

Chapter 8

Living Organisms: Ecosystems

Introduction

The interactions that occur between living organisms and their environments are explored in Chapter 8. Earth has many different types of environments. The particular environment in which an organism lives is its **habitat**. Over time, organisms have developed **adaptations** that allow them to survive in their habitats. If a species cannot adapt to changes in its environment, it will become **extinct**.

The organisms of a particular species make up a **population**. A **community** is all of the populations within a habitat. In order to maintain a habitat, the organisms within it must fill a variety of different roles. The three main roles are those of **producers**, **consumers**, and **decomposers**. In these roles, organisms continuously interact with one another and with their surroundings in **food chains**, **food webs**, and food pyramids.

The relationships between organisms within a community can be classified as either **symbiosis** or competition. As these relationships unfold, the community evolves through the process of **ecological succession**. Ecological succession is a gradual process that concludes when a climax community is reached.

Students Should Understand the Following Concepts

- An **ecosystem** consists of both living and nonliving things.
- Living organisms have developed adaptations to enable them to live in their particular ecosystems.
- Ecological succession is a process by which an ecosystem goes through predictable stages.
- All organisms get their energy from the sun, either directly or indirectly. Plants (producers) directly harness the energy of the sun and convert it into chemical energy. Animals (consumers) may consume either plants or other animals in order to gain energy to carry out their life processes.
- Decomposers break down dead organisms, recycling them back into the ecosystem.
- Producers, consumers, and decomposers are dependent on one another. These relationships can be represented with a food chain.
- All organisms constantly and continuously interact with the environment by taking in nutrients, water, and oxygen and expelling wastes.

Activities to Develop the Topic

Use one or more of the following activities to help your students review this topic.

The idea that an ecosystem is a dynamic and evolving environment is the main theme in this chapter. Students should also understand how organisms relate to one another and their environment. You can relate the basic setup for an ecosystem by comparing it to your school. Everyone in the school has a job or a role to play in the daily running of the school, just as every organism in an environment has a role to play. In nature, there are producers, consumers, and decomposers, and in a school there are students, teachers, administrators, and custodians. It is not important to directly relate the school setting to nature by comparing students to producers, but instead, illustrate the relationships between individuals in a school. For example, point out that teachers, administrators, and custodians would have no functions to perform if there were no students in a school. Similarly, students would not succeed if teachers, administrators, and custodians did not perform their roles.

You can also discuss the resources needed to run the school on a daily basis. Such resources in-

clude heat, water, food for the cafeteria, and books. Mention that items such as books and uniforms are nonrenewable resources because they are eventually disposed of, whereas, resources such as water from the water fountains could be considered to be a renewable resource because it is recycled by the town and by nature.

When demonstrating food chains or webs you can again use the school analogy by placing the students at the bottom, then the teachers above them, then administrators (principals and coordinators), and have the students determine where to place the custodians.

Review of Chapter 8

- Which of the following pairings represents a stimulus-response relationship?
 - bright light: widening of the pupils
 - higher temperature: production of sweat
 - scary situation: release of insulin
 - stomach growling: "goose bumps"
- Which is NOT an example of an adaptation that allows an organism to live in a particular environment?
 - fish's gills
 - bird's hollow wings
 - whale's blubber
 - human's appendix
- The particular environment in which an organism lives is called its
 - ecosystem
 - niche
 - habitat
 - biome
- Humans can cause the extinction of a species by
 - conserving a species habitat
 - allowing pollution levels to increase
 - reducing hunting quotas of endangered or threatened species
 - causing natural disasters
- The levels of organization in an environment from smallest to largest are
 - biosphere, ecosystem, community, population
 - population, ecosystem, biosphere, community
 - community, population, biosphere, ecosystem
 - population, community, ecosystem, biosphere
- Which of the following organisms could be considered to be an omnivore?
 - bear
 - cow
 - lion
 - swordfish
- Which of the following is a food chain?
 - guppies → algae → perch
 - grasses → rabbits → hawks → decomposing bacteria
 - maple tree → songbirds → caterpillars → hawks
 - seaweed → marine snails → shorebird → clams

8. What types of organisms are always located at the base of a food pyramid?
(1) heterotrophs (3) producers
(2) consumers (4) decomposers
9. How would the relationship between bumblebees and flowers be classified?
(1) mutualism (3) parasitism
(2) commensalism (4) competition
10. Which of the following factors would NOT be a source of competition between a wolf and a bear?
(1) den sites (3) food
(2) mates (4) watering sites
11. Suppose an experiment was conducted where all of the rabbits were removed from a meadow. Which of the following results is least likely to be observed?
(1) The predator population, such as hawks, would decrease.
(2) The grasses and shrubs would grow taller and fuller.
(3) Flea and tick populations would increase.
(4) Other small herbivore populations would increase.
12. What process is the *opposite* of evaporation in the water cycle?
(1) condensation
(2) percolation
(3) precipitation
(4) erosion
13. As you move up on a food pyramid, the amount of energy represented
(1) increases
(2) decreases
(3) remains the same
(4) depends on what organisms are on each level
14. Where do producers get their energy?
(1) the sun
(2) other organisms
(3) by breaking down dead organisms
(4) the atmosphere
15. Which of the following organisms is a producer? Why?
(1) a guppy, because it eats algae
(2) a tomato plant, because it converts sunlight into sugars
(3) a tomato plant, because it pulls water out of the ground with its roots
(4) a lion, because it eats zebras

16. The group of all the organisms in a forest would be considered to be a(n)
- (1) habitat
 - (2) community
 - (3) environment
 - (4) ecosystem
17. What must be constantly supplied to an ecosystem to keep it stable?
- (1) nitrogen
 - (2) water
 - (3) oxygen
 - (4) sunlight
18. Which symbiotic relationship is an example of commensalism?
- (1) A flea feeds on a dog's blood.
 - (2) A leech feeds on a human's blood
 - (3) Barnacles attach themselves to whales, and are transported to new feeding grounds.
 - (4) Bacteria in a termite's gut feed on wood while helping the termite digest the wood.
19. Fungi and single-celled algae can live together in colder climates where few organisms can survive. The fungi wraps around the algae and provides water and essential nutrients to the algae. In turn, the algae releases some of the sugars it produces during photosynthesis to nourish the fungi. What type of relationship would this be considered?
- (1) a food web
 - (2) mutualism
 - (3) commensalism
 - (4) parasitism
20. Which of the following is NOT an example of a renewable resource?
- (1) aluminum
 - (2) soil
 - (3) water
 - (4) forests