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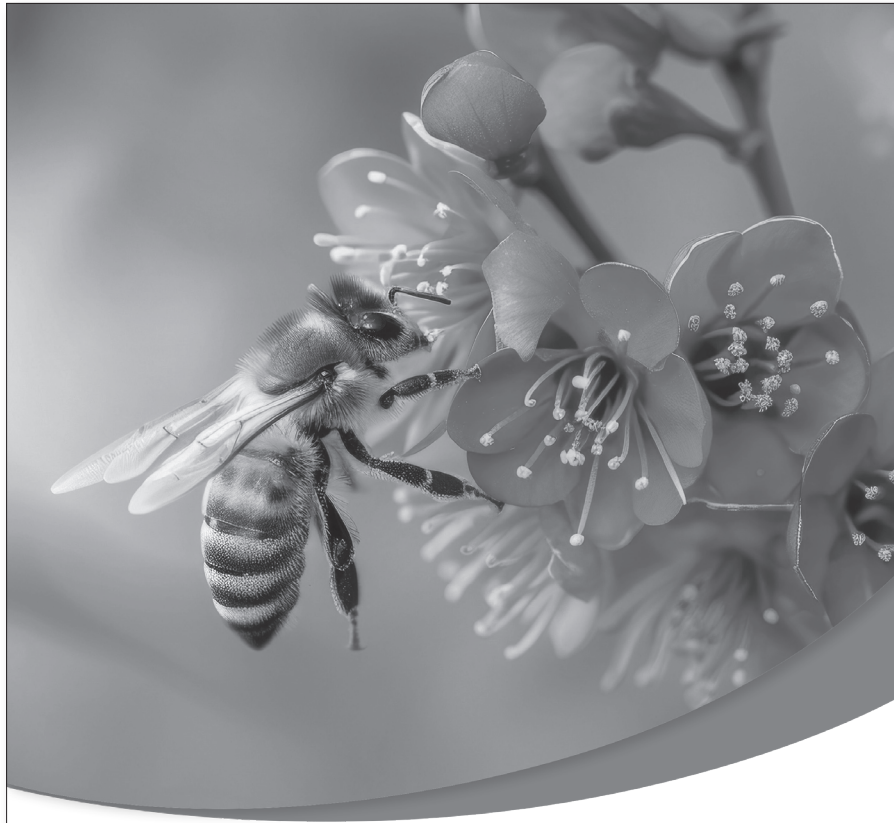
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**GRADE 5**  
**LESSON 19 SAMPLE**

# The Flow of Energy in Ecosystems

**Key Words** • food chain • food web • energy pyramid

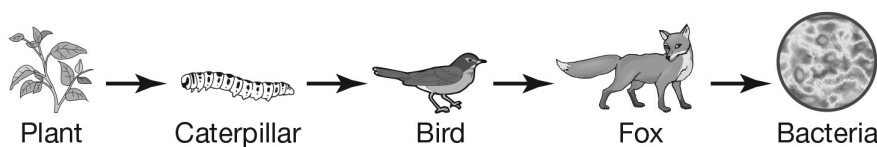
## Getting the Idea

Living things need energy for all the processes of life. They get that energy from their ecosystem. Energy passes from one living thing to the next in an ecosystem. It flows through an ecosystem along many different paths. The amount of energy available for living things changes as the energy moves along these paths.

## Food Chains

Recall that energy is the ability to make things move or change. All organisms need energy to live. A **food chain** is a model that shows the path of energy as it flows from one living thing to the next. Recall that a model is something that represents a real object, event, or process.

Notice that the food chain below begins with a plant. All plants are producers. Remember from Lesson 18 that a producer is a living thing that makes its own food. Producers make food by using the sun's energy. All food chains begin with producers. So the sun's energy plays a very important role in every food chain.



The plant shown above uses the energy of sunlight to make its own food. The food stores energy from the sun. The plant uses most of that energy to live and grow. The plant stores the rest of the energy in its leaves, roots, and other parts.

The caterpillar is a consumer. Remember that a consumer gets energy by eating other living things. When the caterpillar eats the plant's leaves, the energy stored in the leaves goes into the caterpillar's body. The caterpillar uses most of the energy to crawl, grow, and do other things. It stores the rest of the energy in its body.

