

Freshwater Ecosystems

Key Concept Organisms in freshwater ecosystems depend on the abiotic and biotic factors in their environment.

What You Will Learn

- Water temperature, water depth, and nutrients are some abiotic factors that affect organisms in freshwater ecosystems.
- Organisms can be categorized by their ecological roles in freshwater ecosystems.
- As a pond or lake becomes a forest, it supports different kinds of organisms.

Why It Matters

Studying the characteristics of fresh water organisms will help you understand how the environment affects organisms in freshwater ecosystems.

Vocabulary

- littoral zone
- wetland
- open-water zone
- marsh
- deep-water zone
- swamp

READING STRATEGY

Graphic Organizer In your **Science Journal**, create a Venn Diagram that compares various characteristics of wetland ecosystems.

Figure 1 Rivers become larger as more tributaries flow into them.



6.5.c Students know populations of organisms can be categorized by the functions they serve in an ecosystem.

6.5.e Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

▶ A brook bubbles over rocks. A mighty river thunders through a canyon. A calm swamp echoes with the sounds of frogs and birds. What do these places have in common? Brooks, rivers, and swamps are examples of freshwater ecosystems. An important abiotic factor that affects freshwater ecosystems is how quickly water moves. Freshwater ecosystems are also affected by abiotic factors, such as water temperature, water depth, and nutrients.

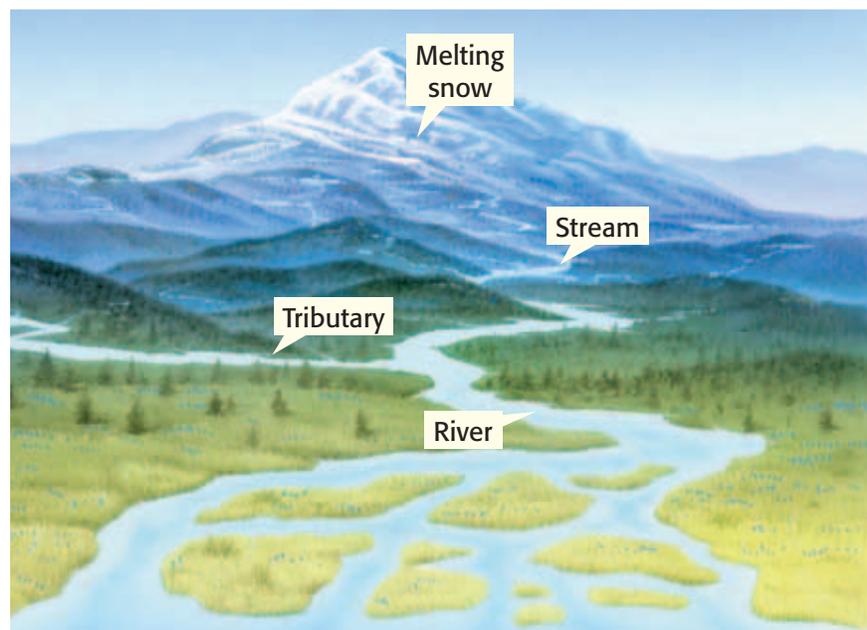
Stream and River Ecosystems

The water in brooks, streams, and rivers may flow from melting ice or snow. Or the water may come from a spring. A spring is a place where water flows from underground to Earth's surface. Each stream of water that joins a larger stream is called a *tributary* (TRIB yoo TER ee). As more tributaries join a stream, the stream contains more water. The stream becomes stronger and wider. A very strong, wide stream is called a *river*.

Figure 1 shows how a river develops.

Stream and river ecosystems are full of life. Plants typically line the edges of streams and rivers. Fishes live in the open waters. Clams and snails live in the mud at the bottom of a stream or river.

Organisms that live in fast-moving water have adaptations to keep from being washed away. Some producers, such as algae and moss, are attached to rocks. Consumers such as tadpoles use suction disks to hold themselves to rocks. Other consumers, such as insects, live under rocks.



