

Energy Flow in Ecosystems

Key Words

producers:	organisms that are able to make their own food
consumers:	organisms that obtain energy by eating other organisms
decomposers:	organisms that obtain energy by breaking down dead organisms
food chain:	a model that shows the flow of energy through the organisms in an ecosystem
food web:	a model that shows how food chains overlap in an ecosystem
energy pyramid:	a model that shows how energy is transferred and lost in a food chain

KEY IDEAS

For populations to survive, energy must constantly flow through an ecosystem. The sun is the primary source of energy for living things. Feeding patterns within an ecosystem allow for the transfer of energy to all its organisms. By studying the feeding patterns of the organisms, we discover how energy flows through an ecosystem.

Many types of insects feed on farm crops to obtain their energy. Farmers often spray pesticides to kill the insects. However, pesticides poison drinking water and may harm helpful animals. Recently, farmers have begun to use feeding relationships to control crop-eating insects. They release insects into the environment that feed on the crop-eating insects. For example, in Nigeria, cassava farmers release wasps into the environment to feed on the mealy bugs that feed on the cassava plants.

Obtaining Energy. All organisms need energy to live. The primary source of energy for all organisms is the sun. Energy from the sun enters the ecosystem and is trapped by producers. **Producers** (pruh-DOOS-erz) are organisms that use the sun's energy to make their own food. The food is made through the process of photosynthesis. In photosynthesis, plants make complex molecules from simple ones.

Producers use some of their food to carry out their life processes. The producer stores any extra food. The stored food makes the producer a

source of energy for organisms that feed on the producer. Plants, some protists, and blue-green bacteria are examples of producers.

All organisms that are not producers are consumers. **Consumers** (kuhn-SOO-merz) are organisms that obtain energy by feeding on other organisms. Some consumers eat only producers. Some consumers eat only other consumers. Still other consumers eat both producers and consumers. Humans are consumers. Most people eat both consumers and producers.



1. What is the difference between a producer and a consumer?

Another type of organism in an ecosystem is a decomposer. **Decomposers** (dee-kuhn-POHZ-erz) feed on dead organisms. A decomposer obtains its energy by breaking down dead organic matter. Mushrooms are an example of decomposers and are often found growing on dead trees.

In its feeding process, a decomposer returns some nutrients to the ecosystem. Producers use these nutrients to carry out life processes, such as photosynthesis.

Energy Relationships. Energy moves through an ecosystem by the feeding relationships of its organisms. A **food chain** (food chayn) is a model that shows an ecosystem's feeding relationships. An example of a food chain is:

SUN > GRASS > MOUSE > SNAKE > HAWK

An ecosystem contains many different, overlapping food chains. A **food web** (food wehb) is a model that shows the connections among food chains. In an example of a food web, grasshoppers, rabbits, and mice all eat the producer, grass. Snakes and hawks both feed on rabbits and mice. However, a snake can be eaten by a hawk.

It is important to remember that a food chain shows how energy is transferred through an ecosystem. Energy enters the ecosystem through producers. Some of the energy is passed along to consumers that eat the producers. However, a great amount of energy is lost to the ecosystem in the form of heat.

An **energy pyramid** (EHN-er-jee PIHR-uh-mihd) is a model that shows how energy is transferred and lost in a food chain. Look at Fig. 40-1. You can see that energy is transferred from the grass to the mice to the snake to the hawk. Note that the shape of the pyramid shows that each level contains less energy than the level below. There is more energy to support life in the beginning of a food chain than in the end of a food chain.

