DOCUMENT RESUME

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ABSTRACT

This document features a lesson plan in which students work in teams to act out different ecosystem services, describe several free services that biodiversity provides to human, and explain how these services make life on earth possible. Samples of instruction and assessment are included. (KHR)

15 Biodiversity Performs!

SUBJECTS

science, art (drama), language arts

SKILLS

gathering (reading comprehension), analyzing (identifying patterns), applying (creating), presenting (acting)

FRAMEWORK LINKS

2, 8, 10, 11, 12, 25, 28, 33

VOCABULARY

atmosphere, **decomposers, ecosystem, ecosystem services,** *erosion,* **photosynthesis, pollination,** *population, respiration, sediments,* **wetland**

TIME

one session

MATERIALS

one set of "Biodiversity Performs!" cards (pages 75–78 in the Student Book)

CONNECTIONS

After "acting out" ecosystem services in this activity, let your students perform a series of simulations to find out more in "Secret Services" (pages 226–229). To learn about other ways that humans benefit from biodiversity, try "Something for Everyone" (pages 90–93), "Ten-Minute Mysteries" (pages 98–101), "The Culture/Nature Connection" (pages 214–225), or "Diversity on Your Table" (pages 230–237).

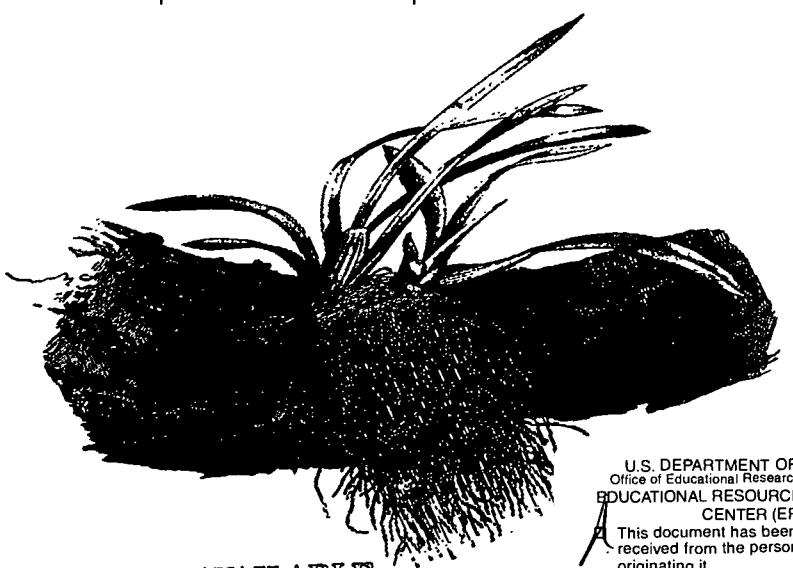
AT A GLANCE

Play a charades-like game to learn about some of the "free" services that ecosytems provide.

OBJECTIVES

Work in teams to act out different ecosystem services. Describe several "free" services that biodiversity provides to humans and explain how these services make life on Earth possible.

Whether you realize it or not, ecosystems and the species within them are working around the clock to perform many jobs that help make human life possible and more livable. Much of the work ecosystems do is difficult to watch or see, so it's easy to take these "secret services" for granted. Just remember, while you're eating, sleeping, working, driving, or watching TV, forests are helping to clean the air, oceans are regulating the climate, and wetlands are helping to purify water, minimize storm damage, and perform flood control. In this activity, your students can learn about some of the secret services that ecosystems and the species within them provide by creating charade-like performances for their peers.



World Wildlife Fund

Before You Begin

Make a copy of the "Biodiversity Performs!" cards (pages 75–78 in the Student Book) and cut the cards apart.

What to Do

1. Introduce ecosystem services.

Begin the activity by asking students to give examples of ecosystems (such as deserts, temperate forests, wetlands, coral reefs, and so on). If your students aren't familiar with the word "ecosystem," you might want to do an introductory activity that focuses on what an ecosystem is (see Resources on page 196). You can also lead a discussion that helps them understand that an ecosystem is a community of plants, animals, and other organisms that interact with each other and the physical environment and that are linked by energy and nutrient flows. The soil beneath a fallen log, a salt marsh in an estuary, and the Brazilian rain forest are all examples of different-sized ecosystems.

