

OIEE, Inquiry-Driven Lessons
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 Biodiversity

Title	Urban Biodiversity: Where Are They Hiding?
Age Group	Seventh Grade
Lesson Duration	One week
Year	2009
Cost	\$126.54

LESSON GOALS:

Seventh grade curriculum is Life Science. Within the study of life science, the majority of the Grade Level Expectations in Louisiana address ecology. In order for young adults to take ownership in their natural surroundings, they need to be aware of what’s out there and how their actions as well as environmental factors may impact their local schoolyard’s ecosystem. This investigation involves the practice of the following process skills: observing, questioning, formulating a hypothesis, creating an experimental design, stating a prediction, inferring, identifying and classifying, collecting and analyzing data, drawing conclusions, and communicating their findings.

Students will first survey their schoolyard by taking a Nature Scavenger Hunt. This observation lesson will lead them to a discussion of what is in our schoolyard. Students will work in groups to study different locations within our schoolyard: maintained foliage area in front of building, open courtyard used for recess, edge of land near parking lot, and high school garden. Each group will be required to record their observations of their site, collect and identify types of organisms, brainstorm reasons why one area of our schoolyard inhabits more groups of organisms over another, and carry out an experiment based on their reasons for diversity.

GRADE LEVEL EXPECTATIONS:

- LA_23 Classify organisms based on structural characteristics, using a dichotomous key (LS-M-C1)
- LA_32 Describe changes that can occur in various ecosystems and relate the changes to the ability of an organism to survive. (LS-M-D2)
- LA_33 Illustrate how variations in individual organisms within a population determine the success of the population. (LS-M-D2)
- LA_34 Explain how environmental factors impact survival of a population. (LS-M-D2)

MATERIALS

- field journals \$3.95 ea.
- pencils
- Hand lenses, 2-3 per group..... \$4.00 ea.
- Meter stick or tape measure, one per group..... \$4.50 ea.
- Forceps, one per student \$2.95 ea.
- Pipettes, one per student\$4.95/per 20
- Petri dishes, 2-3 per group..... \$5.95 ea.
- Trowels for digging leaf litter, 2 per group..... \$12.95 ea.

- Gallon bags, one per group.....\$3.00 box
 - Soil moisture gauge, one per team\$34.58 ea.
 - Soil thermometers, one per team\$19.76 ea.
 - Thermometer, one per team.....\$7.55 ea.
 - Antibacterial wipes and hand sanitizer\$5.00
 - Gloves (if needed).....\$4.95/box
 - Paper towels\$2.00
 - 16 Berlese Funnels (2 L bottles, onion nets, duct tape, scissors)—MAKE prior to field experiment (donated supplies)
 - Access to light source (funnels sit over 24 hour period)
 - Contact parent volunteers to help house funnels overnight
 - Audubon Field guides: common invertebrates\$10.45 ea.
 - Microscopes/stereoscopes (if available)
 - Digital cameras, one for each group (if available)
- TOTAL.....\$126.54

ENGAGE:

One way to capture your students' attention for this lesson is to come in the first day dressed as a biologist ready for field study: big floppy hat, binoculars, khaki shorts, "field" shirt (i.e. REI Sahara shirt), magnifying lens, field journal, and a water bottle.

Another way to create ownership for your students is to find a partner or sponsor for this project. Having the sponsor be a part of this investigation or the reason why students should survey their schoolyard a) provides a real-life connection and b) provides research for future development/beautification of schoolyard. If that person can actually come in to your classroom to address your class would definitely make it more authentic. My school is chartered with Tulane University in New Orleans, LA. As a partner certain departments provide assistance in school-wide initiatives.

Another way to stimulate interest in ecosystems is to have a terrarium set up in the classroom. The piqued interest will begin with "What's inside that?" "Who could live inside here?" "Who is eating who?" "What other organisms do you see living inside, beside plants?"

QUESTIONS:

Introductory

What kinds of organisms live in our schoolyard?

Which area of our schoolyard has more biodiversity than the others?

Comparative

Does the type of area or leaf litter they live in affect the biodiversity?

Does a sunny area have more biodiversity than a shaded area? OR Does a shaded area have more biodiversity than a sunny area?

Does an area with more moisture have more biodiversity than an area with less moisture?

Possible Student Questions

Will any of these organisms bite me?

What do these organisms eat?

Do some eat each other?

HYPOTHESIS:

A shaded moist area will have more biodiversity than a sunny dry area.

OR

The garden will provide a better environment for biodiversity than the open grassy courtyard.

