

Living Things and the Environment

Reading Preview

Key Concepts

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

Key Terms

- organism • habitat
- biotic factor • abiotic factor
- photosynthesis • species
- population • community
- ecosystem • ecology

Target Reading Skill

Identifying Main Ideas As you read the Habitats section, write the main idea—the biggest or most important idea—in a graphic organizer like the one below. Then write three supporting details that give examples of the main idea.

| Main Idea | | | |
|--------------------------------|--------|--------|--|
| An organism obtains food . . . | | | |
| Detail | Detail | Detail | |
| | | | |

Lab zone Discover Activity

What's in the Scene?

1. Choose a magazine picture of a nature scene. Paste the picture onto a sheet of paper, leaving space all around the picture.
2. Locate everything in the picture that is alive. Use a colored pencil to draw a line from each living thing. If you know its name, write it on the line.
3. Using a different colored pencil, label each nonliving thing.



Think It Over

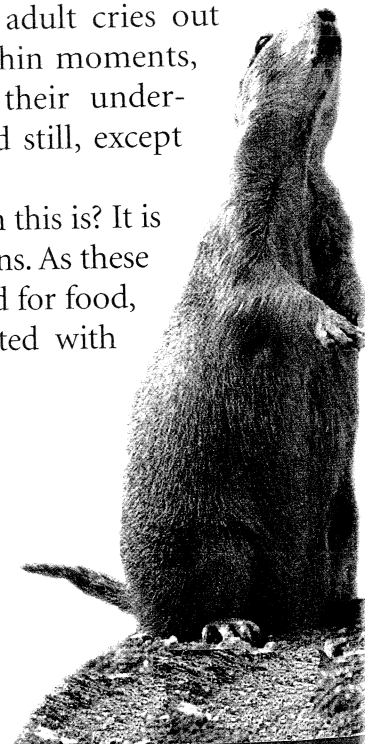
Inferring How do the living things in the picture depend on the nonliving things? Using a third color, draw lines connecting the living things to the nonliving things they need.

As the sun rises on a warm summer morning, the Nebraska town is already bustling with activity. Some residents are hard at work building homes for their families. They are working underground, where it is dark and cool. Other inhabitants are collecting seeds for breakfast. Some of the town's younger residents are at play, chasing each other through the grass.

Suddenly, an adult spots a threatening shadow—an enemy has appeared in the sky! The adult cries out several times, warning the others. Within moments, the town's residents disappear into their underground homes. The town is silent and still, except for a single hawk circling overhead.

Have you guessed what kind of town this is? It is a prairie dog town on the Nebraska plains. As these prairie dogs dug their burrows, searched for food, and hid from the hawk, they interacted with their environment, or surroundings.