Explain that ecosystems as a whole and the individual species that live within them perform many functions. Through their day-to-day activities aimed at their own survival, individual organisms end up performing jobs that help make life more livable for us. And the combined efforts of many species in an ecosystem can have effects that also help make our lives more livable. To help illustrate this idea, ask your students to explain how plants "help" the environment (produce oxygen, help absorb carbon dioxide, help reduce erosion, and so on). The students' answers will begin to underscore the important services that ecosystems and the species within them provide. Be sure to emphasize that species don't perform certain activities to make the planet a better place to live. Rather, the actions that organisms take in order to survive can have beneficial side effects for other living things.

2. Set the stage.

Divide the class into seven groups. Explain that each group will be given a card that describes one of the free services that ecosystems and species provide. They will have time to discuss and practice a performance that gets across the idea described on the card. The audience (members of the other teams) will need to try and figure out what the service is and how it works. Emphasize that the performers should act out the secret service rather than the words on the card. Some groups may need to divide their performance into several segments in order to get the full message across. Students may not use words during their performance, but if you would like to make the game less challenging, they can use sound effects and props. Group members can individually imitate an animal, plant, or other object, or the entire group can form an organism or object.

3. Set the students loose.

Give each group a "Biodiversity Performs!" card and allow the groups plenty of time to develop and practice their performances. When the students are ready, call one group at a time to perform. Make sure you know which card each group has. You will judge whether a student's guess is a correct answer. You may want to make a list of possible answers on the board. Let the performers finish their skit before the audience guesses. If the students can't guess correctly, you may want to provide additional clues as the performance is repeated. When you feel a correct answer has been given, choose a student to read the card to the class. You may also want to go over some of the services as a group to be sure everyone understands how each service works.

4. Summarize the activity.
Remind your students that whatever we call the important jobs that ecosystems and their species provide—"secret services," "ecosystem services," "nature's services," or "free services"—those services are happening around the clock and help make our lives more livable. Ask your students to explain any connections they see between the services and biodiversity. *(Biodiversity is the diversity of life on Earth—including genes, species, and ecosystems. It's because of Earth's natural diversity that we enjoy these benefits. The free services that ecosystems and species provide make life on Earth possible and are, some people feel, one of the most important reasons we need to protect biodiversity.)*

WRAPPING IT UP

Assessment

Upon completion of the game, have each student summarize the services presented in the various skits and how those services occur in the local community.

Unsatisfactory- The student does not participate with the group in the presentation. The student is unable to summarize services or make connections to the local community.

Satisfactory- The student participates in the presentation. The student is able to summarize most of the services presented and can make connections to the community.

Excellent- The student is centrally involved in the group presentation. The student summarizes all the services presented and clearly explains how the services occur in the local community.

Portfolio

There is no portfolio documentation for this activity.

Writing Ideas

- Based on the service they acted out for the class, have the students write a script with dialogue among at least three characters.
- Have the students select one of the ecosystem services portrayed in the skits and, using a metaphor or analogy, write a description of the service.

Extensions

- Challenge your students to work in groups and develop a list of additional services that ecosystems and species provide. Then, play charades again using the students' own examples.
- Have your students create an "ecosystem services" bulletin board for a local library or other community center.

Resources

Earthwatch: Earthcycles and Ecosystems by Beth Savan (Addison-Wesley, 1991).

Ecology for All Ages: Discovering Nature Through Activities for Children and Adults by Jorie Hunken (Globe Pequot Press, 1994).

Nature's Services edited by Gretchen D. Daily (Island Press, 1997).

The Random House Book of How Nature Works by Steve Parker (Random House, 1993).

Web Sites

Visit the National Museum of Natural History's Web site, "Welcome to Exploring Ecosystems Online," at <www.bsu.edu/teachers/academy/ecosytems>.