Fig. 40-1

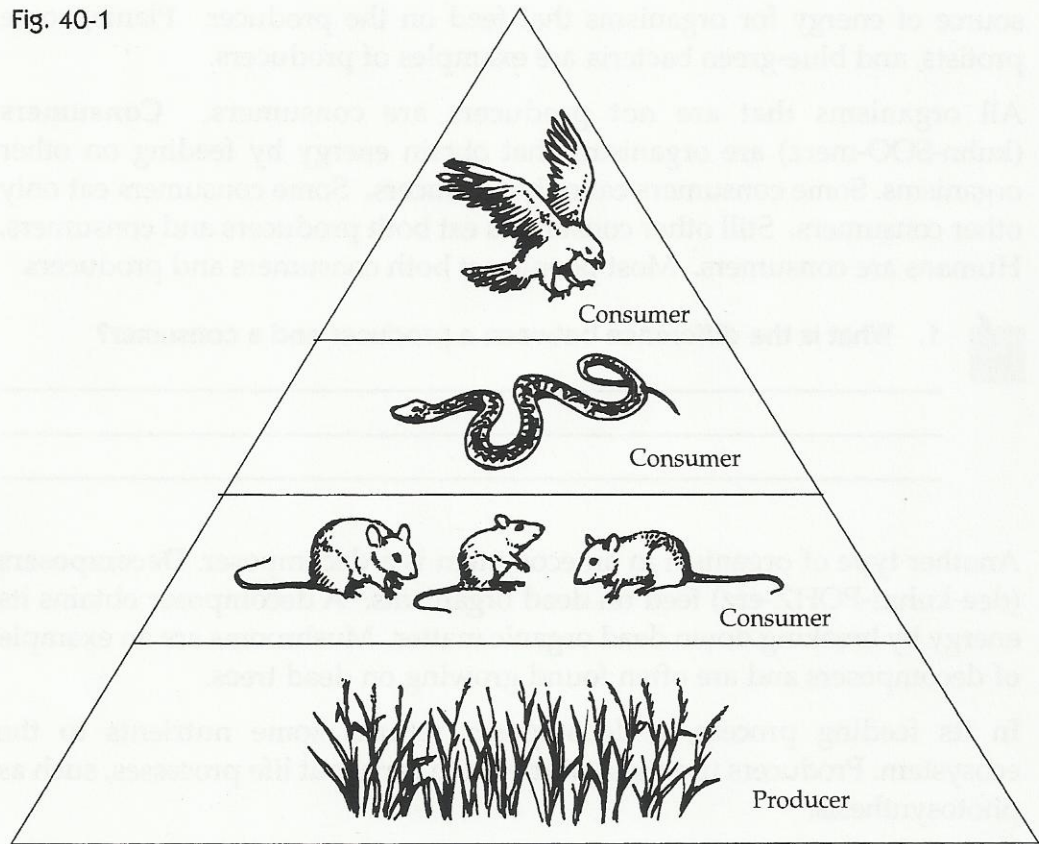
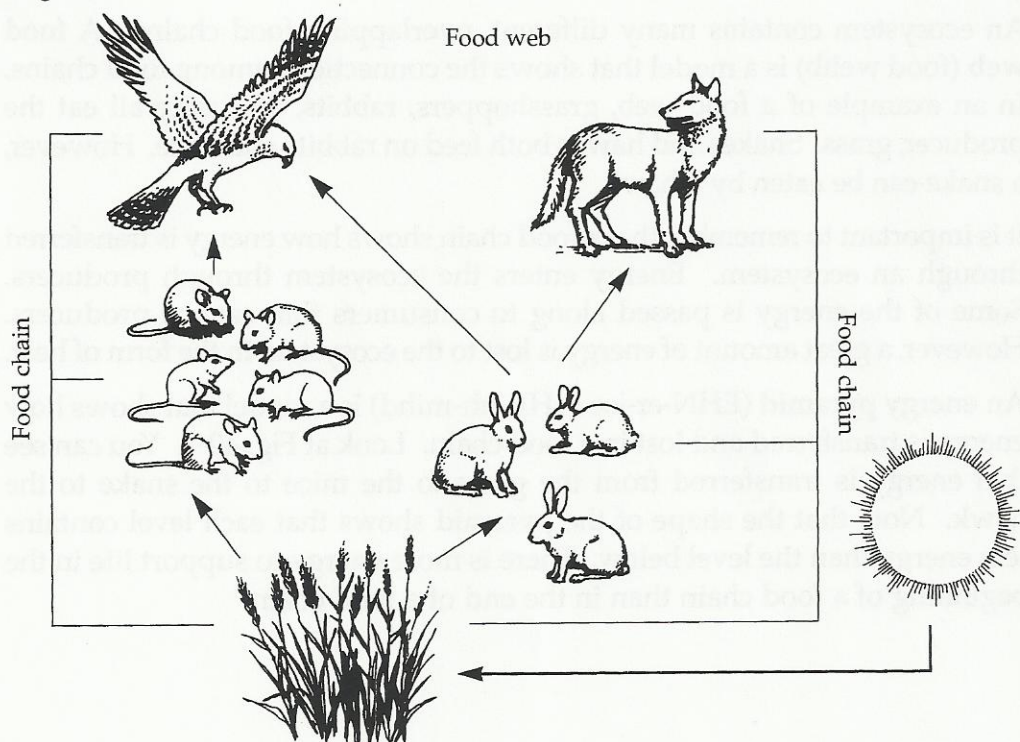


Fig. 40-2 is a model of a food web that shows the connections among food chains.

Fig. 40-2



**TAKE
ANOTHER
LOOK**

Check Your Understanding

Complete the following outline by adding the correct word.

All organisms need (2) _____ to carry out life processes.

Organisms that can make their own food are (3) _____.

Organisms that obtain energy by eating other living things are

(4) _____. (5) _____ feed on dead organisms. The

feeding relationships that exist in a(n) (6) _____ allow for the

flow of energy throughout the system. A(n) (7) _____ is a

model that shows these feeding relationships. A(n) (8) _____ is a

model that shows how food chains are connected. A(n) (9) _____

is a model that shows how energy is lost in a food chain.

10. Could a food chain ever begin with a consumer? Explain.

11. How do decomposers help energy flow through an ecosystem?

12. Why is the amount of energy present at the upper levels of an energy pyramid less than the amount of energy present at the lower levels?

13. Why are there usually more organisms at the bottom level of an energy pyramid than at the top level? _____

