

**National Science
Education Standards**

✧ Standard C: *Life Sciences* — Populations and ecosystems.

✧ Standard C: *Life Sciences* — Diversity and adaptation of organisms.

✧ Standard D: *Science in Personal and Social Perspectives* — Populations, resources, and environments.



OVERVIEW

Students introduce themselves as elements of a forest ecosystem and link with the other elements they need to form a forest food web.

OBJECTIVES

Students will:

1. Using pictures, students will construct and describe food webs that include the nonliving elements of a forest ecosystem.

SUBJECTS

Science

VOCABULARY

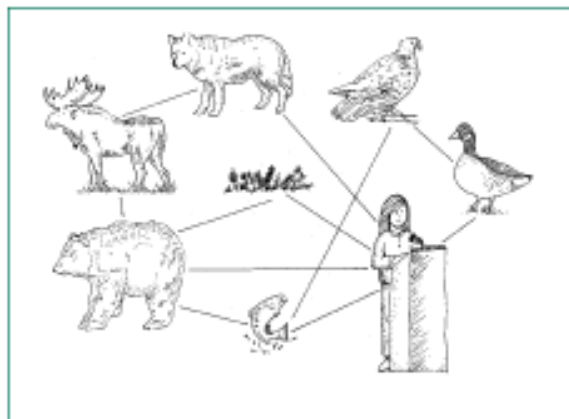
Carnivores, consumers, detritivores; ecosystem, energy, food chain, food web, fungi, habitat, herbivores, minerals, omnivores, producer

TIME

60 minutes

MATERIALS

5X8" notecards; pictures of forest plants and animals from magazines or the internet, lengths of yarn 6 inches to 3 feet long, chalkboard and chalk.



BACKGROUND

A forest is a living community dominated by trees. Each plant in the forest, from tiny mosses to giant trees, has its own specific needs for things like sunlight and moisture. Because environments vary tremendously, a specific location will be better for certain plant species than for others, and those species will grow more abundantly as a result. The most **dominant** tree species in a forest usually determines the forest's appearance and suitability as a habitat for plants and animals. For example, in some forests, large, dominant trees may reduce sunlight and monopolize soil moisture and nutrients, thus limiting the types of plants that can grow beneath them.

While trees and plants are usually its most conspicuous elements, the forest ecosystem also depends on animals. Animals are vital to most plants because they help pollinate flowers and disperse seeds. At the same time, animals such as deer, rabbits, and insects may eat certain plants, greatly reducing their presence. Some insects can substantially damage a forest ecosystem if their numbers get too high. Insect-eating birds play an important role in keeping insect populations in check.

Another way that forest plants and animals are connected is through a web of eating relationships. One primary function of a forest, like any other ecosystem, is to produce and distribute energy. All life depends on the ability of green plants to use sunlight to synthesize simple sugars from carbon dioxide and water. Through this process, called **photosynthesis**, plants take energy from sunlight and make it available to animals. Plant eaters, or herbivores, eat the plants directly; animal or flesh eaters, carnivores, in turn eat both herbivores or other carnivores, thus forming a **food chain**. A food chain is a simplified way of showing energy relationships between plants and animals in an ecosystem.

For example, a food chain of sun-»sunflower seed-»mouse-»owl shows that a seed is eaten by a mouse, that in turn is eaten by an owl. However, rarely does an animal eat only one type of food. A food web describes the interconnection of the food chains in an ecosystem and gives a clearer picture of how plants and animals in an ecosystem are related to each other. In this activity, students will create a "web of life" to depict the relationships among members of a forest ecosystem. This web includes eating relationships (as in a food web), but also shows the various other kinds of relationships found in a forest (shelter, reproduction). The web of life suggests that all living things are connected to all others. No matter how unrelated organisms may seem, they are, in fact, connected.



ACTIVITY

1. Choose the forest ecosystem that you want to investigate. Using your local area might be easiest, however choosing a remote forest would be an excellent research project for your students. Brainstorm the different sorts of organisms that live in the forest. Identify a wide range of organisms such as plants, decomposers, and a variety of consumers. Be sure to include the Sun and the rocks and soil! Create a 'critter card' for each organism—either have students illustrate the organism or find magazine photos.

An example of a list of components for an Alaskan temperate rain forest would be:

COASTAL FOREST

Sunlight
Air
Water
Rocks and soil
Sitka spruce
Red squirrel
Goshawk
Carrion beetle
Bacteria
Gilled mushroom
Bark beetle
Red-breasted sapsucker
Sharp-shinned hawk
Hemlock tree
Sawfly wasp
Chickadee
Truffle
Springtail
Flying squirrel
Trailing raspberry
Moth
White-footed deer mouse
Marten
Polypore or shelf fungi
Protozoans
Lichen
Deer

Grouse
Crossbill
Wolf
Algae

2. Review your students' prior knowledge about **food webs**.

3. Brainstorm the components of an Alaska forest. Encourage students to name a mixture of **nonliving things**, kingdoms of **living things** (*plants, animals, fungi, etc.*), specific organisms (*flying squirrels, woodpeckers, insects, etc.*) and roles of living things (**producers, consumers, etc.**). List whatever they mention on the board.

4. Students divide the list into living and nonliving things. Students then divide the living things into ecological roles (*producer, consumer, herbivore, carnivore, omnivore, and detritivore*).

5. Explain the classification of living things by their ecological roles is important in understanding how a forest **ecosystem** works. *If an ecosystem is to survive* changes, then all of the ecological roles must be conserved. For example, if an herbivore disappears then the carnivore that eats *it will be affected*.





6. Distribute the critter cards. If few students are doing this activity, students hold more than one card from the same ecological role.

For example, one student could hold all of the nonliving cards, or all the producer cards.

7. Students circulate around the room and introduce themselves to each other. They give the name of the item they represent, their type (nonliving, producer, consumer), and what they eat or use to survive. *For example,* “I am the minerals in rocks and soil. I am nonliving. I do not eat;” or “I am a spruce tree. I am a producer. I make my own food using sunlight, water, minerals, and air;” or “I am a moose. I am an herbivore that eats twigs of birch, willow, and other plants.”

8. Whenever a student meets something that it eats, that eats it, that uses it (in the case of producers), or that is used by it (nonliving things), those students should join together by holding pieces of yarn.

Students who are connected by yarn move together as a group. Students in groups can introduce themselves individually, or the top consumer in each group can do the introductions. Other students will join this group whenever appropriate. *Several separate* groups will form at first, but eventually, the whole class should become interconnected.

9. Congratulate the class on becoming a forest food web! Explain that a food web contains all the **food chains** of an ecosystem.

10. Ask what would happen to the ecosystem if one of the organisms in the food web was removed. Tug on one player as if to remove her. Tell her to pass the tug on to all the organisms she connects. Ask those who feel the tug to raise their hands. Discuss the effects. If desired, repeat this step by removing different kinds of organisms. Which causes the most effects – removal of a producer, herbivore, carnivore, or detritivore?

ASSESSMENT

1. Students describe the ecological role of producers, consumers, herbivores, carnivores, detritivores.
2. Students draw a food chain of at least 4 living things from the forest environment.

CREDIT

This activity is adapted with permission from the Alaska Wildlife Curriculum (AWC). AWC is a program of the Alaska Department of Fish and Game. Go to <http://www.wildlife.alaska.gov/education/wilded/awc.cfm> or <http://www.adfg.state.ak.us/> for more information about this award-winning environmental education curriculum.