Visit the Bureau of Land Management's Web site, "Understanding Ecosystem Management," at <www.blm.gov/education/ecosystem/classroom.html>.

Michael Durham/ENP Images

"The humblest of beetle species is still the product of a considerably longer creative process than any painting, statue, or piece of music . . . the natural habitats being destroyed today and the species lost are crucial to our spiritual well-being, in addition to being vital to the Earth's long-term health."

–Andrew P. Dobson, professor, writer

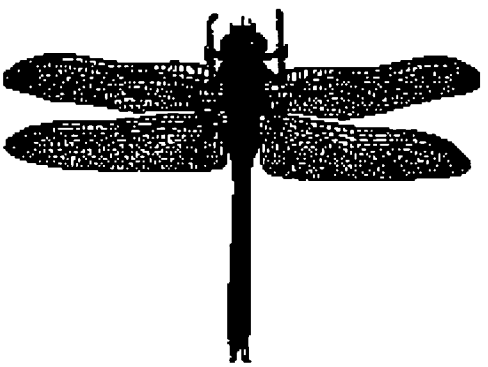
Cut out the cards below and give one card to each group.

INSECTS, BIRDS, AND BATS HELP POLLINATE.

In their daily search for food, bees and other insects as well as some birds and bats, end up moving pollen from plant to plant. While stopping at a flower for a sip of sweet nectar, the animals get dusted with pollen. When they fly to another flower, some of that pollen brushes off and the pollinated flowers are then able to make seeds. Pollination not only helps wild plants but is also important for crop plants. Most of our crops depend on these natural pollinators.

SOME SPECIES HELP CONTROL POTENTIAL PESTS.

Predators often help keep populations of potential pests in check. For example, birds, bats, and dragonflies are responsible for eating millions of insects that might otherwise gobble up crops or give us itchy bites.



SOME ORGANISMS DECOMPOSE ORGANIC MATTER.

Some living things, called decomposers, get the food they need by feeding on dead things. Decomposers not only keep dead organisms from piling up, they also make the nutrients in the dead organisms available to living plants and animals. Any nutrients they use to build their own bodies become available to other animals that eat them. Also, the nutrients that pass through the decomposers as waste end up in the soil in simpler forms that plants can absorb with their roots. Imagine what life would be like without decomposers!

WETLANDS HELP CLEAN WATER.

If you poured dirty water through a filter, you would expect cleaner water to come out. A similar thing happens in nature when water passes through a wetland. By slowing the flow of dirty water as it goes by, the vegetation growing in a wetland traps some of the pollutants and sediments. But plants aren't the only living things that clean water. Aquatic animals, such as oysters, that pump water through their bodies to filter out food for themselves also end up cleaning the water they live in.

Wetlands are areas that have waterlogged soils or are covered with shallow water either all the time or off and on. Freshwater and salt marshes and swamps, as well as bogs, are all wetlands.

freshwater marsh

bog

salt marsh

mangrove swamp

PLANTS HELP CONTROL EROSION AND FLOODING.

Have you ever seen rainwater rushing down a hillside that has little plant cover? With little vegetation (plant cover) to slow it down and absorb it, water sweeps away soil at a rapid rate. Plants slow down water, allowing the soil to soak it up. So plants help prevent both erosion and flooding.

