



Activity 1.4: Nature Walk & Ecosystem Introduction

Grades 7 – 9

Description: Part 1: Nature Walk Students take a walk through nature, make observations of their surroundings, and learn or review what a food chain is and how it functions in an ecosystem.

Part 2: Building an Ecosystem Model This activity can be used as either an introduction to food webs or as a culminating activity for the food chain. (Students will actually be creating an ecosystem model, which is a bit more complex than a food web—as their model will include both abiotic (sun, wind, rain) and biotic (animals, plants) components, while a food web typically contains only biotic components. This activity is designed to provide both visual and tactile demonstrations of the interconnectedness of all components of an ecosystem, and that they are dependent on each other for survival.

Materials:

Part 1

- Available outdoor space (if possible)
- Journals
- Pencils or pens

Part 2

- Picture cards
- Yarn
- Journals

Time: One to two class periods for all activities

National Science Education Standards:

C4a A population consists of all the individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

AAAS Benchmarks:

5D/M4 All organisms, both land-based and aquatic, are interconnected by their need for food. This network of interconnections is referred to as a food web. The entire Earth can be considered a single global food web, and food webs can also be described for a particular environment. At the base of any food web are organisms that make their own food, followed by the animals that eat them, then the animals that eat those animals, and so forth.

5E/M3c Almost all food energy comes originally from sunlight.

Guiding Questions:

- What are the different roles in an ecosystem?
- How does energy flow through ecosystems?
- What are the connections between biotic and abiotic factors in an ecosystem?

Assessments:

- Ecosystem model and description



Pre-Activity Preparation

- Print out the food web cards and review the activity. Cards represent biotic and abiotic components of the food web. There are six shape-coded sets of five cards each. Each set consists of components that make a simple food web. Students will form groups based on these shapes in the second part of the activity.
- One card from each of the set has an X in the upper right-hand corner. This card represents an ecosystem element that will be “disturbed” in part 2 of the activity. If you have access to a color printer and laminator, you may want to print out the cards and laminate them. This creates a set that can be used multiple times.

Part 1: Nature Walk

Note: *Ideally, this lesson will take place outside, but a very similar conversation can take place indoors. The lesson will be described as if the class is taking place outside.*

Procedure:

1. Walk with students or sit down in the most “natural” spot available on campus. Somewhere with sunlight, plants, etc. If possible, have students spread out a little to have their own space.
2. Have students write down one observation using multiple senses. Ask them to record at least one thing they see, hear, smell, and can touch. This is just to get them observing and becoming aware of some of the processes going on around them. Take a few student responses.
3. Some of the observations should involve plants and animals. If they do not, ask students whether they observed any *natural* things around them. Maybe a student saw a bird, bee, some grass, or heard the wind blowing through the trees. If no animals were observed or happen to show themselves during this part of the activity, just pick an animal that could be seen on your campus. If a bird were spotted for example, ask the students, “What does that robin over on the lawn need to survive?” Students may say things like: air, food, or water.
4. Then tell the students, “Yes. All living things need energy and the robin gets energy from its food. What kind of things does a robin eat?” Likely responses would be worms or bugs.
5. Next, ask students where the bugs and worms get their energy. They may not really know that worms and many of these insects get their energy from plant material. Worms feed on decaying plant material in the soil, for example. You may have to lead them there. They don’t realize yet that you are having them build a food chain from the top down.
6. Once you have arrived at plants in your food chain, you can ask, “How do plants get their energy?” You may hear answers such as water, plant food, or the sun. Explain to the students that sunlight is the original source of energy for all living things on our planet. The sun provides energy for the plants and the plants provide energy either directly or indirectly for everything else. Ask them what this process is called. This is called *food chain*. Have them record this term below their observations.



7. Have students skip down a few inches in their notebook and draw a sun. Then have them draw an arrow going from the sun up to a plant or flower. They can draw the plant of their choice or sketch something nearby that they can actually see. Then another arrow up to a bug or earthworm. Finally another arrow up to the robin. You can adapt this process to your particular situation and whichever organisms the students observe. It might be:

sun → grass → rabbit, or sun → flower nectar → butterfly, etc.

8. Review the roles that each organism plays in this chain. Indicate which are producers, primary consumers, and secondary consumers.

NOTE: This lesson is very adaptable in general. You may want to wander a bit more through campus and discuss feeding behaviors the students may observe. If you feel your students already have some background knowledge of food chains, they may be able to wander a little more independently and report their observations back to the larger group nearer the end of the class. The key is to engage the students first and then build to the learning targets.