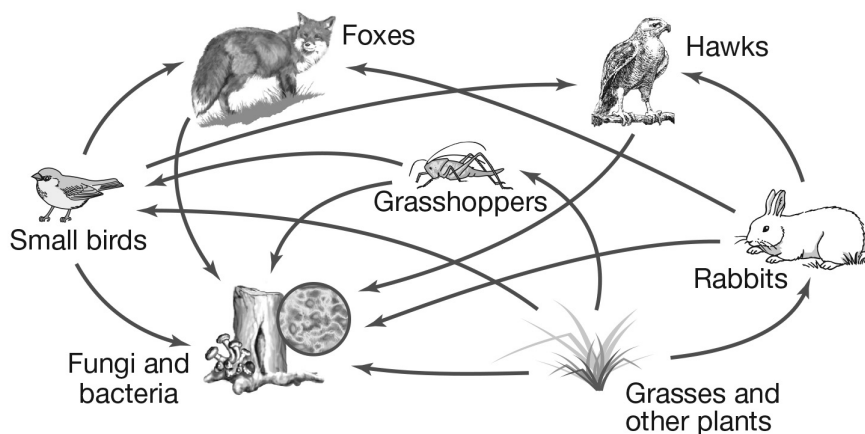
The bird and fox are also consumers. When the bird eats the caterpillar, the energy stored in the caterpillar goes into the bird's body. The bird uses most of that energy to stay warm, fly, build a nest, and do other things. The bird stores the unused energy in its body. Then the fox eats the bird. The fox uses most of the energy from the bird and stores the rest in its body.

Suppose one kind of organism is removed from this food chain. All the other organisms in the food chain will be affected. The other organisms may die or move away to survive. The ecosystem will no longer be in balance and will change.

Say that all the caterpillars in a forest get sick and die. The plants that the caterpillars would have eaten may grow and spread too much. They may use up things such as water that other plants need to live. The birds that depend on the caterpillars for food may die, too. Then the foxes that eat the birds will have less food. The foxes may leave the forest ecosystem to survive. Organisms in other food chains in the forest will also be affected.

## Food Webs

A food chain shows the flow of energy from one living thing to the next in one straight line. But the flow of energy in nature is much more complicated. In an ecosystem, several food chains connect to form a **food web**. See how many food chains you can trace in the food web below.



In the food web above, the grasshoppers are not the only ones that eat the plants. The rabbits and small birds eat them, too. They, in turn, are eaten by both foxes and hawks. The fungi and bacteria get energy from wastes and the remains of the plants and animals after they die.

Put your finger on any animal in the food web on the previous page and follow the arrows backward. You will end up where all food chains and webs begin—with a producer. No matter what an animal eats, the energy in its food began with a producer. The energy that almost all animals get from their food can be traced back to plants. And plants get their energy from the sun.

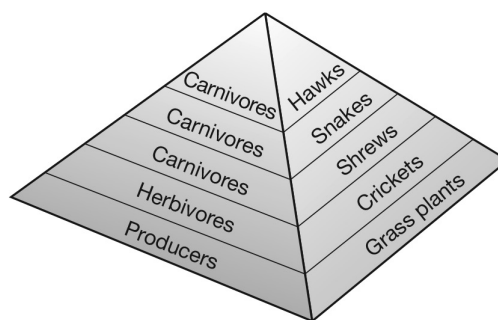
Just as with a food chain, if one kind of organism is removed from a food web, all the other organisms in the food web will be affected. The ecosystem will change. Suppose a fire kills most of the rabbits in a forest. Then the foxes and hawks will have less to eat. They may eat more small birds and other animals, or they may leave the forest to find food.

## Energy Pyramids

Energy moves through ecosystems. It goes from plants to small animals to bigger animals to the biggest animals. But remember that each animal uses most of the energy stored in its food. Each animal stores only part of the energy it gets from the plant or animal it eats.

The diagram below is called an **energy pyramid**. It shows how the amount of energy left for consumers changes as the energy moves through a food chain or food web.

The bottom level of an energy pyramid always contains producers. This level is the widest. It holds the most energy and the most living things. Notice that the levels become narrower as you go up the pyramid. Each higher level contains less energy and fewer living things.



Grass plants use most of the energy they take in. They pass on only a small part to crickets. So there must be more grass plants than crickets. Crickets pass on just a small part of the food energy to shrews. So there must be more crickets than shrews. The same thing happens at each level of the pyramid. At the top of the pyramid, not much energy is left. Only a few hawks can find enough food in an ecosystem.



