

Microhabitat #2: Qualitative Study of Microhabitats

Adapted from: “Wet ‘n’ Wild” in WOW!: The Wonders of Wetlands. The Environmental Concern Inc. and The Watercourse, 1995.

Grade Level: advanced

Duration: 20 minutes – 3 hours

Setting: waterway field site

Summary: Students observe the aquatic life in a wetland or stream area and then create a field guide from what they learned.

Objectives: Students will become skilled at looking closely at their surroundings and learning through observation. In addition, they will discover information about the habits and physical surroundings of the aquatic life that they see.

Related Module Resources:

- Various Macroinvertebrate Activities, Fact Sheets [binder]
- Videos: Creatures of the Pond, SOS for Americas Streams
- Reference Collection:bugs

Vocabulary: habitat, microhabitat, clingers, sprawlers, climbers, burrowers, floaters, quantitative, qualitative

Materials (Included in Module):

- D-frame nets
- Kick nets
- White Plastic Sheets
- Sorting Equipment: Forceps, spoons, & eyedroppers, Magnifying glasses /boxes
- White sorting trays
- Bug ID cups
- Macroinvertebrate guides, field sheets, books [folder and box]
- Brock Microscope

Additional Materials (NOT Included in Module):

- Art supplies
- Clipboards

ACADEMIC STANDARDS (ENVIRONMENT AND ECOLOGY)

7th Grade

4.7.7.A Describe diversity of plants and animals in ecosystems.

- Select an ecosystem and describe different plants and animals that live there
- Identify adaptations in plants and animals

4.6.7.A Explain the flows of energy and matter from organism to organism within an ecosystem.

- Describe and explain the adaptations of plants and animals to their environment

10th Grade

4.1.10.C Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments

- Identify terrestrial and aquatic organisms that live in a watershed
- Explain the habitat needs of specific aquatic organisms

4.7.10.A Explain the significance of diversity in ecosystems.

- Explain the role that specific organisms have in their ecosystem
- Identify a species and explain how its adaptations are related to its niche in the environment

4.7.10.B Explain how structure, function and behavior of plants and animals affect their ability to survive.

- Describe an organism’s adaptations for survival in its habitat
- Compare adaptations among species

12th Grade

4.6.12.A Analyze the interdependence of an ecosystem.

- Analyze the relationships among components of an ecosystem

BACKGROUND: Although ecosystems can be very large, such as rainforests, oceans, and rivers, most organisms do not utilize an entire ecosystem as their **habitat**. A habitat is a place that an organism lives in, which fulfills its need for food, water, temperature, reproduction, and space. Instead, they utilize only a relatively small portion of a large habitat. This is their **microhabitat**.

For example, aquatic insects live in microhabitats that are subdivisions of the larger aquatic system. **Clingers**, like the water penny and the net-spinning caddis fly, are a group of insects that live only on the substrate surface in fast flowing water. The stonefly is a **sprawler** whose microhabitat is composed of rocky or stony substrate filled with leaf and other organic debris. The **climbers** occupy a different microhabitat; they reside primarily on the stems and roots of plants in the slow moving waters at the edge of streams, ponds, and lakes. **Burrowers**, such as the burrowing mayfly, have a microhabitat within silty substrates.

Floaters, such as the mosquito larvae, live just below

the water surface. Insects are not the only organisms in a stream that reside in specific microhabitats; fish, amphibians, and some animals also have microhabitats in our waterways.

It is important to identify and understand microhabitats because destruction of an individual microhabitat can result in the death of an entire species while not showing major changes to the larger habitat. The destruction of certain microhabitats can be a serious threat to the entire ecosystem. For example, excessive siltation may damage the stony microhabitat of the sprawlers. Loss of the sprawlers could have a major impact on the entire ecosystem, yet, the overall habitat would not appear to have been greatly changed. Thus, it is necessary to study not only large ecosystems, but also microhabitats and the specific needs of specific organisms and their relationships with other organisms.