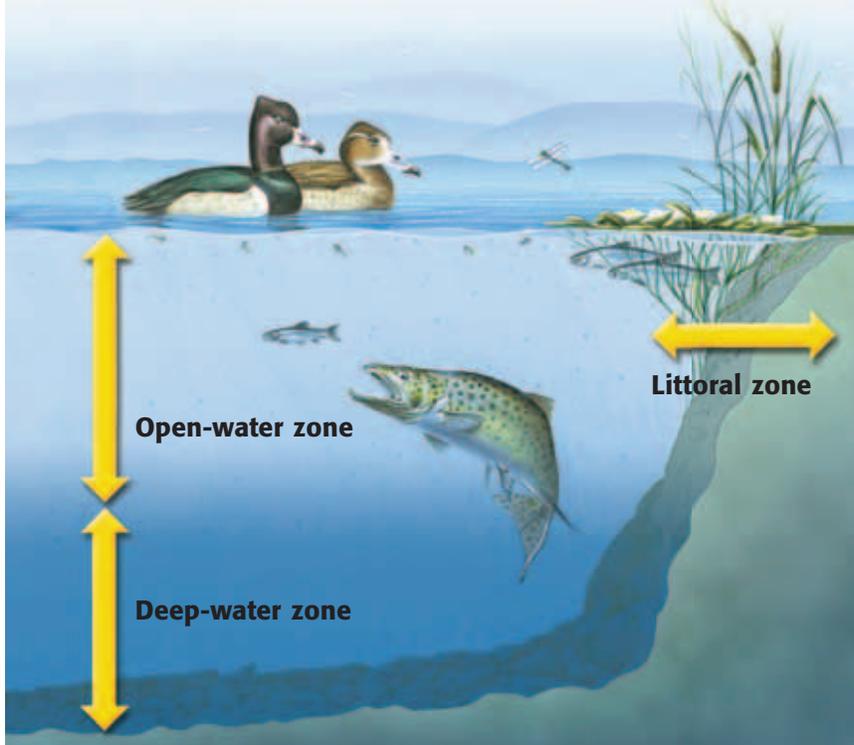


Figure 2 Ponds and lakes can be divided into three zones. Each zone has different organisms and abiotic factors.

Pond and Lake Ecosystems

Ponds and lakes have different ecosystems than streams and rivers do. **Figure 2** shows the zones of a typical lake.

Life near Shore

The area of water closest to the edge of a lake or pond is called the **littoral zone**. Sunlight reaches the bottom of the littoral zone. This sunlight allows producers, such as algae, to grow in this zone. Plants such as cattails and rushes, grow near the shore. Floating plants, such as water lilies, grow farther from the shore. The plants and algae of the littoral zone are eaten by many animals. These plants are also home to consumers, such as snails and insects. Consumers that live in the mud include clams and worms. Consumers such as fishes and snakes also live in this zone.

Life Away from Shore

The area of a lake or pond that extends from the littoral zone across the top of the water is called the **open-water zone**. The open-water zone is as deep as sunlight can reach. So, producers such as photosynthetic plankton grow well here. This zone is also home to bass, lake trout, and other consumers. Beneath the open-water zone is the **deep-water zone**, where no sunlight reaches. So, photosynthetic organisms cannot grow in this zone. Scavengers such as catfish and crabs live here and feed on dead organisms that sink from above. Decomposers, such as fungi and bacteria, also help break down dead organisms.

Standards Check Name a producer and a consumer that typically live in lake ecosystems. **6.5.c**

Quick Lab



6.5.c

Pond-Food Relationships

1. On **index cards**, write the names of some of the plants and animals that live in a typical freshwater pond or small lake. Write one type of organism on each card.
2. Use **yarn or string** to connect each organism to its food sources.
3. Describe the food relationships in a pond.



15 min

littoral zone (LIT uh ruhl ZOHN) the shallow zone of a lake or pond where light reaches the bottom and nurtures plants

open-water zone (OH puhn WAWT uhr ZOHN) the zone of a pond or lake that extends from the littoral zone and that is only as deep as light can reach

deep-water zone (DEEP WAWT uhr ZOHN) the zone of a lake or pond below the open-water zone, where no light reaches

Wetland Ecosystems

An area of land that is sometimes underwater or whose soil contains a great deal of moisture is called a **wetland**. Wetlands support many kinds of plants and animals. Wetlands also play an important role in flood control. During heavy rains or spring snowmelts, wetlands soak up large amounts of water. The water in wetlands also moves deeper into the ground. So, wetlands help replenish underground water supplies.

Marshes

A treeless wetland ecosystem where producers such as grasses grow is called a **marsh**. A freshwater marsh is shown in **Figure 3**. Freshwater marshes are often found in shallow areas along the shores of lakes, ponds, rivers, and streams. The plants in a marsh vary depending on the depth of the water and the location of the marsh. Grasses, reeds, bulrushes, and wild rice are common marsh plants. Consumers, such as muskrats, turtles, frogs, and birds, also live in marshes.



Figure 3 This painted turtle suns itself on a log in a freshwater marsh.

wetland (WET LAND) an area of land that is periodically underwater or whose soil contains a great deal of moisture

marsh (MAHRSH) a treeless wetland ecosystem where plants such as grasses grow

swamp (SWAHMP) a wetland ecosystem in which shrubs and trees grow

Swamps

A wetland ecosystem in which producers such as trees and vines grow is called a **swamp**. Swamps, like the one shown in **Figure 4**, are found in low-lying areas and beside slow-moving rivers. Most swamps are flooded for part of the year, depending on rainfall. Willows, baldcypresses, and oaks are common swamp trees. Vines, such as poison ivy, grow up tree trunks. Plants, such as orchids, may hang from tree branches. Water lilies and other plants grow in standing water. Plants that grow in standing water are adapted to growing in waters with low oxygen levels. Many consumers, such as fishes, snakes, and birds, also live in swamps.

