



Science Unit: *Ecologists Grow A Garden*

Lesson 6: *Compare Invertebrate Diversity Between A School Ground and UBC Forest*

School Year: 2012/2013

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Grade level: Presented to grades 4 and 5; appropriate for grades 2 –7 with age appropriate modifications

Duration of lesson: 1 hour and 20 minutes

Notes: This lesson links directly to Scientist in Residence Program Lesson 5 UBC Farm and Forest Field trip in the science unit Ecologists Grow A Garden. Observational data from Lesson 6 (this lesson plan) and Lesson 5 are compared.

Invertebrate traps need to be set out the day before.

Objectives

1. Observe the school ground closely.
2. Compare observations from the school ground to UBC Farm and forest.
3. Explore invertebrate diversity.

Background Information

This lesson compares the forest at UBC Farm (Lesson 5) with our school garden. Two activities completed in the forest are repeated in the garden: invertebrate diversity experiment and sensory scavenger hunt. In the invertebrate diversity experiment, pit traps are installed to catch garden soil invertebrates. Many of these animals are most active at dawn, dusk and/or at night. Therefore, the traps are installed in the afternoon and checked the next day.

The forest floor is a rich ecosystem we rarely explore. It is full of organisms we cannot see, such as bacteria, yeasts and molds and many more we can easily see, such as beetles, worms, centipedes, millipedes, spiders, slugs, snails and sow bugs. These organisms interact in food webs similar to the interactions in the landscape above the forest floor.

In a garden, soil is regularly disturbed, exposed to the sun, disconnected from neighbouring natural areas and there are no leaves, branches nor logs lying on the soil. In contrast, forest soils are relatively undisturbed, full of leaf litter and downed wood, shaded and set in a natural setting. These habitat differences mean our samples may differ in the type and diversity of species. Some of the invertebrates we may see include:

Ground Beetles: Ground beetles are usually longer than wide, have long legs, run fast, are nocturnal, solitary and predatory. They are found throughout the world and are common in forests. There are more than 26,000 species worldwide.

Earthworms: There are thousands of earthworm species worldwide. They live in moist soil and help to decompose dead plant material.



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Centipedes: Centipedes have 1 leg per body segment, flat bodies, and scurry away if disturbed. They are also predators.

Millipedes: Millipedes typically have two legs per body segment, rounded bodies, curl into a ball if disturbed. Most are decomposers (eat dead organic matter, such as leaves).

Spiders: Spiders have two body sections and eight legs. There are more than 40,000 known species of spiders in the world. They are solitary and predatory.

Slugs: Snails and slugs are both gastropods. There are approximately 100 species of terrestrial slugs and snails in British Columbia. In coastal British Columbia gardens the introduced Great Grey Slug and European Black Slug are common, voracious herbivores. However, in our forests the native Banana Slug is more common. Banana slugs are excellent decomposers.

Sow Bugs: Sow bugs, also know as pill bugs or roly-polies, are terrestrial crustaceans. They roll into a ball when threatened and are mostly decomposers.

Vocabulary

Analysis: Tabulating and graphing the data we collected to make conclusions about our experiment.

Data: Facts collected during our experiment.

Community: All species living and interacting in a specific habitat.

Ecosystem: A system formed by the interactions of all the living and non-living things in an environment.

Habitat: The home of an organism, such as a plant or animal.

Invertebrate: A measure of the number of species or invertebrate groups and the abundance of

Species Diversity: individuals in each species or invertebrate group.

Materials

- 3 portable plastic tubs with high sides
- 12 drink cups or tin cans
- waterproof worksheets
- trowel
- clipboards, pencils
- waterproof cushions
- graph paper
- invertebrate data analysis worksheet

In the Classroom

Introductory Discussion

1. Read Under One Rock Bugs, Slugs and other Ughs by Anthony D. Fredericks. Discuss organisms caught in forest pit traps in Lesson 5. Which invertebrates do students expect to catch in the garden?
2. Science experiment/activity: Students will collect and analyze results for the invertebrate diversity experiment.
3. Safety guidelines: Outside behaviour and ethics.

Science Activity/Experiment

Activity 1: Invertebrate Diversity Experiment

Purpose of Experiment: To compare invertebrate diversity in the forest and our garden

Prediction or Hypothesis: Will we see greater diversity of invertebrates in the forest or in our garden?



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Methods and Instructions:

Set-up prior to experiment: Find 12 drink cups or tin cans, trowels and jam.

1. Place 12 pit traps: drink cups or tin cans, in the garden **the day before**. Bait the trap with jam. Put a thin layer of jam around the inside rim. Dig a hole. Place traps with the rim at soil level. Place a bit of leaf litter in the bottom of each trap.
2. Check traps the next day. Provide a plastic tub with high sides to gently place invertebrates in.
3. Record the number of different types of invertebrates found.
4. Release all invertebrates back to the garden.

Activity 2: Compare Invertebrate Diversity

Purpose of Activity: To analyse the invertebrate data we collected in the forest at UBC Farm and in the school garden.

Methods and Instructions:

Set-up prior to experiment: Source graph paper and compile data.

1. Compile data in a table for students.
2. Instruct students on how to draw a double bar graph. Place invertebrate groups (i.e. beetles, slugs, centipedes, millipedes and worms) on the X axis (horizontal) and total number collected on the Y axis (vertical).
3. Students compare the graph with their hypothesis and make conclusions.

Activity 3: Sensory Scavenger Hunt

Purpose of Activity: To experience and describe the school garden with each sense.

Methods and Instructions:

Set-up prior to experiment: Copy sensory worksheets.

1. Provide a sensory worksheet.
2. Each student finds a quiet place to sit on their own.
3. Instruct students to write examples of things they see, hear, lightly touched and smell. Encourage them to use descriptive words.
4. Come back together to discuss what they found.

Closure Discussion

1. What organisms did you find in your garden pit traps? How do your results in the forest and garden compare?
2. Compare forest and garden sensory experiences.

References

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Extension of Lesson Plan

1. Complete a Venn Diagram of UBC Forest, UBC Farm and the school garden.



Name: _____

Date: _____

Invertebrate Diversity Experiment Data Analysis

Location

Data was collected at the UBC forest on <ADD DATE> and our garden on <ADD DATE>.

Methods

12 pit traps were set the day before sampling at each location. The rim of each trap was placed level with the soil. Students: checked traps, recorded invertebrate data and carefully released invertebrates back to the forest floor or garden.

Results

Table of the total number of invertebrates by type at each site <ADD YOUR DATA>

Location	Slugs	Beetles	Centipedes	Millipedes	Worms	Spiders	Ants	Sow Bugs
<i>UBC Forest</i>								
<i>Our Garden</i>								

Analysis

1. Graph your results on graph paper using double bar graphs. Remember to include a legend and title. Write the invertebrate names on the horizontal (X-axis). Write the number of invertebrates on the vertical (Y-axis). Your bar graphs will have two colours. All the bar graphs for the UBC forest must be the same colour. All the bar graphs for our garden must be the same colour.
2. What conclusions can you make from your graph?
3. How do the results compare with your hypothesis (written on the waterproof paper you collected your invertebrate data on)?



Invertebrate Diversity Experiment

Hypothesis: _____

Location	Date	Weather	Time	Pit Trap #	Record how many of each type of invertebrate are caught in each trap (Snail, Slug, Beetle, Worm, Spider, Centipede, Millipede or Other)
UBC Forest					
Our Garden					