Microhabitats can be studied **quantitatively** or **qualitatively**. A quantitative study requires that data are measure, not simply observed. The amount, number, size, shape, and degree of all factors must be measured and recorded. For example, a quantitative study of an aquatic microhabitat would require recording the amount and type of aquatic life present and could include the study of other water parameters (temperature, water flow rate, etc.). Quantitative studies are also much more concerned about specific scientific procedures in collecting data, procedures that could possibly be repeated in the future to compare data.

A qualitative study is less strict, less scientific in the approach, and is more concerned with visual observations and discovering all of the organisms within the microhabitat. It does not require that measurements and records are made of how many or how much of something is present. The qualitative study simply asks what was observed. And it doesn't really matter how the observations are made; procedures can vary and be less technical because they do not have to be specifically repeated in the future.

OVERVIEW: Students observe the aquatic life in a wetland or stream area and then create a field guide from what they learned.

PROCEDURE:

Teacher Preparation:

Before visiting the site with your students, check it out to be sure that it is safe and wadeable and that there are plenty of different microhabitats. The area selected should be safely and easily accessed. If on private property, permission must be obtained prior to the field trip. All those going on the field trip should be dressed appropriately – with old clothes that can get wet. Make sure everyone is wearing either boots, waders, or old shoes – no one should go barefoot into a waterway.**

Student Activity:

1. Collect and observe different organisms at your site, making notes and sketches to refer to when creating the field guide later. Remember to include plants! You will have to approach the area as quietly as possible, so that animals are not frightened away. Remember to treat the organisms with respect, keeping their stress levels down as much as possible. Also, be sure to leave the area as it was before you arrived. This includes returning all creatures, rocks, logs and other materials back to where they were found.
2. Consider the following questions when making notes about the organisms, but do not be limited by them.
 - Where was it found? Be as specific as possible. (i.e. Avoid saying simply “in the water.” Instead try to specify, “in the vegetation in the water” or “attached to the bottom of a rock in shallow water.”)
 - What was it doing when it was observed and/or caught?
 - What does it look like? Include size, shape, and colors.
 - How does it move? Do you see any special adaptations that allow it to move better?
 - How does it eat? Do you see any special adaptations that allow it to eat better?
 - How does it breathe? Special adaptations?
3. Be sure to examine a number of different microhabitats. For example, explore the surface of the water, the middle of the water column and the bottom of the stream bed. Look at places that have plants and those that don't. Observe places near shore and those farther out.
4. Allow the students to use the field guides to identify the organisms they observed. However, they should not use the field guides while they are observing the animals so they can concentrate on their own powers of observation.
5. Make a sketch of the area and show where the organisms were found. It can be from any perspective – cross-sectional, aerial view, etc.
6. Finish the field guides indoors with the information that was collected.

Waterway Microhabitats

Examples

Riffle (shallow, fast water)
Pool (slow, deep water)
Run (deeper, moving stretches)
Side channel
Puddle
On a sandbar/gravel bed
Next to shore
On the water surface
Within the water column
Under / on large rocks
Under small rocks/gravel
Under/on logs
Within tree roots in water
In muddy bottom
In beds of vegetation
On floating plants

DISCUSSION:

Have the students share their observations with each other. Talk with them about why the organisms look and act the way they do. How might their appearance and actions help them to survive in their habitat and microhabitat?

When the field guides are finished, set aside some time for the students to look at their classmates' work.

Were students surprised at anything they found? Did they expect to find more or less aquatic life?

EVALUATION:

- Identify some organisms that live in water.
- Explain how aquatic organisms are adapted to their environments and microhabitats.

EXTENSIONS AND MODIFICATIONS:

- Have students write a story/poem about their microhabitat or things that live in it.
- Have one or two students examine each microhabitat and write a page for the field guide about it. Then assemble all of the pages to make a complete field guide made by the entire class. Use copies of illustrations from all the supplied resources.
- Focus the field guide only on animals or only on plants, attempting to describe every animal or plant in the area.

NOTES (TEACHERS, PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE):

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