

## Energy in Ecosystems



*Essential Question: How is energy distributed among trophic levels?*

### Overview

You have learned about predator-prey relationships and trophic levels within ecosystems. You have been introduced to the idea of energy flow within an ecosystem. In this lesson, you are going to take a closer look at how energy flows through an ecosystem. You will study where energy is stored and how much is available at each trophic level. You will look at the number of individual organisms within each trophic level. You will also seek a correlation between stored energy and population.

Energy moves between trophic levels when animals eat plants and animals eat other animals. Energy transfer among these trophic levels is not very efficient. The amount of energy transferred from a lower trophic level to a higher one is limited. This explains why an ecosystem has lots of rabbits and few mountain lions. In this lesson, you will learn why the transfer of energy leads to uneven distributions of plants and animals in the world.

### Materials

For each group:

- 6 32-oz. clear plastic cups

### Procedure

#### **Rules:**

1. Each student represents an organism (plant or animal) in a food chain.
2. Each organism gets one full cup of water. Each organism needs a full cup of water (energy) to survive. If you have less than a full cup of water, you cannot survive.
3. Only the Sun provides energy to primary producers. Consumers must get their energy from primary producers or other consumers.
4. After you get energy from a consumer or producer, stand in line behind them.

#### **Round 1: Half of Your Energy is Transferred**

In Round 1, only half of your energy can be transferred to the next trophic level. The rest of the energy is used up as you grow and move around. Primary producers get all of their energy from the Sun. They can pass half of that on to a primary consumer. Your teacher will explain the procedure to you.

1. With 12 producers, how many primary consumers can survive?
2. How many secondary consumers can survive? Tertiary consumers?
3. Draw a pyramid to show how many plants or animals are in each trophic level.