hillside without plants

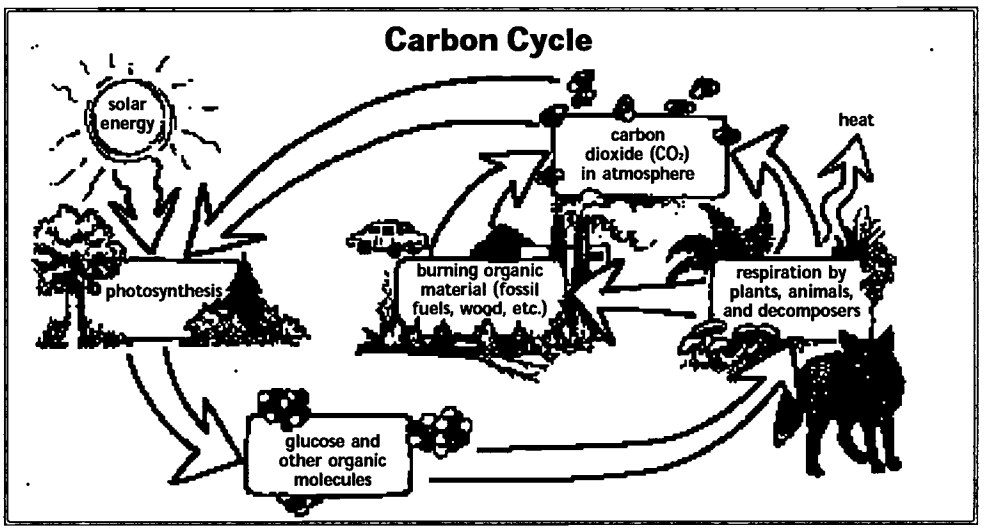
hillside with plants

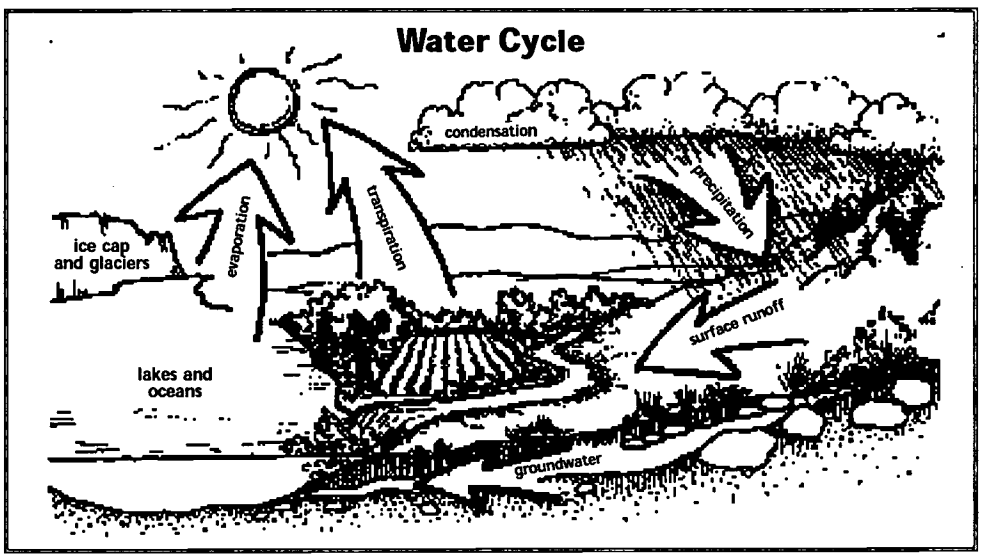
PLANTS CONVERT THE SUN'S ENERGY INTO ENERGY WE CAN USE.

Although the first warm days of spring may make you feel energetic, we humans (and other animals) can't get the energy we need to fuel our activities directly from the sun. Instead we rely directly or indirectly on plants for energy. Green plants capture the sun's energy and convert it to starch and sugar through a process called photosynthesis. They store some of the energy in their leaves and stems. When animals eat plants, the animals get the energy that the plants stored and use it or store it. And when animals eat animals that ate plants, they then get the energy passed along. Without green plants we'd all go hungry!

PLANTS AND ANIMALS WORK TOGETHER TO HELP MAINTAIN THE BALANCE OF GASES IN THE AIR.

Plants and animals continuously cycle gases among themselves, the soil, and the air. For example, plants take in carbon dioxide from the air and then release oxygen into the air during photosynthesis. Animals, including humans, use oxygen in respiration and release carbon dioxide into the air. The carbon cycle is even more complicated because plants also respire, using oxygen and releasing carbon dioxide. Water vapor and other gases, such as nitrogen, also cycle from the atmosphere to animals and plants, to the soil, and back again. Without living things, the air just wouldn't be the same!





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