Habitat in a Bucket

Topic
Habitat

Grades
PreK-5

Site
Indoors

Duration
30-60 minutes

Materials
See page 2

Vocabulary
adaptation, ecosystem, habitat

Next Generation Science Standards

Practices

Asking questions and defining problems

Core Ideas

LS2.C Ecosystem dynamics, functioning, and resilience

LS4.D Biodiversity and humans

Crosscutting Concepts

Patterns (K-2)
Cause and Effect (3-5)

Performance Expectations

See page 5

Focus Question

What questions can be asked and tested in order to better understand a habitat?

Overview

What is a habitat? Students find out firsthand by exploring a "habitat in a bucket" that includes outdoor habitat items (e.g., leaves, branches, snails, etc.) that have been collected and brought into the classroom. Students use the exploration as an inquiry starting point. They make observations, generate questions of interest and design and conduct their own investigations. Typical investigations might focus on plant and animal interactions, food chains, physical and behavioral adaptations of living things and biodiversity.

Objectives

Students will be able to:

- Identify the living and nonliving parts of a habitat.
- Design and conduct an investigation around a measurable question.
- Record data and communicate results.

Background

The hands-on exploration of a habitat is a great way to integrate inquiry and make learning more student-directed. The inquiry process is non-linear and includes exploring, asking questions, investigating and communicating experiences and results. In this activity, students explore the concept of a habitat and go through the inquiry process by investigating a related question that interests them. Comfort with content related to habitats will help in the support and mentoring of students through the inquiry process. For more information on inquiry, see the Exploratorium's "A Description of Inquiry" at www.exploratorium.edu/IFI/about/inquiry.html.

A **habitat** is the place where an organism lives. In its habitat, an organism is able to meet all of its needs: shelter, food and water, necessary light, temperature and oxygen. Habitats can be very diverse. They can be large like a grassland, desert, forest or smaller like a tide pool, cave or the underside of a rock.

VOCABULARY

Adaptations: body parts and behaviors an organism uses to survive in its habitat

Habitat: a home for plants and animals that provides food and protection

Ecosystem: the area where organisms live and interact with each other

Habitats are found within **ecosystems.** These are areas in which organisms interact with each other and with their physical environment. Ecosystems have living and nonliving parts. Living or once living things are called biotic factors and include plants, animals, fungi and bacteria. Abiotic factors are the nonliving parts of an ecosystem and can include air, water, soil, sunlight, temperature and wind.

A community is all the living organisms in an ecosystem. A community contains several populations. A population is all the organisms of one species in an ecosystem. Each population, or species, lives in a specific habitat. Every species fills a niche, or a specific role, in every habitat and ecosystem. Each organism has **adaptations** that help it to survive in a specific habitat.

Habitats worldwide are impacted by the actions of humans. Many plants and animals can be negatively affected if their **habitat** is damaged or destroyed. By making informed choices, we can help protect the world's habitats and the plants and animals that live there.

Materials

For each group:

- Large tub or bucket
- Items from a habitat or habitats such as under a pine tree, the edge of a pond, a flower garden, beach wrack and sand, etc. (items may include leaf litter, compost, dirt, rocks, twigs, seeds, leaves, small animals and insects, evidence of animals, such as feathers, snake skin, etc. *Watch out for and avoid poison oak!*)
- Tools for exploration: hand lens, unsharpened pencil, white paper plate, clear plastic cups
- Paper towels, spray bottles, shoebox lids, Q-tips, flashlights, string
- Foods, such as dry oatmeal, apple slices, carrots
- Different surfaces, such as sand paper, construction paper, plexiglass, foil, wax paper, carpet, artificial turf

For each student:

- science notebook

TEACHER TIP

Inquiry can fall on a spectrum between "open" inquiry which is purely student-driven learning and "structured" inquiry which is more teacher directed.

"Guided" inquiry falls in the middle of the spectrum. You may choose to incorporate the "guided" inquiry components of the procedure.