## Focus on Inquiry

Recall that a model is something that represents a real object, event, or process. For example, the diagram on page 122 is a model. It represents a food web in a real ecosystem and the flow of energy through the food web. In this model, drawings represent living things. Arrows represent the path of energy as it flows from one living thing to the next.

As you have learned, models are often used to show how the parts of something are related. A model represents, but is not exactly the same as, the real thing. For example, the model diagram of the food web is less complicated than the real thing. In a real ecosystem, many more organisms and food chains connect to form a food web. Also, the organisms in the model are much smaller than the real organisms. The model is made of paper and ink, not leaves, bones, and feathers. But the model shows how the parts of the real food web are related to one another.

Recall that not all models are flat like a diagram or drawing. Some models are three-dimensional, like a globe. You can use common objects to make a three-dimensional model of a food chain or food web. Your teacher can help you choose materials from the classroom or can suggest objects to bring from home.

First, think about a food chain or food web of which you are a part. Make a list of the organisms involved. Design a model of that food chain or food web. When you choose your materials, think about the size of your model. You may wish to work with a partner. Have your teacher approve your design first. Then make your model.

How is your model like the real food chain or food web?

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How is your model different from the real food chain or food web?

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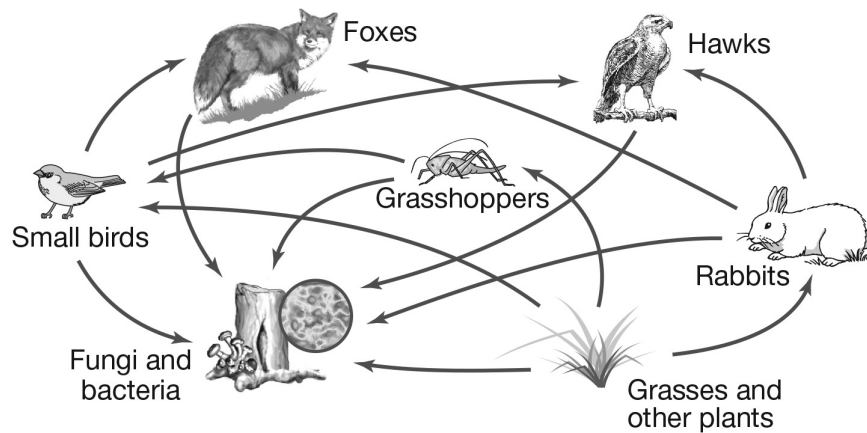
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Present your model to the class. Show how energy flows from one living thing to another. Imagine that one of the organisms was removed. Describe how the food chain or food web would be affected.

### Lesson Review

1. Where would a decomposer be in a food chain?
  - A. at the beginning
  - B. between a producer and a consumer
  - C. between two consumers
  - D. at the end
2. Mice and rabbits eat plants. Hawks eat mice and rabbits. Suppose a disease kills most of the rabbits in a meadow ecosystem. Which of these is *least likely* to happen?
  - A. The hawks will move to another meadow.
  - B. The hawks will eat more mice.
  - C. The mice will not have enough food.
  - D. The mice will have more plants to eat.

3. Look at the model food web again.



- Which list of organisms in the food web includes *only* consumers?
- A. foxes, hawks, fungi
  - B. rabbits, small birds, foxes
  - C. grasses, rabbits, small birds
  - D. grasshoppers, small birds, bacteria
4. Which group of living things makes up the bottom level of an energy pyramid?
- A. consumers
  - B. herbivores
  - C. carnivores
  - D. producers

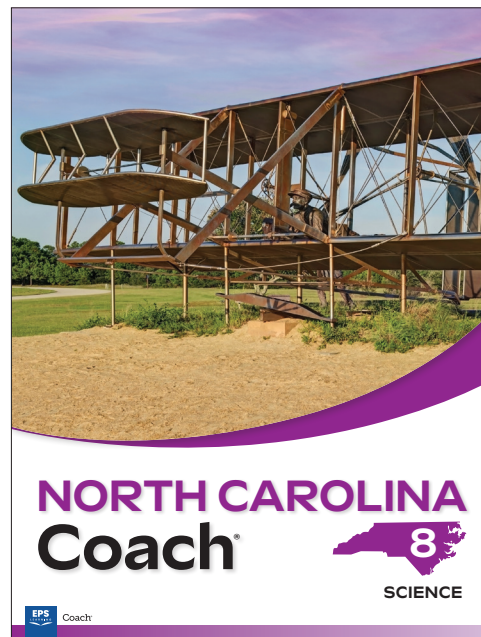


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