Chapter 10 Ecosystems • Section 3 Summary

Energy Flow in Ecosystems

Key Concepts

- What energy roles do organisms play in an ecosystem?
- How does energy move through an ecosystem?
- How much energy is available at each level of an energy pyramid?

An organism's energy role is determined by how it obtains energy and how it interacts with the other living things in its ecosystem. **Each of the organisms in an ecosystem fills the energy role of producer, consumer, or decomposer.**

Plants, algae, and some bacteria can carry out photosynthesis. In this process, the organism uses the sun's energy to turn water and carbon dioxide into sugar molecules. An organism that can make its own food is a **producer**. Producers are the source of all the food in an ecosystem.

Other organisms cannot make their own food. They depend on producers for food and energy. An organism that obtains energy by feeding on other organisms is a **consumer**. Consumers are classified by what they eat. Consumers that eat only plants are called **herbivores**. Consumers that eat only animals are called **carnivores**. A consumer that eats both plants and animals is called an **omnivore**. A **scavenger** is a carnivore that feeds on the bodies of dead organisms. An organism may play more than one role in an ecosystem.

Organisms that break down wastes and dead organisms and return the raw materials to the environment are called **decomposers**. As decomposers obtain energy for their own needs, they return simple molecules to the environment to be used again by other organisms.

The transfer of energy from organism to organism in an ecosystem can be shown in diagrams called food chains and food webs. A food chain is a series of events in which one organism eats another and obtains energy. The first organism in a food chain is always a producer. The second organism, called a first-level consumer, eats the producer. The next consumer, called a second-level consumer, eats the first-level consumer. A food chain shows just one possible path of energy through an ecosystem.

Most producers and consumers are part of many food chains. A more realistic way to show the flow of energy through an ecosystem is a food web. A **food web** consists of the many overlapping food chains in an ecosystem.

When an organism makes its own food or eats other organisms, it obtains energy. The organism uses some of this energy to move, feed, grow, and reproduce. Only some of the energy will be available to the next organism in the food web. A diagram called an **energy pyramid** shows the amount of energy that moves from one feeding level to another in a food web. **The most energy is available at the producer level of the pyramid. As you move up the pyramid, each level has less energy available than the level below.** In general, only about 10 percent of the chemical energy at one level of a food web is transferred to the next higher level. As a result, there are usually few organisms at the highest level in a food web.

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Energy Flow in Ecosystems (pp. 404–409)

This section explains the different roles that organisms play in the movement of energy through an ecosystem. The section also describes how organisms in the different roles interact to form food chains and food webs.

Use Target Reading Skills

Look at the illustration titled A Food Web on page 407 of your textbook. In the graphic organizer below, ask three questions that you have about the illustration. As you read about food chains and food webs, write the answers to your questions.

A Food Web	
Q. How is a food chain related to a food web?	
A.	
Q. What do the levels of a food web represent?	
A.	
Q. What is the role of decomposers in a food web?	
A.	

Energy Roles (pp. 404–405)

Match the energy role with its definition.

Energy Role	Definition
____ 1. producer	a. Organism that breaks down wastes and dead organisms
____ 2. consumer	b. Organism that obtains energy by feeding on other organisms
____ 3. decomposer	c. Organism that can make its own food

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4. What types of organisms are producers?

5. Is the following sentence true or false? Energy enters all ecosystems as sunlight. _____

6. Is the following sentence true or false? Producers are the source of all the food in an ecosystem. _____

7. List two major groups of decomposers.

a. _____ b. _____

8. Complete the compare/contrast table.

Types of Consumers	
Type of Consumer	Type of Food
a.	Only plants
Carnivore	b.
c.	Both plants and animals
d.	Dead organisms

9. Is the following sentence true or false? Decomposers return raw materials to the environment.

Food Chains and Food Webs (pp. 406–407)

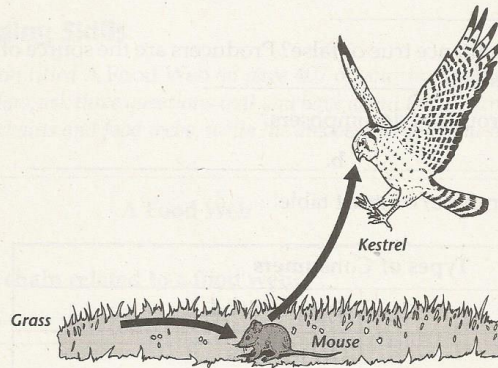
10. A series of events in which one organism eats another and obtains energy is called a(n) _____.

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Energy Flow Ecosystems (continued)

11. Label the producer and the first-level and second-level consumers in the food chain illustrated below.



12. The many overlapping food chains in an ecosystem make up a(n) _____.
13. Circle the letter of each sentence that is true about a food web.
- a. Producers are at the top of the food web.
 - b. All first-level consumers are carnivores.
 - c. Second-level consumers may be carnivores or omnivores.
 - d. An organism may play more than one role in a food web.

Energy Pyramids (pp. 408–409)

14. What does an energy pyramid show?

15. Circle the letter of each sentence that is true about an energy pyramid.
- a. The greatest amount of energy is available at the producer level.
 - b. At each higher level of the pyramid, there is more energy available.
 - c. About half the energy at one level is transferred to the next.
 - d. Scavengers and decomposers are part of the energy pyramid.
16. Why are there usually few organisms at the top of a food web?