Teacher Preparation

1. Collect habitat items and bring them to the classroom.
2. Consider and provide for the needs (food, water, light) of the living things you collect.
3. Make a plan for returning the organisms and materials to their original locations.
4. Review the Exploratorium's "Description of Inquiry."

Procedure

1. **SET THE STAGE FOR HABITAT INVESTIGATIONS.**
   Engage students by telling them it's a special day—they get to go on a field trip without even leaving the room! You've brought the outdoors inside and they are going to investigate a habitat in a bucket. Depending on prior knowledge, you may want to discuss the definition and components of a habitat.

2. **REVIEW INVESTIGATION PROTOCOL AND SAFETY.**
Before beginning this activity, review the ethics of collecting animals and the proper care of animals while they are in the classroom. *What are some of the pros and cons of collecting organisms? How can we minimize our impact on the site as we collect? How can we do our best to assure the survival of the animals we collect, so that we can return them outdoors after our studies?* Be sure to remind students to keep different habitats separate from one another.

Inquiry Process: Exploration

3. **GIVE STUDENT GROUPS TIME TO EXPLORE AND GENERATE QUESTIONS.**
Divide students into groups and give them each a habitat. Orient your students to their task: they are to carefully explore their *Habitat in a Bucket*, listing things that they notice and things that they wonder about in their science notebooks. Encourage students to pick things up, smell them, move them around, use a hand lens for observations, place items on the paper plates to examine more closely, etc. Remember to emphasize using care, especially if there are live animals in the habitat. You may choose to give them a time limit so they can pace their explorations (10-20 minutes is reasonable).

   Guided Inquiry: Give students a T-chart graphic organizer to help them organize this list.

4. **PROVIDE SUPPORT DURING STUDENT EXPLORATIONS.**
Circulate among the groups, posing open-ended questions, if the student explorations slow down. Questions may include: *What habitat do you think the bucket represents? What animals may live in this habitat? What makes you think that? What parts of this habitat provide shelter for an animal? Food? Water? What do you notice about the leaves, seeds, etc.?*

   Guided Inquiry: Depending on your content goals, you may focus questions around nonliving versus living components (*Which living things make up this habitat? Which are nonliving? How do you know?),* food web connections (*Do you see any producers? Consumers? What makes you think that?)*, ecosystems (*Who are the community members in this ecosystem*?), adaptations (*Why would one plant have these needle-like leaves and this plant have wide, flat leaves? How does this animal protect itself?*) or other science concepts.

Inquiry Process: Questioning

5. **STUDENTS TURN THEIR OBSERVATIONS INTO INVESTIGABLE QUESTIONS.**
Once the groups have finished their explorations and cleaned up, have them review their "I notice, I wonder" lists in their notebooks. Encourage them to use their notes to turn some into questions that they or other students might want to investigate further. At this point all questions are encouraged.

6. **AS A CLASS, SORT QUESTIONS INTO THOSE THAT CAN BE INVESTIGATED AND THOSE THAT CANNOT.**
Collect and post all student questions. Review the questions with the class, helping them identify those that can be investigated using materials that you have available, those that can be answered by using books or the web, and those that cannot be answered at this time. As a class, remove all questions

CONSERVATION TIPS

Have a class discussion about the use of living things in investigations. The field of science is varied in their approach toward acceptable use of animals in research. Where do the students stand? Model care for living things in the classroom and our neighborhoods.

TEACHER TIP

The inquiry process works best when students' pursue their own questions. It takes time and may be frustrating during investigations.

Trust the process and allow students to make mistakes. It can be a challenge for a teacher not to intervene with answers, but it's important to let them develop their own scientific habits of mind.

that are not realistic. (Good questions will be measurable, observable and able to be investigated using the available amount of time and materials. See "Inquiry Questioning Tips" for more information on questions.) Examples of investigable questions are: What does a leaf look like close up? How far can a snail move in 10 minutes? Will snails be more likely to eat a carrot or oatmeal? Are there more bugs above or below the soil?