Part 2: Creating an Ecosystem Model

Time: 20 – 30 minutes

Procedures

Modeling a food web

1. Introduce the activity by asking students to list some of the things they observed in their walk outside; make notes on the board. Ask students:
 - How all of these different things are connected to each other?
 - How do they interact with each other?
 - How do they depend on each other?Today they are going to explore in a little more detail the connections in a regional ecosystem.

2. Pass a picture card out to each student.

3. Have students stand in a circle either in the classroom, or outside. Explain to the students that they are going to create an ecosystem. Students can pass the ball of yarn to any student who has a card that is connected to their own in an ecosystem. For example:
 - Student 1 – I have a bird, and I will pass the yarn to Student 2 because s/he has a tree and some birds eat nuts.
 - Student 2 – I have a tree, and I will pass the yarn to Student 3 because s/he has water and trees need water to grow.
 - Student 3 – I have water, and I will pass the yarn to Student 4, because s/he is a fish that swims in water.
 - Student 4 – I have a fish, and I will pass the yarn to Student 5 because....



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4. Have the first student hold onto the loose end of the string and pass it on to the next student. Every time the yarn is passed, the student should hold onto their piece of yarn. As students pass the ball back and forth, they will create a web between them.
5. When all of the students are holding one part of the web, have them close their eyes.
6. Pluck a string in the middle of the web, and ask students to raise their hands if they felt the tug. Most, if not all students will feel the tug. Have them open their eyes, and look to see how many students have their hand up. Explain that this is because everything in an ecosystem is connected.
7. Mention to students that an ecosystem contains both living (biotic) and non-living (abiotic) things that interact. Ask students to raise their hand if their card is an abiotic factor of an ecosystem, and then if their card is a biotic factor.
8. Next, have one student drop his or her string—ask students what happened to the web they created.
9. Explain that the web they just made is like a natural ecosystem. All the different components are connected and when you disturb one, it affects all the others in the system.

Disrupting an ecosystem

10. Have students break into groups of nine students, each based on the shape on their card.
11. Have students first create a diagram of the ecosystem that includes all nine cards. They should indicate producers, primary and secondary consumers, and any abiotic factors (sun, water) and the relationships between them. Students should draw their ecosystem diagram either in their journal or on a piece of paper.
12. One of the cards will have an **X** in the corner. The card with the **X** is the component of the ecosystem that has been “disturbed.”
13. Once they have completed their diagram, have them remove the card with the **X** and discuss and write down the potential impacts on the ecosystem if the **X** is taken away. Have students use the following questions as prompts. They should write their answers in their journals.
 - Label each organism as a producer, primary consumer, or secondary consumer. Do not label abiotic factors.
 - Is the organism you removed a producer, or a primary or secondary consumer?
 - List the other organisms that are directly dependent on the one you removed.
 - i. Write a sentence describing how each organism depends on the organism you removed.
 - ii. Write a sentence describing what will happen to each organism without the organism you removed. (For example, if it is a food source, are there other food sources available? If not, what will happen?)



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- How does the removal of that organism affect other organisms that are not directly dependent on it? List all the secondary impacts you can think of.
 - Explain how the removal of one organism from an ecosystem can impact the whole ecosystem using yours as an example. Make sure you describe how *all* the organisms in your ecosystem are impacted.
14. This can be done entirely in class or completed as an individual homework assignment. If this is done as homework, have students answer the prompt questions in their journal.
15. Conclude the activity with a discussion of what happened when the ecosystem was disrupted. What are the consequences for the ecosystem when one component is removed?

Ecosystem Model Grading Rubric

In their model and description students should:

- Identify each organism correctly as a producer, consumer, or secondary consumer
- Identify the direct impacts of removal of the assigned organism
- Identify secondary impacts of the removal of the assigned organism
- Explain how an ecosystem functions as a system, with all organisms linked together, directly and/or indirectly.

Extensions:

- In groups or individually, students can draw food webs or ecosystem models of organisms from different habitats, for instance: prairie, pond, forest, desert. Students can then label producers and primary and secondary consumers. They can compare diagrams across different habitat types, and show that these roles are common to different ecosystems.
- To continue the idea of ecosystem disruption, students can research a specific disruption to their habitat types (for example: deforestation in forest habitats, eutrophication in ponds) and show how the effects of this disruption are felt among different interconnecting organisms in that habitat.
- You may wish to draw the distinctions between energy and nutrients in an ecosystem. Energy flows in one direction through an ecosystem, while nutrients cycle through an ecosystem.

Resources

<http://www.paconserve.org/151/energy-flow-where-does-it-go> (Western Pennsylvania Conservancy provides good information on energy flow through and ecosystem)