

Ecologists use the term *ecosystem* to indicate a natural unit of living and nonliving parts that interact to produce a stable system in which the exchange of materials between living and nonliving parts follows a circular path. An ecosystem may be as large as the ocean or a forest or one of the cycles of the elements, or it may be as small as an aquarium jar containing tropical fish, green plants and snails. To qualify as an ecosystem, the unit must be a stable system in which the exchange of materials follows a circular path.

A classic example of an ecosystem compact enough to be investigated in quantitative detail is a small lake or pond (Fig. 6-5). The nonliving parts of the lake include the water, dissolved oxygen, carbon dioxide, inorganic salts such as phosphates, nitrates and chlorides of sodium, potassium and calcium, and a multitude of organic compounds. The living organisms may be subdivided into producers, consumers and decomposers according to their specific role in keeping the ecosystem operating as a stable interacting whole.

The *producer* organisms are the green plants that manufacture organic compounds from simple inorganic substances by photosynthesis. In a lake there are two types of producers: the larger plants growing along the shore or floating in shallow water, and the microscopic floating plants, most of which are algae, that are distributed throughout the water, as deep as light will penetrate. These tiny plants, collectively known as *phytoplankton*, are usually not visible unless they are present in great abundance and give the water a greenish tinge. They are usually much more important as food producers for the lake than are the more readily visible plants.

The *consumer* organisms are heterotrophs such as insects and insect larvae, crustacea, frogs, fish, and perhaps some fresh water clams. Primary consumers are the plant eaters and secondary consumers are the carnivores that eat the primary consumers. There might be some tertiary consumers that eat the carnivorous secondary consumers.

The ecosystem is completed by *decomposer* organisms, bacteria and fungi, which break down the organic compounds of cells from dead producer and consumer organisms either into small organic molecules, which they utilize themselves as saprophytes, or into inorganic substances that can be used as raw materials by green plants. Even the largest and most complex ecosystem can be shown to consist of the same components—producer, consumer and decomposer organisms and nonliving components.

FUNCTIONING WATER GARDEN ECOSYSTEM

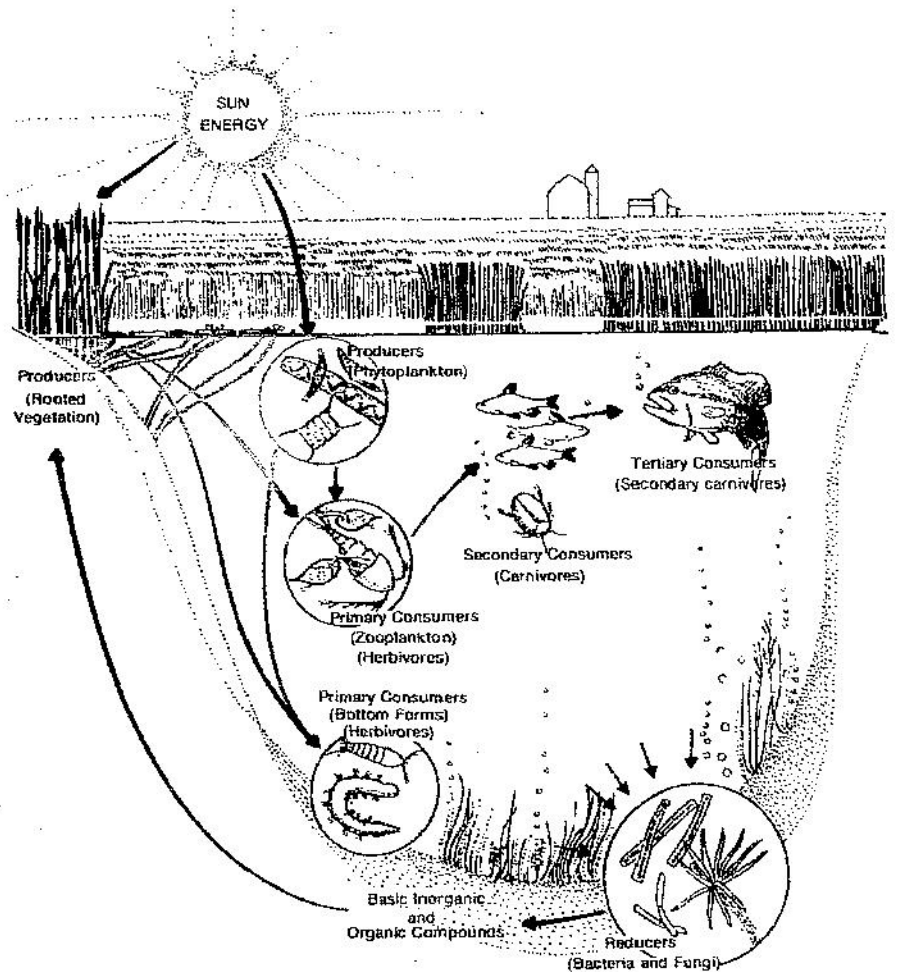


Figure 6-5 A small fresh water pond as an example of an ecosystem. The component parts (producer, consumer, and decomposer) and the nonliving parts (water, dissolved oxygen, carbon dioxide, inorganic salts, and organic compounds) are shown.