Guided Inquiry: Take more of a lead in the facilitation of the question sorting process.

Inquiry Process: Investigate

7. **STUDENTS SELECT A MEASURABLE QUESTION AND DESIGN AN INVESTIGATION.**
Have students choose a question to investigate that interests them. Review each of the questions carefully to make sure it is measurable and realistic. Assist students in the design of their investigation as needed and make sure they have protocols for safety and care especially if working with living things. Once students have received your approval, they may conduct their investigation. A sample investigation for "How far can a snail move in 10 minutes?" may include isolating a snail at one end of the habitat, marking its starting point with a rock and timing it for 10 minutes. Students may use pebbles to mark its path and then measure the distance. The only necessary tools would be a reliable timer, pebbles to mark the path, a measuring tape and a science notebook.

   Guided Inquiry: Choose a question or set of questions for the class to investigate to limit needed materials and tools.

8. **STUDENTS INVESTIGATE THEIR QUESTION AND SYNTHESIZE FINDINGS.**
Students should record their findings in a scientific notebook and prepare a presentation for their classmates. Usually students' investigations, just like those of professional scientists, generate more questions than answers. A sample finding for the path of the snail may include: The snail moved five centimeters in 10 minutes. It didn't move in a straight line. Questions that arise may be: What made it move the way it did? Is that its average speed? How do snails move? Students may make a map of its path or calculate how far it moves per minute or moves per hour based on their collected data.

   Guided Inquiry: You may choose to provide graphic organizers or require specific charts, graphs or tables to display student results and data.

Inquiry Process: Communicate

9. **DISCUSS STUDENTS RESULTS.**
As a class, discuss students' experiences. Questions may include: *What were some of the investigations? What were some of the results? Were results what students expected? Why or why not? What did you learn about habitats? Ecosystems? Adaptations? What would you have done differently in your investigation? Explain. Do you have any other questions now? What would you investigate next? Why? How is what you did like what scientists do? How might it be different?*

ELL TIPS

Inquiry explorations are an excellent opportunity for the natural use of academic language.

Create a vocabulary list of the new words from the exploration. If possible, allow conversations in the English language learners' native language to support the new vocabulary development.

10. **PROPERLY CLEANUP INVESTIGATIONS.**
Make sure animals are fresh, healthy and exhibiting their typical behaviors when investigations are completed. Return animals and habitat components to the location where you found them.

Extensions

- Explore schoolyard or neighborhood habitats. Share your findings with your class.
- Make a map of your exploration. Label the animals and habitats that you saw.
- Pursue long-term questions over a school year. For example, observe seasonal changes of a schoolyard tree.

Resources

Website

Monterey Bay Aquarium www.montereybayaquarium.org
Find animal and habitat information and video clips, plus a wealth of educational ideas in our Education section.

Books

An Earthworm's Life and *A Pill Bug's Life.* Himmelman, John. Children's Press, 2000.

I Took a Walk. Cole, Henry. Greenwillow Books, 1998.

One Small Square—Backyard. Silver, Donald. Learning Joy Press, 1993.

Rolypolyology; Snailology; Spiderology; and *Wormology.* Ross, Michael Elsohn. Carolrhoda Books Inc., 1995-2004.

Salamander Rain. Pratt-Serafini, Kristin Joy. Dawn Publications, 2000.

Standards

Next Generation Science Standards www.nextgenscience.org

Performance Expectations
Relates to K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive

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

Relates to 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved

Common Core State Standards www.corestandards.org

Language Arts, W.1.8
Writing: With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question

Mathematics Practices
MP.2 Reason abstractly and quantitatively
MP.5 Use appropriate tools strategically

THE MISSION OF THE MONTEREY BAY AQUARIUM IS TO INSPIRE CONSERVATION OF THE OCEANS.