

Web of Life

Activity 45

By conducting research and simulating a food web, students will take a close look at a forest ecosystem and discover ways that plants and animals are connected to each other. While this activity focuses on forests, you can also use it to study other ecosystems, such as oceans, deserts, marshes, or prairies by substituting the appropriate information.

Levels

Grades 4-8

Subjects

Science, Language Arts,
Visual Arts

Concepts

Plant and animal populations exhibit interrelated cycles of growth and decline. (3.2)
Ecosystems possess measurable indicators of environmental health. (3.4)

Skills

Researching, Discussing,
Identifying Relationships and
Patterns, Predicting



Differentiated Instruction

Higher Order Thinking,
Paired/Cooperative Learning,
Prior Knowledge Skills



Graphics Software,
Internet Resources

Materials

200 feet of string or yarn,
resource materials about forest
plants and animals, folders
(optional)

Time Consideration

Preparation: 30 minutes
Activity: two 50-minute
periods

Related Activities

*Schoolyard Safari; Field, Forest,
and Stream; Are Vacant Lots
Vacant?; Planet Diversity;
Dynamic Duos*

OBJECTIVE

- Students will understand that ecosystems are made up of interdependent organisms and other components.

ASSESSMENT OPPORTUNITIES

- Have students select a local bird, fish, reptile, amphibian, or mammal, and find organisms it depends on and organisms that depend on it.
-  Have students write about a local invasive species (plant or animal) that is causing a negative impact on the local environment. Have them research to find when and how the organism came to the area, what problems have been created by its being there, and what is being done to control it.

BACKGROUND

A forest is a complex living system. While its appearance is often dominated by trees, a healthy forest is composed of many different animals and plants that interact with and depend on each other.

One way that forest plants and animals are connected is through the energy from food. A 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 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*plant seed* mouse*owl shows that a seed is eaten by a mouse, which in turn is eaten by an owl. However, in reality it is rare for an animal to 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.

Plants and animals are interdependent in other ways besides food. For example, plants may depend on animals for pollinating flowers, dispersing seeds, and keeping insect populations in check. And animals may depend on plants for shelter and to help modulate the amount of moisture and sunlight in their environment.

In this activity, students will create a “web of life” to show how all living things are connected to others. No matter how unrelated organisms may seem, they are, in fact, connected.

GETTING READY

(Optional) For each student, begin a folder of information on a specific forest animal or plant. Folders might include pictures you cut from magazines or calendars, and articles or other information you glean from nature journals or other sources. If possible, select a variety of plants and animals so folders include at least two of each type: mammal, arthropod (insect or spider), bird, reptile, amphibian, trees, and other plants. *Animal possibilities* include bark beetle,

bat, beaver, bear, box turtle, butterfly, chipmunk, deer, earthworm, field mouse, red fox, tree frog, grasshopper, king snake, lizard, mosquito, hawk moth, opossum, barred owl, rabbit, raccoon, skunk, snail, red squirrel, tick, or woodpecker. *Plant possibilities* include azalea, clover, columbine, cottonwood, honeysuckle, lichen, maple tree, Douglas fir, paintbrush, pine tree, poison ivy, shelf fungus, or violet.

 Students will need access to resource materials or the Internet for information about forest plants and animals. Arrange time in the library or media center.

DOING THE ACTIVITY

 **1.** Ask students to work in pairs or teams to brainstorm all the components they think would be necessary for a healthy forest. Invite them to share their ideas with the rest of the class.

2. Have each student select a forest organism to study. (Or choose one of the folders prepared earlier.) Make sure the students select a variety of plants and animals, including mammals, insects, birds, reptiles, trees, and other plants.

3. Instruct students to collect the following information about their chosen organism.

For Animals:

- Where within the forest does this animal live?
- What does this animal eat?
- What animals prey on it?
- What other animals and plants live in the forest with this animal?
- In what ways does this animal depend on these other animals and plants?



- How does the animal influence its environment?

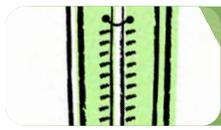
For Plants:

- Where within the forest does this plant live?
- What animals eat this plant?
- What other plants and animals live in the forest with this plant?
- How does this plant depend on these other plants and animals?
- How does this plant influence its environment?

4. After students have completed their research, have them make a nametag for their forest plant or animal, including a picture. Have students sit on the floor in a circle with their nametag. Introduce the web of life concept (see Background).

5. Starting with one “plant,” ask that student to hold the end of a ball of string, and to name another organism in the circle with which that plant interacts (for example, is eaten by or depends on). Pass the ball to this second student. Ask the second student to name another organism with which his or her organism interacts. This process will continue until each “organism” is linked to the ecosystem, and the ball is returned to the first student.

6. Now, have students slide back until the string is taut. Tell students to keep still. But if they feel a tug, they should tug in response. When everyone is still, tell the student holding the original end of the string to gently begin tugging. Keep reminding everyone that if they feel a tug, they should tug in response. Through this mechanism,



vibration will spread through the food web until everyone is tugging and the whole web is shaking.

7. Ask students how the tugging demonstration might illustrate what happens when one of the links in an ecosystem is damaged through natural or human-made stress. (The rest of the ecosystem feels the effects.)

