

Lesson 13

Water Webs

What is the difference among food chains, food pyramids and food webs?
How are food webs affected naturally and unnaturally?

GOAL To understand that living organisms are connected.

OBJECTIVES Students will:

- ✓ identify a food chain, food pyramid and food web
- ✓ identify connections among living things
- ✓ become familiar with the terms producer, consumer and other trophic levels
- ✓ recognize the importance of protecting our ecosystems

MATERIALS food chain cards, yarn

CORE CURRICULUM CONTENT STANDARDS

- Language Arts 1(9)
- Math 2(2,4,5)
- Science 3(2-6), 4(6), 5(1-5)

VOCABULARY ecosystem, components, producer, consumer, herbivores, carnivores, decomposer, food chain, food pyramid, food web, energy, tertiary, trophic

PROCEDURES

1. Explain to students they will examine a stream ecosystem and its components (parts).
2. Explain to students that components of an ecosystem include producers, plant eaters, consumers (primary, secondary and tertiary). Primary consumers are plant eaters (herbivores), secondary consumers are meat eaters (carnivores) and tertiary are at the top of the food chain. Decomposers are essential because they help break down plant and animal materials back into the soil. Food chains models can show how energy is passed through the ecosystem. For example, the top of the food chain is the sun. Producers, or plants, make their own food through the process of photosynthesis. Primary consumers eat plants and so on.
3. Separate students into groups of five. Distribute five cards to each group and have students formulate food chains. Have students hold cards in food chain order. Have them begin with the sun, then a plant, plant eater, meat eater and top of the food chain. Have them either stand or place the cards in order of the trophic levels of the food chain. (copy words in food chains on oak tag, cardboard or construction paper to be made into cards at end of lesson)
4. The various trophic levels of the food chains include the following:

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- a. Producers - algae, diatoms, grasses, leaves, and plankton.
 - b. Primary consumers - mayflies, stoneflies, caddisflies, crayfish and snails.
 - c. Secondary consumer - dragonflies, salamanders, frogs, trout and damselflies
 - d. Top or tertiary level - heron, otter, eagle, bear and people.
5. After students create food chains, explain that food chains are simplified in nature. Dragonflies, herons, otters may eat a variety of items and not just one type of species. This would create more of a food web, which includes a number of food chains.
 6. Before creating a web, demonstrate a food pyramid model. Show how many organisms it may take to sustain, support or feed the top of the food pyramid or tertiary level. For example, one of the food chains may include sun, algae, caddisfly, salmon and heron.
 7. Beginning with the highest trophic level, have the students estimate how many trout a great blue heron may eat in one day.
 - a. Have students guess the number. For example, if the guess for the blue heron is five salmon, then the next estimate involves how many caddisfly the salmon eats in one day. Maybe, that amount is twenty.
 - b. Then, have students estimate how much algae is needed to support the 20 caddisflies. Maybe, each caddisfly eats 50 algae, then the total amount would equal to 20×50 or 1,000 algae. In this manner, students can visualize the numbers that are required to support a food chain.
 8. Now students are ready to create food webs. Have students sit in a circle with their cards from the food chains.
 9. Begin activity with student who has the sun card. Have student with sun card hold an end of a ball of yarn or string.
 10. Pass the other end of the yarn to the next person who has the card that depicts the next trophic level.
 11. Have students go up and down the food chains until everyone has had a chance to hold the string and become part of the web.
 12. As everyone is holding a section of the yarn, ask the students what happens if there is a drought and some of the plants do not grow. How would that affect the next level? Have those students gently tug their yarn and have those that feel the tug pass it along. All eventually are affected by the disappearance or reduction of the first level.
 13. Have students think how humans affect the food chain or web? (*development, pollution, cut down trees, etc.*)

EXTENSIONS

1. Identify an aquatic insect that is a predator. Name one that is prey. Can an aquatic insect be both?
2. Ask students the significance of forest fires, pesticide use, and water pollution. Ask how the factors affect the ecosystem.

RESOURCES

Bechdol, Michael, Cheo, Martha S., O'Neal, Vicky J., Slater, Meredith, The Pawcatuck Watershed Education Program Curriculum Guide, 1993, The Southern Rhode Island Conservation District and The University of Rhode Island Department of Natural Resources Science

GLOSSARY

carnivore - a predatory, meat-eating animal

components - a part of a system

consumer - a heterotrophic organism that ingests other organisms or organic matter in a food chain

decomposer - an organism, often a bacterium or fungus, which feeds on and breaks down dead plant or animal matter, thus making organic nutrients available to the ecosystem

ecosystem - an ecological community together with its environment, functioning as a unit

energy - the capacity for work or vigorous activity

food chain - a succession of organisms in an ecological community that constitutes a continuation of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member

food pyramid - a graphic representation of the structure of a food chain, depicted as a pyramid having a broad base formed by producers and tapering to a point formed by end consumers

food web - a complex of interrelated food chains in an ecological community

herbivore - an animal that feeds chiefly on plants

producer - a photosynthetic green plant or chemosynthetic bacterium, constituting the first trophic level in a food chain; an autotrophic organism

tertiary - third in place, order, degree, or rank

trophic - of or involving the feeding habits or food relationship of different organisms in a food chain

Chain/Food Web Cards

Sun	Leaves	Algae
Diatoms	Grasses	Plankton
Mayfly	Stonefly	Caddisfly
Snail	Crayfish	Salamanders
Frog	Heron	Damselfly
People	Otter	Bear
Eagle	Salmon	Dragonfly