




Lesson Plan: Bugs-Clues to the Environment

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www.naturebridge.org

Goal: Students participate in a biomonitoring project in a local pond or stream. By studying and identifying macro invertebrates that live in that particular habitat, students can determine the health of the ecosystem. This interactive activity is fun for everyone!

Assessment: Students will identify macro invertebrates, learn why certain aquatic life does or doesn't exist locally and will understand that we cannot always see the wildlife around us.

Age Group: Grades 7-8

Time: 1 hour of field work, plus flexible time for indoor analysis and wrap-up.

Materials:

- A body of fresh water, preferably a creek or stream
- Small fish nets, one per pair of students
- Collection device, one per pair of students: Frisbees, ice cube trays, or plastic bowls
- Field guides: 1-2 picture guides or dichotomous keys to aquatic invertebrates
- Magnifying glasses, one per pair of students
- Plastic bug boxes with magnifying lids, one per pair of students

Vocabulary

Macro invertebrates - Are animals without backbones that are large enough to be seen without high-powered microscopes.

Biomonitoring - The presence or absence of certain macro invertebrates in a stream or river to ascertain pollution levels

Background Information for Teachers

Macro invertebrates are animals without backbones that are large enough to be seen without high-powered microscopes. Aquatic biologists detect the presence or absence of certain macro invertebrates in a stream or river to ascertain pollution levels, a process known as biomonitoring. A healthy stream has a mixture of Class 1, 2 and 3 macro invertebrates.

Class 1: Highly sensitive to pollution, absent or present only in small numbers in heavy pollution.

Class 2: Somewhat sensitive to pollution, present in slightly polluted habitat.

Class 3: Tolerant of pollution

Other species: These are present in all types of water and do not indicate the level of pollution.

The class system is designed for moving water rather than still water in ponds and lakes. This lesson is meant to teach biomonitoring as a valuable educational tool, even though monitoring a pond ecosystem may not effectively assess pollution levels.

Preparation

- Copy any needed materials.
- Choose a body of water you can safely and legally visit. If there isn't one available, bring collected animals from another location to your classroom.
- Have additional adults to supervise students for their safety.
- Reintroduce the concept of an ecosystem.
- Fill up the collection devices with stream water. Remind students that aquatic animals must remain underwater to breathe.

Activity

- Using the net, scrape along the underside of plants, skim the surface of the water, or collect gumball-sized mounds of mud from the bottom. Avoid clouding the entire collection pool with mud.
- Turn nets inside out to delicately transfer any collected animals and debris. Repeat the whole process several times.
- Concentrate the macro invertebrates in a container to facilitate identification.
- Students identify and record how many macro invertebrates they collected (this can be done in the field or the classroom). Emphasize caring for the animals and returning them to where they came from on the same day.
- Compile the lists of animals found to determine which class each species belongs in (this can be done in the field or the classroom).
- Students rinse out the nets and collection devices and clean up.
- In the classroom, students write up results and discuss their significance.
- An adult returns the aquatic animals to their habitat on the same day they were collected.

Discussion Questions

- What classes of animals did you find?
- What possible sources of pollution exist in the area?
- What could you do as an individual to maintain clean waterways?
- Volunteers in some communities have established biomonitoring programs. Is there a volunteer biomonitoring group in your community?
- What could your class do to improve the aquatic habitat of your area? (Examples include participating in a creek clean-up, removing plants that are not native to the area, or joining or starting a biomonitoring program.)

Extensions

- Using a simple water quality testing kit, collect chemical data (dissolved oxygen, nitrogen, phosphorus, turbidity, bacteria, etc.) from the same location.
- Have students write a creative piece tracing the journey of a water molecule as it travels through the water cycle in your watershed
- Inventory the stream structure (habitats present, diversity of niches, presence or absence of silt, light).

Resources

Pet stores and large department stores usually carry fishnets.

Pond Life (Golden Guide) is an excellent reference.

Water quality testing kits and other supplies can be obtained from Acorn Naturalists

Minnesota Teaching Standards

7th Grade

Science: 7.4.2.1.1, 7.4.3.2.4, 7.4.4.1.2

8th Grade

Science: 8.1.1.2.1, 8.1.3.4.2