

STEAM Subject: Ecology
Lab: Food Chains
Grades: 3–5

Learning objective:

Students will be able to:

- identify food chains in ecosystems and how each trophic level is linked in the transfer of energy
- develop a model of a food chain and describe how organisms are connected

ENGAGE:

Ask students the following questions:

- How do animals get energy to survive?
 - *Eating food, such as other animals and plants*
- What is the primary source of energy on Earth?
 - *The Sun — plants (producers) convert the energy from the light of the Sun into food (sugars) that they can use. Producers are then eaten by consumers and those consumers can also be eaten by other consumers.*
- What is a food chain? Give an example of one.
 - *A food chain shows how organisms are related to each other by the food they eat.*

EXPLORE:

Simple Forest Food Chain:

Producers use energy from the sun to make their own food. **Primary consumers** (like a cricket) eat the producers to get energy for themselves. In turn, **secondary consumers** eat the primary consumers (such as a mouse eating a cricket), **tertiary consumers** eat the secondary consumers (such as a snake eating a mouse), and tertiary consumers above that eat other tertiary consumers (such as a hawk eating a snake). Decomposers get their energy from dead organisms of all trophic levels and recycle nutrients that producers can use.

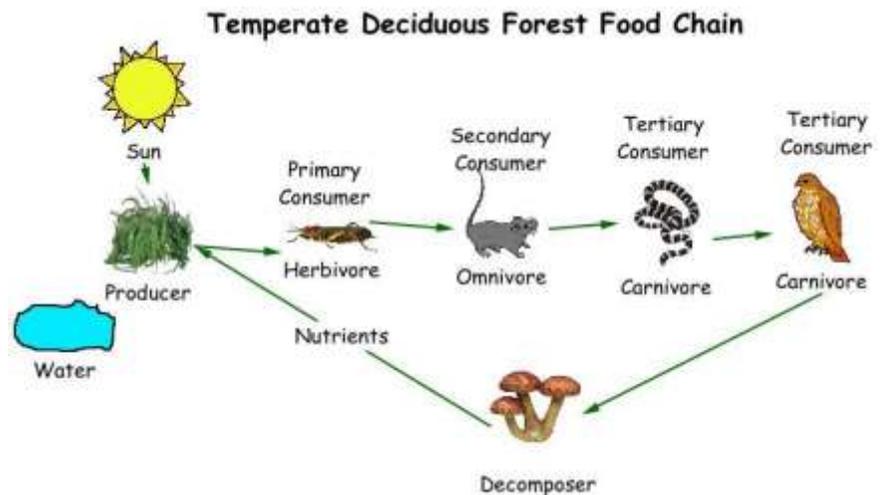


Image Credit:
<https://heightstechnology.edublogs.org/files/2011/05/Temperate-Forest-Food-Chain-2a4qqvi.jpg>

Food Chain Activity:

Students will model simple food chains and examine how the trophic levels are linked to each other in this interactive activity.

Materials needed per student:

- Scissors
- Glue stick
- Tape
- Food chain model ([here](#))
- Color pencils/markers

Directions:

1. Print out the forest food chain model, [link here](#). Give one to each student, along with scissors and a glue stick. If the students wish, they may color in the model.
2. Cut on the dotted lines. The model should have five strips of paper (the organisms) and one larger half sheet of paper (the habitat).
3. Using some tape, hang the half sheet of paper of the habitat on a wall.
4. Have students identify the producer organism from the model and label that strip of paper "Producer." Make a ring from the strip of paper by applying glue in the box "Glue Here" and sticking it to the other end of the strip.
5. Tape or glue the producer ring to the habitat.
6. Next, identify the primary consumer organism, label it "Primary Consumer," and attach its strip of paper to the producer ring by slipping the strip of paper through the ring and gluing the ends of the strip together.
7. Repeat step 6 with the Secondary Consumer and Tertiary Consumer.
8. For the Decomposer, slip its strip of paper through both the Tertiary Consumer ring and the Producer ring so that all the paper chain forms a loop. Explain how decomposers bring the circle of life together so that Producers can use nutrients from dead organisms. Even though Producers can make their own food (sugars), they need other nutrients to grow properly, just like how humans need a variety of vitamins and minerals to survive.
 - a. *Key: Producer = Live oak, Primary Consumer = Deer mouse, Secondary Consumer = Least weasel, Tertiary Consumer = Great horned owl, Decomposer = Fungi*

Exploring the importance of the links:

1. Cut the Decomposer ring and remove it from the chain. The loop should fall apart. Ask students, "What happens when decomposers are removed from the food chain?"
 - *Nutrients from dead organisms are not returned to the environment. Producers cannot grow after some time and eventually, the ecosystem collapses. The circle of life needs to be a circle.*
2. Say, "Let's consider that before the ecosystem collapses, the least weasels disappear because of habitat loss." Cut the Secondary Consumer ring and remove it from the chain. Ask students, "What happens to Tertiary Consumers after the Secondary Consumers are gone?"
 - *They die out as well because they lose their food source.*

3. Cut the Secondary Consumer ring to illustrate how the Tertiary Consumer ring also falls from the chain because the Secondary Consumer and the Tertiary Consumer are connected. Ask students, “What happens to the Primary Consumers without the Secondary and Tertiary Consumers?”
 - *They become more numerous because they don't have predators eating them.*
4. Say, “Deer mice, the Primary Consumers, eat the acorns of the Live oak, the Producer. Since there are now a lot of Primary Consumers, what happens to the Producers?”
 - *The Producers die out because they cannot grow.*
5. Cut the Producer ring and remove it from the Habitat half sheet of paper.

EXPLAIN:

Ask students to explain the importance of each level of the food chain. What happens if one species is removed? Why did the least weasels disappear? (habitat loss) What can humans do to preserve ecosystems?

- Watch video about food chains:
 - Crash Course Kids: <https://www.youtube.com/watch?v=CZhE2p46vJk>
- Play a food chain game:
 - Brain Pop: <https://www.brainpop.com/games/foodchaingame/>
- Review vocabulary:
 - **Food chain:** shows how organisms are related with each other by the food they eat
 - **Food web:** all the food chains in a single ecosystem
 - **Producers:** organisms that can make their own energy using the sun
 - **Consumers:** organisms that must eat other organisms for energy
 - **Trophic level:** the position an organism occupies in a food web

EVALUATE:

Have students think of food chains and food webs of the environments around them. How are the organisms in these ecosystems connected? What happens if you remove a species? What can you do to help these species and their ecosystems stay connected?

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