



Ecosystems

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|---------------------|--------------------------------------|---------------------------|
| ○ Sun.....A         | ○ Floating Microorganisms.....E      | ○ Floating Algae .....H   |
| ○ Air.....B         | ○ Mud Dwelling Microorganisms .....F | ○ Insects.....I           |
| ○ Water.....C       | ○ Invertebrates.....G                | ○ Fish .....J             |
| ○ Soil (Mud) .....D |                                      | ○ Submerged Plants .....K |
|                     |                                      | ○ Aerial Plants.....L     |

## Chapter 11-2: Ecosystems

A community is a complex system of mutual dependency. Numerous interrelationships exist between the community and the physical features of the environment it inhabits. This dynamic relationship between the community and its physical environment is called an ecosystem. Ecosystems vary in size from very large forests to tiny droplets of water. In this plate, we will study some of the dynamics of a freshwater pond ecosystem.

This plate consists of a single diagram in which a collection of organisms is shown in its natural environment. Both the living organisms and the physical environment will be considered in our discussion of the ecosystem.

The first item we will mention is the **sun (A)**. The amount of solar heat that reaches the pond is one of the factors that determine the type and number of organisms that can exist in the pond. Ecologists are scientists that study ecosystems. For instance, they would study a pond's photosynthetic organisms to determine how solar energy is used. They would also study the strength of the ultraviolet light that reached the surface of the pond, and its effect on its organisms.

Another item in a community's physical environment is the **air (B)**. Ecologists might run tests to determine whether the air is clear or polluted, or whether the atmosphere is stagnant or kept circulating by the wind. They might determine how much moisture the air could hold, or how high its temperature could rise due to solar radiation. All of these factors affect the organisms living in the pond.

A third important physical factor is the **water (C)**. Ecologists might investigate whether there is an outlet that refreshes the pond, or whether the water is stagnant. They might also test the water for organic nutrients that enable microorganisms to grow and compete with fish for oxygen.

The final physical component we will mention is the **soil (mud) (D)**. In studying the ecosystem, ecologists determine if the soil is sandy or if it is rich in organic matter. Limited populations of organisms inhabit sandy soil, while a variety thrive in organic-rich soil. They would also determine if the soil contained dissolved oxygen to support aerobic microorganisms, or lacked it and supported anaerobic microorganisms.

Now we have named the physical factors of a pond ecosystem, and we will turn to its living members to see how they interact with each other and their physical environment.

We will begin our survey of the living members of our ecosystem with the **floating microorganisms (E)** depicted in the box. The type and variety of microorganisms present varies according to the amount of organic matter present. For example, if the pond receives outflow from a food processing plant, much organic matter will be present and will support a variety of microorganisms.

At the bottom of the pond are **mud-dwelling microorganisms (F)**. As we mentioned above, conditions in the mud influence the type and number of organisms present. Mud-dwelling microorganisms serve as a source of food for **invertebrates (G)**, which include tiny fish, insects, worms, mollusks, and echinoderms. These invertebrates float in the water and provide food for larger animals.

Among the plant population is photosynthetic **floating algae (H)**. Its metabolic processes cause it to produce carbohydrates, which are consumed by vertebrates and other small organisms. The addition of detergents or other pollutants to ponds can cause a bloom of floating algae, which in turn may cause fish to suffocate.

This pond also contains a variety of **insects (I)** that feed on both floating algae and invertebrates. Because of their extreme resistance to environmental fluctuations, the insect population remains fairly stable, and provides food for the **fish (J)**.

Two types of plants inhabit this ecosystem. The type and number of **submerged plants (K)** depend on the conditions of the mud and water. Mud, for example, provides anchorage for submerged plants. As you can see, the second type of plant is the **aerial plant (L)**, which grows at the border of the pond. When the nature of aerial plants changes, whether it is due to pollution or the effects of weather, the entire community structure of the ecosystem changes.

## 11.2 Ecosystems

1. What do we call the dynamic relationship between the community and its physical environment? \_\_\_\_\_
2. Are ecosystems large or small? \_\_\_\_\_
3. What do we call people who study ecosystems? \_\_\_\_\_
4. List four physical components of an ecosystem? \_\_\_\_\_
5. List two types of microorganisms found in this sample ecosystem : \_\_\_\_\_
6. List three types of animals that inhabit this sample ecosystem: \_\_\_\_\_
7. List three types of plants that inhabit this sample ecosystem: \_\_\_\_\_
8. What do you think might happen if the insect population was suddenly eliminated? \_\_\_\_\_

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