

Fifth Life Science

TRACKING MATTER: Movement of Matter

Background Information:

Energy and matter are both cycled through ecosystems. Food webs can be used to help trace the paths of both energy and matter as they cycle between organisms and their environment. Food webs are models that show the connections between the sun, producers, consumers, and decomposers.

Almost all of the energy on Earth comes from the sun. Producers are organisms that use the sun's energy (as well as water, air, and other nutrients) in order to make their own food necessary to live and grow. Plants are an example of producers. Consumers are organisms that must find food to eat in order to survive. Herbivores are consumers that feed only on plants. Carnivores are consumers that feed only on other animals. Omnivores are consumers that feed on both plants and animals.

Herbivores are also called primary consumers. Secondary consumers are animals that eat primary consumers. Tertiary consumers eat secondary consumers, and quaternary consumers eat tertiary consumers.

Decomposers are organisms that break down dead organisms (both dead plants and animals). Bacteria and fungi are common decomposers in all ecosystems. Decomposers recirculate matter and nutrients back into the soil to be used again by other living things. Without decomposers, our world would be covered in dead organisms. Different ecosystems are composed of their own specific producers, consumers, and decomposers that are best suited for that environment. In Illinois, there are a number of different ecosystems in which plants and animals thrive: the prairie ecosystem, woodland ecosystem, and aquatic ecosystem are the three most common.

Performance Expectation

LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

<https://www.nextgenscience.org/pe/ms-ls2-1-ecosystems-interactions-energy-and-dynamics>

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems: Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

Science and Engineering Practices

Developing and using models: Develop and/or use models to describe and/or predict phenomena. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.

Crosscutting Concepts

Cause and Effect: Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Activity Materials:

- Ecosystem cycles cards
 - Prairie Ecosystem (16 cards)
 - Woodland Ecosystem (16 cards)
 - Wetland Ecosystem (16 cards)
- Yarn in 3 different colors
 - White yarn → used to trace energy from sun to producers
 - Red yarn → used to trace energy and matter between consumers and producers
 - Purple yarn → used to trace energy and matter between decomposers and consumers/producers

Teacher Preparation:

The cards have dark circles printed by the names that you may wish to hole punch out. This way, students can tie the yarn to the cards while constructing their web. Alternately, you may wish to tape the yarn over the circles, or find another way to attach the yard to the cards and account for the correct number of connections. You may also want to turn the cards into ‘necklaces’ using yarn, or have students place the cards at their feet for a better vantage point of the web. Additionally, laminating the cards will make them more durable and help them to last longer.

Activity Suggested Implementation:

There are three sets of Ecosystem cards, each with 16 cards. You might want to start with the ecosystem most familiar to your students, and then use the other ecosystem sets to reinforce the activity after a day or two. Depending on class size, you will probably need to pair students up so that there are 1-2 students per card. You will also need 3-4 students to be in charge of the yarn used to make connections between the cards. Alternately, if there are not enough students for the activity, it is ok to give 1 student 2 cards.

Pass out cards to students/pairs of students, and have them stand in a large circle with the ‘sun’ in the middle. The orders of the other students/cards around the circle do not matter--however, the students with the ‘decomposer’ cards will need to read their information last. The ‘sun’ will begin by reading the information on the back of their card. The student in charge of the green yarn will use the yarn to make connections from the sun to the producers it provides energy to. Next, starting at any point in the circle, students will go around and read their cards one at a time, skipping the decomposers (worms, mushrooms, bacteria). As each card is read, the student in charge of the red yard will make the appropriate connections. When there are only decomposers left, you may wish to pause and have a discussion about why all the cards have three holes remaining, and even ask about what happens when organisms die. Next, allow the decomposers to read their cards and have the student with the purple string make the appropriate connections. When all cards have been read, the holes/dark circles on each card should all be covered or tied through.

To prepare for the debrief questions, you may want to ask the students what would happen if one or two of the cards went missing/extinct--or even repeat the activity with a different ecosystem set, purposefully leaving a couple cards out.

Debrief:

- Where do plants get their energy to grow?
- What else do plants need to make food?
- Why are decomposers so important?
- What would happen in some of the organisms (and their matter) were removed from the web?

Assessment:

The following single point rubric can be used to assess student understanding. For each of the four criteria listed below, either circle the proficient description or add notes to a box indicating why the student’s performance was either lacking or exceptional.

Areas that need improvement. Developing Performance	Criteria for Proficient Performance	Evidence of exceeding standards. Advanced Performance
	Described how matter moves between at least two of the following: plants, animals, decomposers, the environment	
	Developed a model that shows interaction between plants, animals, decomposers, and the environment	
	Explained how plants, animals, decomposers, and the environment work together to create a comprehensive system	

Accommodations:

This lesson may require students to tie knots, or perform other tasks with yarn that require **fine motor skills**. Assigning student’s partners, or providing them with tape or other means to affix yarn may help.

Some of the cards may introduce new vocabulary. Pairing students of different reading levels together may help with any difficulties regarding reading or comprehension.

Possible Extension/Supplemental Activity

The following link is to an online game where students track matter and energy through a food web and may help to reinforce understanding of this topic.

<https://games.legendsoflearning.com/games/WyJnYW1lcyIsNTUxXQ==>