Black-Tailed Prairie Dog ▶



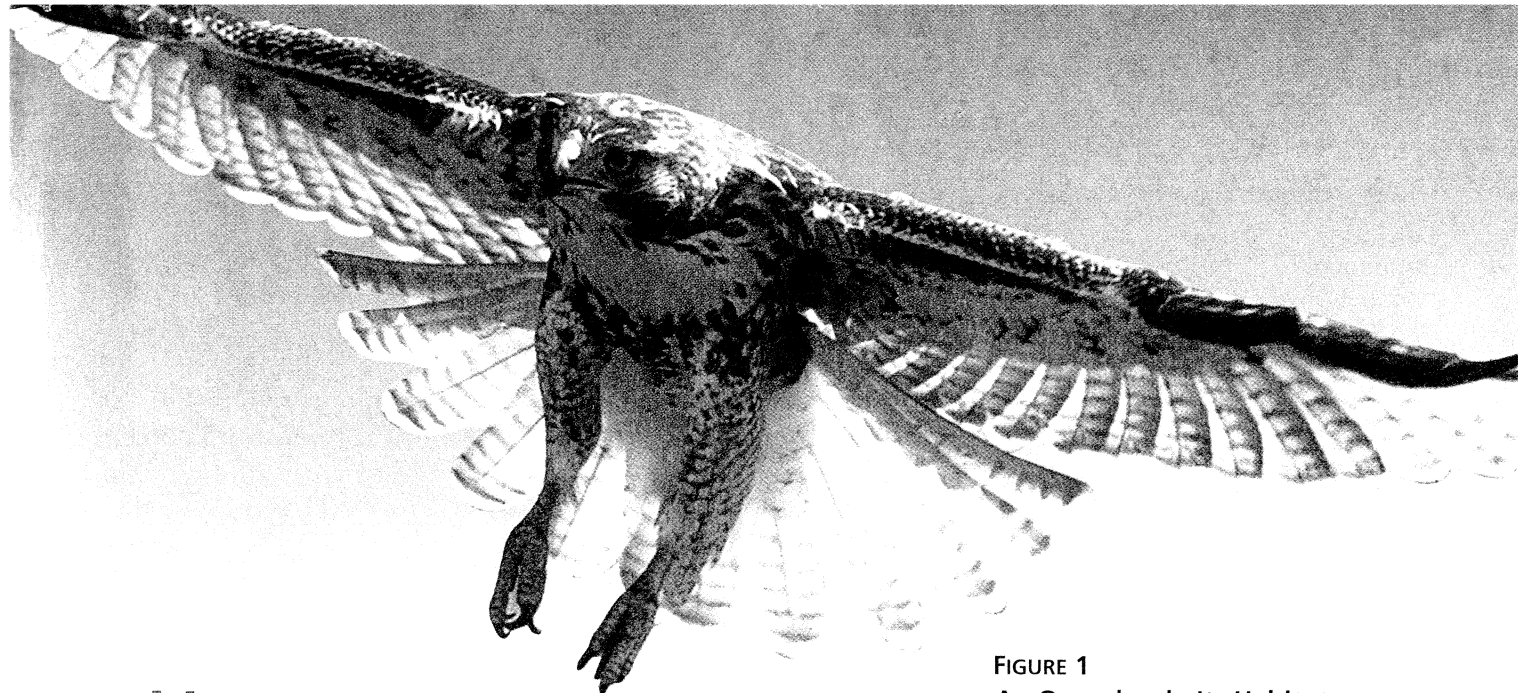


FIGURE 1

An Organism in Its Habitat

Like all organisms, this red-tailed hawk obtains food, water, and shelter from its habitat. Prairie dogs are a major source of food for the red-tailed hawk.

Habitats

A prairie dog is one type of **organism**, or living thing. Different types of organisms must 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.** An environment that provides the things the organism needs to live, grow, and reproduce is called its **habitat**.

One area may contain many habitats. For example, in a forest, mushrooms grow in the damp soil, salamanders live on the forest floor, and woodpeckers build nests in tree trunks.

Organisms live in different habitats because they have different requirements for survival. A prairie dog obtains the food and shelter it needs from its habitat. It could not survive in a tropical rain forest or on the rocky ocean shore. Likewise, the prairie would not meet the needs of a spider monkey or hermit crab.



Reading
Checkpoint

Why do different organisms live in different habitats?

Biotic Factors

To meet its needs, a prairie dog must interact with more than just the other prairie dogs around it. **An organism interacts with both the living and nonliving parts of its habitat.** The living parts of a habitat are called **biotic factors** (by AHT ik). Biotic factors in the prairie dogs' habitat include the grass and plants that provide seeds and berries. The hawks, ferrets, badgers, and eagles that hunt the prairie dogs are also biotic factors. In addition, worms, fungi, and bacteria are biotic factors that live in the soil underneath the prairie grass.



Reading
Checkpoint

Name a biotic factor in your environment.

FIGURE 2

Abiotic Factors

The nonliving things in an organism's habitat are abiotic factors. **Applying Concepts** Name three abiotic factors you interact with each day.



▲ This orangutan is enjoying a drink of water.



▲ Sunlight enables this plant to make its own food.



▲ This banjo frog burrows in the soil to stay cool.

Abiotic Factors

Abiotic factors (ay by AHT ik) are the nonliving parts of an organism's habitat. They include water, sunlight, oxygen, temperature, and soil.