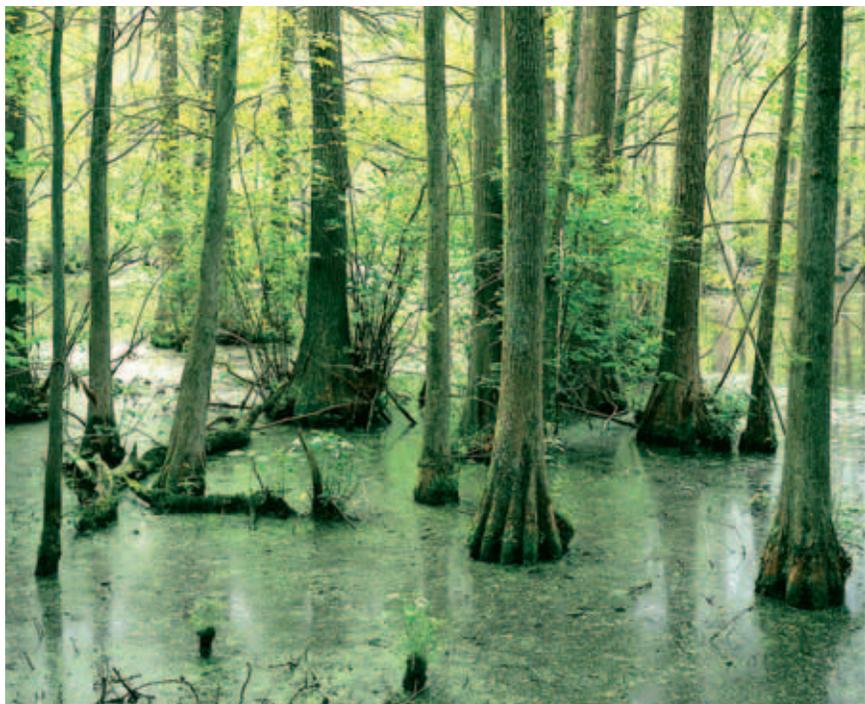


Figure 4 The trunks of these trees are adapted to give the trees more support in the wet, soft soil of a swamp.

How Ecosystems Can Change

Did you know that a lake or pond can disappear? Water entering a standing body of water usually carries nutrients and sediment. These materials settle to the bottom of the pond or lake. Dead leaves from overhanging trees and decaying plant and animal life also settle to the bottom. Then, bacteria decompose this material. This process uses oxygen, an abiotic factor. Decreasing levels of oxygen can affect the kinds of animals that can survive in the pond or lake. For example, many fishes would not be able to survive with less oxygen in the water.

Over time, the pond or lake is filled with sediment. New kinds of plants grow in the new soil. Shallow areas fill in first. So, plants slowly grow closer and closer to the center of the pond or lake. What is left of the lake or pond becomes a wetland. As the soils dry out and the oxygen levels increase, forest plants can grow. Forest plants will, in turn, support forest animals. In this way, a pond or lake can become a forest.

Standards Check How might the decomposition of dead plant and animal life in a pond affect the fish that live there?  **6.5.e**

INTERNET ACTIVITY

Earth Biome Brochure

How do you choose where you would like to live? Create a brochure to help plants, animals, and people find the best place to live. Go to go.hrw.com, and type in the keyword HY7ECOW.

SECTION Review



6.5.c, 6.5.e

Summary

- Each kind of freshwater ecosystem supports different communities of organisms because each ecosystem has different abiotic factors.
- Organisms can be categorized as producers, consumers, and decomposers in freshwater ecosystems.
- Changes in abiotic factors, such as an increase in sediment and a decrease in oxygen, can cause lake organisms to die. Eventually, further changes can lead to the development of a forest.

Understanding Concepts

- 1 **Identifying** What are two producers and two consumers found in swamp ecosystems?
- 2 **Describing** Describe what happens as a lake becomes a forest.
- 3 **Analyzing** Why can't photosynthetic organisms grow in the deep-water zone of a lake?

Critical Thinking

- 4 **Making Inferences** A river is slowly drying up. What do you think will happen to the plants that grow on the edge of the river and the algae that grow on the rocks in the river? Explain.
- 5 **Applying Concepts** Imagine a steep, rocky stream. What kinds of adaptations might animals living in this stream have? What might happen to animals without these adaptations? Explain.

Math Skills

- 6 **Making Calculations** Sunlight can penetrate a certain lake to a depth of 15 m. The lake is 5.5 times as deep as the depth to which light can penetrate. In meters, how deep is the lake?

Challenge

- 7 **Making Inferences** Fungi and bacteria decompose material in many freshwater ecosystems. Would you expect to find any freshwater ecosystems that did not have decomposers? Explain.

Internet Resources

For a variety of links related to this chapter, go to www.scilinks.org

Topic: [Freshwater Ecosystems](#);
[California's Freshwater](#)

SciLinks code: [HY70621](#); [HY7C05](#)