

Web of Life

Teacher Guide

Grade Levels: 4 - 5

Program overview

The instructor will discuss the basic concepts and definitions of ecosystems with the students. The class will construct a simple food chain as they are learning about how energy travels through an ecosystem. Then students will work with plant and animal specimens in small groups. The class will then collect data and graph the results. The program will end with an ecosystem role playing game.

Objectives/Student Learning Outcomes

After participating in this program, students will be able to

- Discuss the different components of ecosystems and communities.
- Determine the possible roles and relationship an organisms may have in an ecosystem.
- Understand how an ecosystem works and why all members of that system are important and necessary.

Background

Ecosystems are all around us. Humans are part of **ecosystems**, and are connected to nature through ecosystems. When you wash your hands at the sink, the water goes down the drain, through the sewer, to the water treatment plant, and back into the ecosystem through a river or lake. The water we drink came from a well, river, or lake before it was treated at the water station then pumped into our homes. Understanding how ecosystems work and process both living and nonliving matter is critical for all students. **Living** or **nonliving**, our resources come from nature.

Life on earth continues because plants can use light energy from the sun and combine it with water and carbon dioxide to form sugar, a stored food resource available to the plant and anything that eats a plant. This basic ability, to transform light energy into sugar energy, is what drives ecosystems. All other living things depend on plants, either directly or in indirectly.

Plants are called **producers** because they produce sugar, or food. They also store other important nutrients in their leaves and stems that they have removed from the soil through their root systems. When an animal, or **consumer**, eats or consumes a plant, it

P.A.S.S.

GRADE 4

Science Process – 1.2, 2.1, 3.1,
4.2, 4.3, 5.1, 5.3, 5.4
Life Science – 3.1, 3.2

GRADE 5

Science Process – 1.2, 2.1, 3.1,
4.2, 4.3, 5.1, 5.3, 5.4
Life Science – 2.1, 2.2

takes the sugars and nutrients into its body. When another animal eats the first one, those nutrients and sugars are transferred to the body of the second animal. This is a **food chain**: energy and nutrients moving from one organism to the organism that eats it.

Consumers can be further divided, depending on what they consume. An animal that eats only plants is a **herbivore**, or plant eater. An animal that eats both plants and animals is an **omnivore**, or everything eater. An animal that eats only (or mostly) other animals is a **carnivore**. A sunflower is a producer; a butterfly who eats the sunflower nectar (or the leaves as a caterpillar) is a herbivore; a cardinal who eats both sunflower seeds and butterflies (or caterpillars) is an omnivore; a hawk who eats a cardinal is a carnivore.

Dead matter is another problem. **Decomposers** are organisms that consume dead matter and decompose it back to basic elements and small particles that are then in the soil or other parts of the ecosystem and readily available for plants to absorb them again. The basic workings of the decomposition process can be observed in a back yard compost pile.

At the Museum

The Hall of Natural Wonders features four ecosystems: an upland stream, an oak-hickory forest, a limestone cave, and a mixed-grass prairie.

Discussion questions:

- Ask students to look for the biotic and abiotic members of the ecosystem. Have students identify

Vocabulary

Adaptation - a physical characteristic or behavior that enables an organism to survive or reproduce more successfully than it otherwise would in the conditions of a particular environment; a special feature of a living thing that makes it better suited to its particular way of life.

Carnivore - meat eater; any animal that eats only animal matter, a second or third-order consumer.

Community- The living part of an ecosystem; any relationship in nature that involves plants and animals living together and interacting with one another in a particular environment..

Consumer - any organism that depends directly or indirectly on food producing plants; any organism that consumes other organisms.

Decomposers - a living thing that obtains food by breaking down the remains of dead organisms.

Ecosystem- all of the living and non-living things interacting in a particular area.

Environment - all the living and non-living factors that actually affect an individual organism at any point in its life cycle.

First-order consumer - an animal that eats plants, or producers, directly (herbivore).

the types of living things that they see in the exhibits.

- Which kinds of organisms are producers? Which are primary consumers, or herbivores? Which are secondary consumers, or omnivores? Which are tertiary consumers, or carnivores?
- What kinds of foods do these animals eat?
- Can you locate a decomposer in each ecosystem or habitat? How large or small is this organism?

Writing prompts:

- Choose one of the four different habitats in this gallery. Follow a food chain from the producers through the tertiary consumer. You may need to read the exhibit labels for more information about the organisms and their diets.
- Choose an animal in one of the exhibits. What do you think a day in this animal's life might be like? Where does it live? What does it eat? How does it avoid predators?
- Which ecosystem represented in this gallery is your favorite? Why?

Food chain - transfer of energy through an ecosystem through the action of food producers, food consumers, and decomposers. Food chains interact to create a complex food web.

