Woodland Ecology

GRADES: 6–8

Key Words and Definitions

ECOLOGY : branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

ECOSYSTEM : biological community of interacting organisms and their physical environment.

FOOD WEB : model representing the interdependent organisms of an ecosystem and the methods of energy transfer in that ecosystem.

INVASIVE SPECIES : organism that is not native to an ecosystem and causes harm.

COMMUNITY SCIENCE : collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

BIOTIC : living, or once living, components of an ecosystem.

ABIOTIC : non-living components of an ecosystem, such as climate and soil.

TROPHIC LEVELS : levels of an ecosystem that demonstrate the transfer of energy. Each level contains organisms with similar ecological functions.

PRODUCERS : organisms that get their energy from abiotic factors (such as the sun).

PRIMARY CONSUMERS : organisms that get their energy from eating producers.

SECONDARY CONSUMERS : organisms that get their energy from eating other consumers.

DECOMPOSERS : organisms that recycle nutrients in an ecosystem by breaking down dead or decaying matter for their energy.

*Look for keywords—***BOLDED***—throughout this lesson extension!*

Activity 1: Designing Your Own Ecosystem

Two, approximately 45-minute sessions; pre-visit

LEARNING OBJECTIVE

Students demonstrate their understanding of the relationships between different organisms in an ecosystem by designing an imaginary ecosystem that has all the necessary components to function.

MATERIALS

- Paper
- Pencils
- Colored pencils or markers (optional)

PROCEDURE

Divide the students into groups of 4 to 5. Ask each group to invent an imaginary ecosystem. In their new ecosystem, have them identify the following:

- **Location** Where is the **ECOSYSTEM**? (Water, mountain, jungle, desert, another planet, etc.)
- **Abiotic Factors** Describe climate (temperature, precipitation, seasons, amount of sunlight, etc.) and surface conditions (soil texture, amount of water, vegetation, atmosphere, etc.).
- **Living Community** Create imaginary organisms to inhabit the ecosystem. Must have organisms from each of the following trophic levels (give population size of each level):
    - Producers
    - Primary Consumers
    - Secondary & Higher Consumers
    - Decomposers
- **FOOD WEB Requirements** Create a food web for your community of organisms that shows the interactions between the **PRODUCERS**, **PRIMARY CONSUMERS**, **SECONDARY** (and higher) **CONSUMERS** and **DECOMPOSERS**.

Then ask the group to choose one organism from each **TROPHIC LEVEL**. Have each student in a group choose a different trophic level, make a drawing of the organism and describe the following:

- Trophic level (give trophic level and tell what it eats in the ecosystem)
- Species Name
- Population Size
- Niche and Habitat
- Particular relationships to other members of the ecosystem
- Adaptations for the Environment

The final product, each group's ecosystem, should include:

- An oral presentation describing the ecosystem, explaining the food web and describing the four specific organisms chosen from each trophic level.
- A poster showing a drawing of the ecosystem.
- A poster of the food web/relations between the organisms.

NOTE: This project can be very simple or very complex, depending on the level of detail you want from your students. Students can complete this project individually as well, which will take more time but give them more creative license.

Activity 2: Great Lakes Earthworm Watch

One, approximately 40-minute session; post visit

LEARNING OBJECTIVE

Students conduct the Great Lakes Earthworm survey (as carried out at Wave Hill) in a local area, such as a nearby park or other green space. This activity allows students to solidify their data-collection skills, recognize the natural value of green spaces and practice techniques for comparing data.

MATERIALS

- Data collection sheets (5-6)
- Pencils
- Flags (4 per group)
- Measuring tape

PROCEDURE

If you plan to go to a public park, please note: NYC Parks requires approval to do research in and/or impact the natural environment. Be sure to contact the appropriate Parks staff and obtain necessary approvals and/or permits.

Before class, go to the Great Lakes Earthworm Watch page to view several different data-collection techniques. At Wave Hill, the "Hand Sampling" technique and this data sheet are used. For this activity, it is recommended that you use "flip and strip." This will be less invasive for our public spaces. To use this method, break students into groups of 4 to 5. Assign each group to a section of land that has some kind of decaying matter (wood chips, leaves, exposed soil). Have them place one flag, and then use the measuring tape to place the three, remaining flags in a square. 6 feet by 6 feet is recommended, but the size can be dictated by your site. The important thing is that this square size is consistent across all groups of students.

Then have students methodologically walk through their site and flip over any rocks, rotting logs, or piles of decaying matter they see and count the number of worms they can find. If it has been particularly dry, they may not find any worms, but encourage them to look for other decomposers. When they have finished, have each group report their findings to the other groups and ask students to compare the data: what might have influenced differences between the sites? What might make them similar to or different from Wave Hill?

Discuss the fact that earthworms are an invasive species in the Northeastern United States. What might the data they found mean for overall ecosystem health in this area? Either at the end of the activity, or back in the classroom, lead a discussion about why it is important to contribute to this, and other, community science projects. If your class is interested, there are many other projects to be found online that they can participate in.

SOURCES

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BACKGROUND INFORMATION

Community Science

"What Is Citizen Science?" *SciStarter*, Arizona State University, 2019, http://scistarter.com/citizenscience.html.

Invasive Earthworms

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Urban Conservation in NYC

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Food Webs and Energy Relationships

"Food Webs and Energy Pyramids: Bedrocks of Biodiversity." *YouTube*, Amoeba Sisters, 24 July 2015, www.youtube.com/watch?v=-oVavgmveyY&feature=youtu.be.