



Lesson Plan: Bugs-Clues to the Environment*

*This lesson plan was adapted from [Nature Bridge](#)

Goal: Students participate in a bio-monitoring project in a local wetland, 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.

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-recommended but not required
- Plastic bug boxes with magnifying lids, one per pair of students-recommended but not required

Vocabulary:

- Macro invertebrates - Are animals without backbones that are large enough to be seen without high-powered microscopes
- Bio-monitoring - The presence or absence of certain macro invertebrates in a stream or river to ascertain pollution levels

Background Information: Macro invertebrates are animals without backbones that are large enough to be seen without 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 bio-monitoring. **A healthy stream has a mixture of [Group 1, 2, 3 & 4 macro invertebrates](#).**

- Group 1: Very intolerant to pollution, absent or present only in small numbers in heavy pollution.
- Group 2: Moderately intolerant to pollution, present in slightly polluted habitat.
- Group 3: Fairly tolerant of pollution
- Group 4: Very tolerant of pollution
- Other species: These are present in all types of water and do not indicate the level of pollution.

NOTE: The group system is designed for moving water habitats and may be less effective in assessing water quality in stagnant or slow moving water.

Preparation:

- Copy any needed materials.
- Choose a body of water you can safely and legally visit.
- Have an adult supervise students for safety.
- Review the concept of an ecosystem.
- Remind students that aquatic animals must remain underwater to breathe.
- Aquatic animals should be returned to the water following identification and counting.

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 at home).
- Emphasize caring for the animals and returning them to where they came from.
- Use the [simple](#) key in the field or the more detailed [dichotomous key](#) if working at home to identify the macro invertebrates sampled.
- Compile the lists of animals found to determine to which tolerance group each species belongs.
- Once the identification and analysis is done be sure to return the macro-invertebrates to their habitat as soon as possible.

Discussion: Consider-

- What classes of animals did you find?
- What can you determine regarding the water quality and ecosystem health of the site?
- What possible sources of pollution exist in the area?

- What could you do as an individual to maintain healthy aquatic ecosystems?
- Volunteers in some communities have established bio-monitoring programs. Is there a volunteer bio-monitoring group in your community?