Habitat - the physical place where an animal lives; it provides all of the resources needed for life.

Herbivore - an animal that eats only plants, a first-order consumer.

Niche - role or job of an organism in the environment; its activities and relationships in the community.

Omnivore - everything eater; an animal that eats both plants and animals, usually a second-order consumer.

Predator - an animal that kills and eats other animals.

Prey - an animal that is killed and eaten by another animal.

Producer - any green plant that makes its own food using chlorophyll and light energy.

Resources - substances or objects required by an organism for normal maintenance, growth, and reproduction.

Second-order consumer - an animal that eats animals that eat plants (omnivore, carnivore).

Third-order consumers - an animal that eats second-order consumers (carnivore).

Supplementary/Enrichment Activities

Science

1. **What kind of consumer are you?** Have the students look at their teeth in a mirror.
 - What kinds of teeth do they have?
 - What do they do with their front versus their back teeth?
 - Make a list of the types of food the students like to eat. Favorite foods, or typical lunch time meals. You can have the class make a favorites graph, say 10 pizza lovers, two hamburger fans, one pad thai eater, three spaghetti fans.
 - Look at the ingredients used to make these foods, or you can just pick the class favorite, pizza. Have the kids break down the whole food into its parts, crust, sauce, cheese, and toppings.
 - Write each ingredient for the crust on a separate small piece of paper, flour, sugar, yeast, water.
 - Write your ecosystem categories on several large pieces of paper: living and nonliving, then producer, consumer, decomposer.
 - Students should sort their ingredients to the correct category. Wheat is a plant, and should go in the producer category. For example: Yeast is a fungus and should go in the decomposer category. Cheese is made from cow milk, cows are herbivores, so cheese goes in the consumer category.
2. **Compost your lunch!** It's easy to make your own compost pile. You'll need a small area on your school grounds, or you can purchase (or get one donated to your school) a small compost bin.
 - Layer your compost. Alternate green and brown matter. Green matter is living stuff, such as left overs from lunch, grass clippings, weeds your class pulled from the outdoor classroom. Brown matter is dead stuff, such as tree leaves and coffee grounds. When adding food to the pile, make sure you cover it up with an inch or two of old compost so the smell will not attract animals.
 - Only vegetable matter. Compost piles are vegetarians! Meat and cheese will rot and stink up your compost. Healthy compost should not be stinky
 - Water your compost. Keep it from getting too dry. If it hasn't rained in a while, give your compost a drink to keep those bacteria and fungi hard at work, breaking down your scraps into natural fertilizer.
 - Try placing some small pieces of things in your compost pile, such as a plastic fork, a piece of paper, a soda can, an apple core, and orange peel. Come back to check on the condition of these items throughout the school year to see which things are decomposing and which things are not!

Language Arts

1. **Take a walk through an ecosystem.** Many famous writers have looked to nature for inspiration. You don't have to go to the woods to be a part of nature. Any natural area will do. Take a walk to a local park or open field or stand of woods near your school. If your school has one, you can use your outdoor classroom. Or you can just have your class sit on the grass on the playground. Nature is everywhere, but the degree of wildness may vary. Ask your students to write about their experience. You may let your students choose their poetry or prose style, or you may suggest a style. A paragraph or a short essay and very open ended. However, poetry is a great way to encourage both a better understanding of nature and the medium of poetry. There are many forms of poetry that work well for prompted writing: free verse, rhyming couplets, cinquain, and haiku.
2. **Outdoor writing prompts** you may use with your students:
 - Imagine you are a small member of this ecosystem. What are you? What does the world look like to you? What do you do each day? Where do you get food or find shelter?
 - Close your eyes and just listen for 1 or 2 minutes. What sounds did you hear? Which were human made and which were made by animals, plants, or wind or other non-human causes?
 - Imagine you lived in this ecosystem. How would you find the things you need to survive: air, water, food, and shelter? Look around you and think about how you might use the things you see around you to survive here.

Art

1. **Create a critter!**
 - Students can work together or in small groups to create an imaginary animals that would live in a specific habitat. You may assign the habitat or the students may select one.
 - Offer students a variety of art supplies, including colored paper or construction paper, scissors, glue, crayons or markers, popsicle sticks. Other great things to include: paper cups, tissue paper, colored feathers, interesting fabric scraps, old magazines with pictures, old wrapping paper, newspaper, egg cartons.
 - Ask students to consider the following: where does the animal live, what does it eat, what eats it, how does it move, how does it avoid predators, what time of day is it active, what is it called?
 - After completing their critters, have each group present their critter to the class. This can also be a great extension activity for the Choose Your Habitat report or the outdoor writing activities.