

Chapter 46

Ecosystems

*The greatest thing in the world is not so much where we are,
but in what direction we are moving.*
Oliver Wendel Holmes

46-1 Ecology and Feeding Relationships

1. In your opinion, what is the most serious environmental problem we face in the United States?



Objective

You will be expected to define ecology, food chain, food web, producer, first order and second order consumer. Also be able to predict the effects upon a food web caused by changing one variable in the web.

What is Ecology

Ecology is a popular topic these days. The media regularly runs special news accounts about environmental problems. The Environmental Protection Agency is a relatively new governmental group. Ecological concerns are common topics of conversation and make frequent news headlines. Exactly what is ecology? **Ecology is the study of the interactions of organisms with one another and their environments.** For example, in studying a pond, an ecologist would determine which animals, plants and other organisms live in the pond. He or she would study the ways in which each organism depends upon other organisms for food. How organisms depend upon various physical and chemical requirements, such as minerals, oxygen, carbon dioxide and light would be examined. The effect of pollutants upon the organisms would also be studied.

Food Chains

When biologists study a specific area, it is important to know the diet of each animal interacting in that environment. One way of describing these feeding relationships is to describe them as food chains. A **food chain** describes which organism is eaten by which other organism.



The scene at the left shows a typical food chain. Grass is eaten by a rabbit. The rabbit is eaten by the owl. The relationship is also shown as follows:

Grass → Rabbit → Owl

The arrow always points to the animal doing the eating. The grass is known as the **producer**. All green plants are producers because they produce food. The rabbit is known as a **first order consumer**.

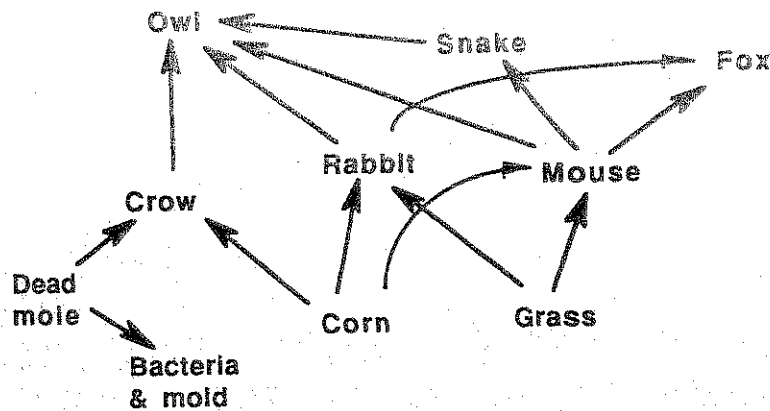
All first order consumers eat producers (plants and algae). The owl is a **second order consumer**. All second order consumers eat (consume) first order consumers. **Third order consumers** eat second order consumers.

2. What is ecology?
3. Define producer, first order consumer and second order consumer.
4. Diagram a food chain relationship for a deer, cougar and huckleberry bush. Identify the producer, first order consumer and second order consumer.

Food Webs

Food chains do not represent the complex interactions between organisms in an environment. The owl does not only eat rabbits. Rabbits eat other plants and other animals eat rabbits. A **food web** shows the interactions between a wide variety of organisms in an environment. Examine the following food web:

Food Web



5. In the preceding food web, name two first order consumers and two second order consumer.
6. Diagram two new food chains in the above food web. Use the arrows and organism names method. Include at least three organisms in each food chain.
7. What does the snake eat? What does the fox eat?

Biologists can use a food web to study the effects of changing or introducing a variable in an environment. If three or four house cats were introduced into the environment described by the preceding food web, a biologist could predict how the interactions between organisms might be affected. Refer to the food web as you study the following predictions: It could be assumed that the cats would eat all the mice. Since mice are the only food for the snakes, the snakes would die. The owls would need to eat more rabbits and crows. The rabbit and crow populations would decrease. The foxes would only have rabbits to eat and they would be in scarce supply. This would decrease the fox population. The foxes could eat the cats. If all of the cats were destroyed, the area might return to normal. The important thing to remember is that changing one thing in an environment can affect most other organisms in the area since all living and non-living things are connected.

8. A logging company cut all large trees needed by owls. This resulted in the death and migration of the owls. Write a hypothesis that would predict the effect of this action upon the other organisms in this area.