Water All living things require water to carry out their life processes. Water also makes up a large part of the bodies of most organisms. Your body, for example, is about 65 percent water. Plants and algae need water, along with sunlight and carbon dioxide, to make their own food in a process called **photosynthesis** (foh toh SIN thuh sis). Other living things depend on plants and algae for food.

Sunlight Because sunlight is needed for photosynthesis, it is an important abiotic factor for most living things. In places that do not receive sunlight, such as dark caves, plants and algae cannot grow. Because there are no plants or algae to provide food, few other organisms can live in such places.

Oxygen Most living things require oxygen to carry out their life processes. Oxygen is so important to the functioning of the human body that you can live only a few minutes without it. Organisms that live on land obtain oxygen from air, which is about 20 percent oxygen. Fish and other water organisms obtain oxygen that is dissolved in the water around them.

Temperature The temperatures that are typical of an area determine the types of organisms that can live there. For example, if you took a trip to a warm tropical island, you might see colorful orchid flowers and tiny lizards. These organisms could not survive on the frozen plains of Siberia.

Some animals alter their environments so they can survive very hot or very cold temperatures. Prairie dogs, for example, dig underground dens to find shelter from the hot summer sun and cold winter winds.

Soil Soil is a mixture of rock fragments, nutrients, air, water, and the decaying remains of living things. Soil in different areas consists of varying amounts of these materials. The type of soil in an area influences the kinds of plants that can grow there. Many animals, such as the prairie dogs, use the soil itself as a home. Billions of microscopic organisms such as bacteria also live in the soil.



How do abiotic factors differ from biotic factors?

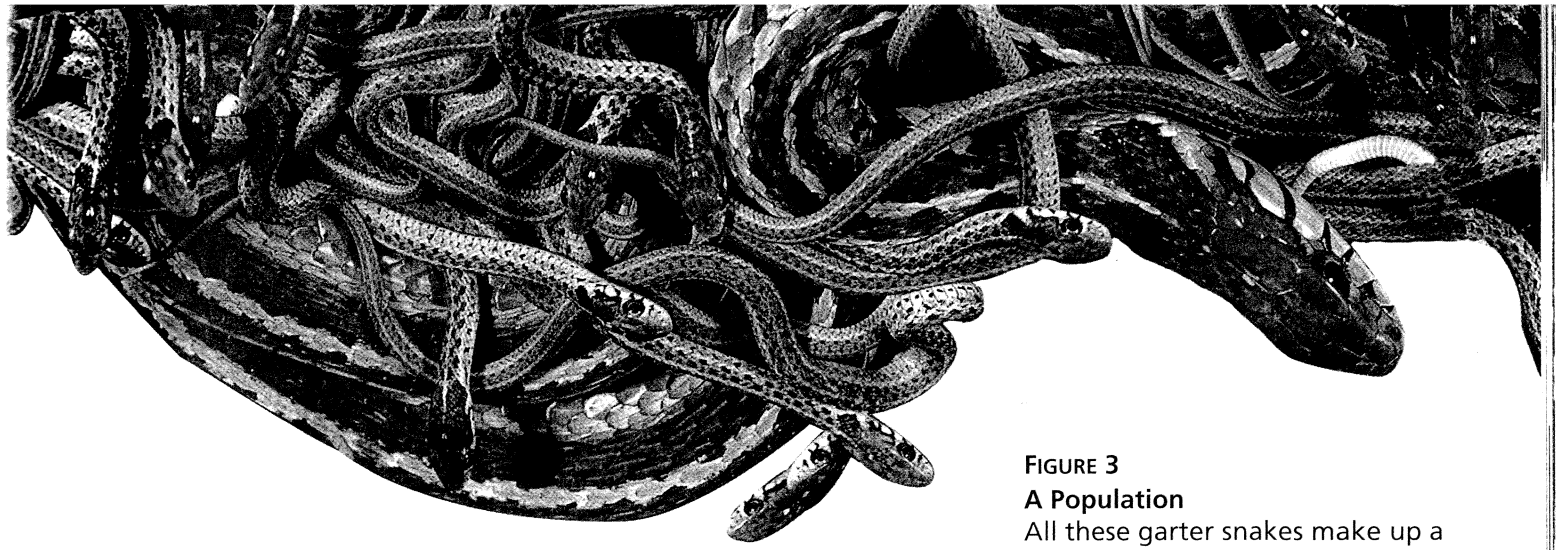


FIGURE 3
A Population
All these garter snakes make up a population.