8. Ask students to pick one organism that seems less important than the others, and have it drop out of the web. Ask if any other organisms should drop out because they depended on that organism. After one or more have dropped out, ask the students again to identify an organism that seems less important, and repeat the procedure. Continue playing for a few more rounds; then ask the following questions:

- What happens when we remove a link in the forest ecosystem? (Organisms that depend on it are affected. The web itself changes shape.)
- Were the changes more dramatic when the system was composed of many parts or when it had fewer parts? (fewer)
- What can we say about the relationship between how many parts the system has (its complexity or diversi-

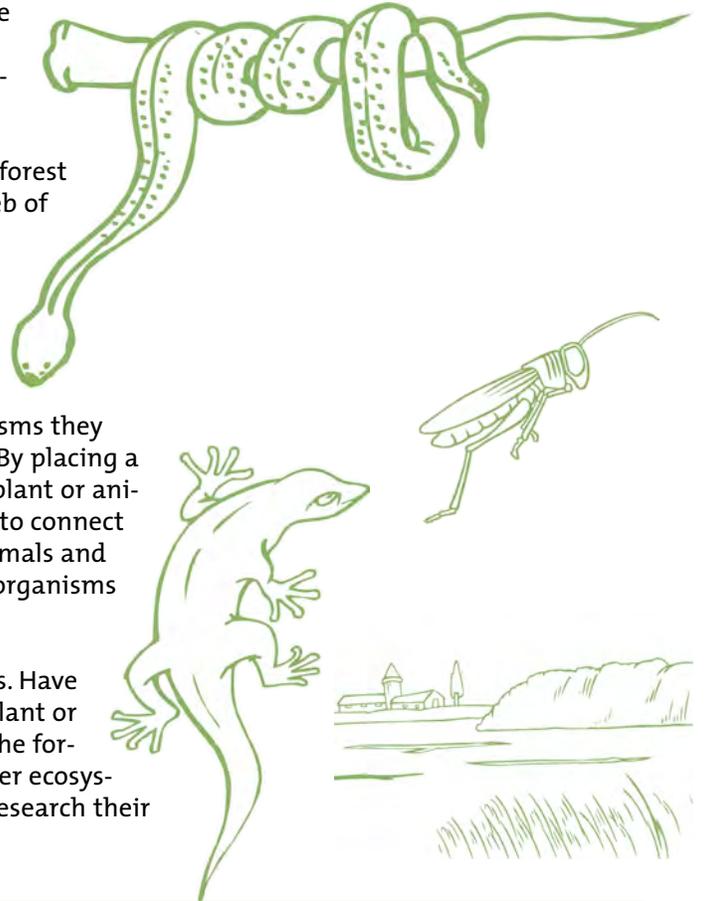
ty) and how stable it is? (In general, complexity makes it more stable.)

- What would happen if humans were introduced to the web?

Enrichment

-  Have students use concept mapping or graphics software to illustrate the web of life using plants and animals the students studied in the activity.
- Help students create a forest mural showing the “web of life.” Have them draw hills, valleys, streams, and other features on sheets of cardboard or poster paper and then add photos or drawings of the organisms they studied in the activity. By placing a push pin next to each plant or animal, they can use yarn to connect organisms to other animals and plants with which the organisms directly interact.
- Make food web mobiles. Have each student select a plant or animal that is part of the forest ecosystem or another ecosystem. Students should research their

organism’s place in the food web and make a cutout of all the food web organisms from construction paper and colored markers. Using a clothes hanger and thread to hang cutouts in the proper arrangement, students can construct a mobile that represents their food web.



READING CONNECTIONS

- Carrighan, Sally. *One Day on Beetle Rock*. Heyday Books. 2002. In the setting of Sequoia National Park, the story describes the lives of the animals that live under and around a granite outcropping. Readers gain a sense of being right there observing the interactions between predator and prey. Grades 4-8. ISBN: 1890771538.
- Cherry, Lynne. *The Great Kapok Tree: A Tale of the Amazon Rain Forest*. Harcourt. 1990. This inspired look at what the Kapok tree means to the creatures that live in it, and what rain forests mean to the world’s ecology, was at the forefront of the ecological movement ten years ago and continues to resonate profoundly with children everywhere. Grades 4+. ISBN: 0152026142.

Mason, Cherie. *Everybody’s Somebody’s Lunch*. Tilbury House. 2002. A young girl learns about predators and prey in the animal world when her cat, Mouser, is killed by a coyote. Grades 2-6. ISBN: 0884481980.

McLimans, David. *Gone Wild: An Endangered Animal Alphabet*. Walker Books for Young Readers. 2006. Colorful illustrations transform each letter into a work of art. An information box identifies each animal’s habitat, range, threats, and status. Grades K-5. ISBN: 0802795633.

Reed-Jones, Carol. *The Tree in the Ancient Forest*. Dawn Publications. 1995. The story of an old fir tree and the remarkable web of plants and animals living around it. Beautifully illustrated. Grades 3-6. ISBN: 1883220319.

Relf, Patricia. *Magic School Bus Gets Eaten: A Book About Food Chains*. Scholastic. 1996. A forgotten assignment, a soggy shoe, and a tuna fish sandwich set the scene for another Magic School Bus adventure, as Arnold and Keesha travel to the depths of the ocean and end up in the belly of a tuna. Their excursion teaches them about the food chain. Grades K-4. ISBN: 0590484141.

Smith, Howard. *Small Worlds: Communities of Living Things*. Scribner. 1987. Describes a number of small self-contained communities, including a sand dune, tidal pool, old barn, and vacant lot, and examines the ways in which the plants and animals interact. Grades 4+. ISBN: 068418723X.

