



Schoolyard Ecosystems

Connected Next Generation Science Standards

2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some less well, and some cannot survive at all.

Featured Science and Engineering Practices

Developing and Using Models

Featured Cross-Cutting Concepts

Patterns

Structure and Function

Students should know the difference between habitat and ecosystem if you are using those terms. A **habitat** is the place that an animal lives. An **ecosystem** includes all the living and nonliving parts of that place. Either concept will work with this activity but be consistent with your terminology.

Overview

This lesson will explore the variety of "micro" ecosystems at your school. No matter the size of your outdoor garden space, there are diverse ecosystems outside your school! This lesson incorporates a raised garden bed, grass lawn, pavement, and a native plant garden but get creative and include trees, compost piles, or other sites. If working with younger students, check out the adaptations at the end of the lesson.

Students will

- Compare and contrast the biotic (living) and abiotic (nonliving) factors of a variety of ecosystems.
- Model how an organism meets its needs within an ecosystem.
- Argue why certain organisms are found in a specific ecosystem.

Teacher Preparation

- Walk through the garden to familiarize yourself with the space. Choose at least 3 different "micro" ecosystems for students to investigate. Decide if student will only observe or if they can dig in the soil.
- Create observation circles if hula hoops not available - tie two ends of string together, enough for each student pair to have one.
- Optional: Mark where students will put their observation circles if you want them to observe specific plants or phenomena.

Guiding Question - How do the parts of the ecosystem interact?



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Materials

- Garden journals or worksheets and clipboards
- Pencils
- String circles or hula hoops, enough for every pair to have one
- Optional - magnifying glasses, signs to label the different ecosystems, thermometers, hand towels

Settings

- School garden or green space
- Works best on a sunny day in the fall and spring when pollinators and other animals are most active.

Observation circles can be an introduction to mindfulness. When students get to a new observation spot, encourage them to slow down and sit quietly for a moment to notice how that spot feels, smells, and sounds different.

Explore

- On your way out to the garden, discuss different ecosystems they have seen or read about. What do all ecosystems have in common? How were the ecosystems different?
- Popcorn student answers about the variety of observed ecosystems. Reveal that today they will explore many different ecosystems while staying at school.
- Explain to students they will explore "mini" ecosystems - a raised garden bed, grass, pavement, and a native plant garden - using special observation circles. These circles are similar to quadrats that scientists use to study ecosystems all over the world!
- What do you think you should do to make good observations? (Slow down and use tools like a magnifying glass and all your senses.) Encourage students to notice abiotic factors like sunlight, ground moisture level, smell, and soil texture. (Use tools if available.)
- Divide students into pairs. Each pair will explore 2 different ecosystems for 5-10 minutes. They will record their observations through written descriptions, drawings, photos, or a combination. If using drawings or photography, the focus is capturing their observations, not making pretty artwork.
- Optional: Encourage students to pay close attention to the structure and function of traits observed at each site.
- Either let students place their observation circles in one of the different ecosystems or set them up beforehand. Pass out trowels to sites that are allowed to dig in the soil.



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Or ask, How do the plants and animals meet their needs in the ecosystems?

- Remind students of garden boundaries and expectations.
- Walk around and help students who are struggling. Encourage students, particularly those studying pavement, grass, or bare soil, to get low to the ground and use magnifying glasses. Students looking for pollinators should try to sit still for a minute to encourage more flying insects to visit their site.
- After 5-10 minutes, rotate students to a different ecosystem before they get distracted.

Digging Deeper

- Bring students back together and pair up groups that worked at different sites to compare ecosystems. How were the abiotic and biotic factors of the ecosystems similar? How did the plant and animals' structures (traits) differ between the ecosystems?
- Each student then chooses their favorite observed plant or animal. List what their plant or animal needs to survive. What abiotic and biotic parts of the ecosystem does it need to stay alive?
- On the ecosystem observation where their favorite organism lives, circle the parts of the ecosystem that help their favorite plant or animal survive.
- Students then look at their other ecosystem drawings or notes. Would their chosen animal or plant be able to survive in the other ecosystem? Why or why not? Remind students to base their argument on observations, not assumptions.



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Younger Student Variations

- Focus on plants and animals, not nonliving parts of the environment. Students use magnifying glasses and circles to observe and draw what they notice in different parts of the schoolyard.
- Observe each ecosystem on a different day and pair observations with a book that highlights that ecosystem, such as *Diary of a Worm* (soil), *Monarchs and Milkweed* (pollinators), and *Hey, Little Ant* (asphalt).

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Making Connections

- Bring the students back together to pair share with a different student. Do they agree with their classmate's argument about where their favorite plant or animal can live? Could your chosen animal live in the same ecosystem? What other evidence could you collect to help your argument?
- Although all of these "micro" ecosystems are different, they are part of the larger schoolyard system. How do the different ecosystems we studied today interact?
- As students walk back, reflect on the lesson. What surprised you about the ecosystems you visited today? Did your thinking about any of the ecosystems change?