Levels of Organization

Of course, organisms do not live all alone in their habitat. Instead, organisms live together in populations and communities, and with abiotic factors in their ecosystems.

Populations In 1900, travelers saw a prairie dog town in Texas that covered an area twice the size of the city of Dallas. The town contained more than 400 million prairie dogs! These prairie dogs were all members of one species, or single kind, of organism. A **species** (SPEE sheez) 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**. The 400 million prairie dogs in the Texas town are one example of a population. All the pigeons in New York City make up a population, as do all the bees that live in a hive. In contrast, all the trees in a forest do not make up a population, because they do not all belong to the same species. There may be pines, maples, birches, and many other tree species in the forest.

Communities A particular area usually contains more than one species of organism. The prairie, for instance, includes prairie dogs, hawks, grasses, badgers, and snakes, along with many other organisms. All the different populations that live together in an area make up a **community**.

To be considered a community, the different populations must live close enough together to interact. One way the populations in a community may interact is by using the same resources, such as food and shelter. For example, the tunnels dug by prairie dogs also serve as homes for burrowing owls and black-footed ferrets. The prairie dogs share the grass with other animals. Meanwhile, prairie dogs themselves serve as food for many species.

Lab zone Try This Activity

With or Without Salt?

In this activity you will explore salt as an abiotic factor.

1. Label four 600-mL beakers A, B, C, and D. Fill each with 500 mL of room-temperature spring water.
2. Set beaker A aside. Add 2.5 grams of noniodized salt to beaker B, 7.5 grams of salt to beaker C, and 15 grams of salt to beaker D. Stir each beaker.
3. Add $\frac{1}{8}$ spoonful of brine shrimp eggs to each beaker.
4. Cover each beaker with a square of paper. Keep them away from direct light or heat. Wash your hands.
5. Observe the beakers daily for three days.

Drawing Conclusions In which beakers did the eggs hatch? What can you conclude about the amount of salt in the shrimps' natural habitat?

Go Online

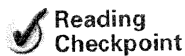


For: Links on biotic and abiotic factors
Visit: www.SciLinks.org
Web Code: scn-0511

Ecosystems The community of organisms that live in a particular area, along with their nonliving surroundings, make up an **ecosystem**. A prairie is just one of the many different ecosystems found on Earth. Other ecosystems in which living things make their homes include mountain streams, deep oceans, and evergreen forests.

Figure 4 shows the levels of organization in a prairie 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.**

Because the populations in an ecosystem interact with one another, any change affects all the different populations that live there. The study of how living things interact with each other and with their environment is called **ecology**. Ecologists are scientists who study ecology. As part of their work, ecologists study how organisms react to changes in their environment. An ecologist, for example, may look at how a fire affects a prairie ecosystem.



Reading Checkpoint What is ecology?

Section 1 Assessment

Target Reading Skill Identifying Main Ideas

Use your graphic organizer to help you answer Question 1 below.

Reviewing Key Concepts

- Listing** What basic needs are provided by an organism's habitat?
 - Predicting** What might happen to an organism if its habitat could not meet one of its needs?
- Defining** Define the terms *biotic factors* and *abiotic factors*.
 - Interpreting Illustrations** List all the biotic and abiotic factors in Figure 4 on page 11.
 - Making Generalizations** Explain why water and sunlight are two abiotic factors that are important to all organisms.
- Sequencing** List these terms in order from the smallest level to the largest: *population, organism, ecosystem, community*.
 - Classifying** Would all the different kinds of organisms in a forest be considered a population or a community? Explain.
 - Relating Cause and Effect** How might a change in one population affect other populations in a community?

Writing in Science

Descriptive Paragraph What habitat do you live in? Write a one-paragraph description of your habitat. Describe how you obtain the food, water, and shelter you need from your habitat. How does this habitat meet your needs in ways that another would not?