OR

The maintained front foliage will provide a better environment for biodiversity than the edge of the parking lot.

METHODOLOGY:

Experimental Design/Procedure

DAY ONE

Take students on a Nature Scavenger Hunt. Have students look for certain natural artifacts: an unusual shaped leaf, something soft, something prickly, a pine needle, an insect that can camouflage, a seed, a pinecone, evidence of the presence of an animal. Have students bring their Field Journals to make observations of the things they find. Remind students at this point not to disturb nature; they are just making observations and writing questions from their observations.

IF students are having a hard time with questioning lead them to:

Looking at leaves to see if there are animal bites: do some kinds of plants have more evidence of little holes than others? Looking low on the ground, have students investigate animal activity under rocks and under leaf litter. Do you see different kinds of animals in different areas of our schoolyard?

DAY TWO

Discuss their findings and observations from the scavenger hunt. What are things they discovered or noticed? Are there areas that seemed to have more evidence of animal activity than others? Lead students in a discussion of biodiversity. What is it? How can we test to see if one area has more than another? Have students brainstorm a list of questions. Discuss closed versus open questions (easily answered or research questions vs. testable questions). Choose a question and formulate the hypothesis. Next, guide students to their experimental design: how are we going to measure our area? How can we make this a fair test? Which areas will be tested? How many replicates or samples will we collect?

Anticipated Design:

- 1) Students will be in groups of four. With a class of 32 students, assign groups to an area: 2 groups will collect at the garden; 2 groups will collect in the front yard; 2 groups will collect in the courtyard; 2 groups will collect in the area near the parking lot.
- 2) Equip students with meter stick, a gallon bag, a trowel/shovel, air and soil thermometers, and a soil moisture gauge.
- 3) Students will measure out a 30 cm x 30 cm plot of leaf litter in their designated area. They will collect either leaf litter or a thatch of grass that is 5 cm above the soil. Students will place leaf litter or grass thatch in labeled gallon bag. Each group will collect 2 samples of their area, resulting in 4 samples from each designated site.
- 4) Students will also take air and soil temperatures of their area as well as test their soil's moisture level using the soil moisture gauge.
- 5) Students will record data in their field journals in a data table.

Designated Site:

Time and Date:

Air temperature	Soil temperature	Soil moisture level

- 6) Revisit the chosen hypothesis. Discuss how we will determine our results. Will it be the number of different types of organisms or how many total organisms they find? Write a prediction.

If a shaded moist area has the best environment for biodiversity, then it will have a greater number of organisms than a sunny, dry area.

OR

If the garden provides a better environment for biodiversity than the open grassy courtyard, then it will have the greatest number of organisms living in it.

OR

If the maintained front foliage area provides a better environment for biodiversity than the edge of the parking lot, then it will have the greatest number of organisms living in it.

DAY THREE

Conduct field experiment. Make sure to discuss safety issues: show example of poison ivy and vines as well as tick identification. Make sure students also record observations of their site as well as make sketches of any interesting findings. At the end of class have students place leaf litter and grass thatch in Berlese Funnels. Label each funnel with tape stating area and group number.

DAY FOUR

Students will investigate their critters found in bags. Tables should be set up prior to class with microscopes and/or stereoscopes, petri dishes, pipettes, and probes. Field guides and invertebrate dichotomous keys should be available for identification. Students will list their organisms and tally numbers of organisms in a t-chart format in field journals.

DAY FIVE

Have students analyze their data. Have students create presentations in order to share their findings with the other scientist teams. Great ideas: poster, data charts, skits, news show, rap song, pamphlet, radio show, commercial. Share findings with administration, your sponsors or partners in the community, local news and public radio!

RESOURCES:

Local community partner or sponsor: Parkway for Partners, Audubon Zoo education department, Tulane University- Biology Department

The Audubon Society Pocket Guides: Familiar Insects and Spiders of North America

Student books: *The Song in a Walnut Grove* by D. Kherdian, *Nicky the Nature Detective* by U. Svedberg, *No Bones: A Key to Bugs and Slugs, Worms and Ticks, Spiders and Centipedes and Other Creepy Crawlies* by E. Sheperd

Teacher Guide: *Eco-Inquiry* by Kathleen Hogan

www.brainpop.com

www.pbskids.org

www.orkin.com/learningcenter/kids_and_teachers.aspx

www.ipl.org/div/kidspace/

EXTENSIONS:

- Create a food web of our organisms
- Identify trees in schoolyard
- Compare schoolyard to a local park, Audubon Park