Water Quality - Macroinvertebrates

SUBJECTS

Biology, Entomology, Limnology

OVERVIEW

In common words, aquatic macroinvertebrates are water ‘bugs’, like dragonflies and water beetles that can be found in water – attached to plants, under stones, and skimming the surface. Also included (but not insects) are crayfish, leeches, snails, and freshwater mussels. Studying these organisms is a fun way to explore what is living in the waters that you play in, swim in, and otherwise enjoy. As a part of studying an aquatic ecosystem, these tiny life forms can tell you the health of a system. Macroinvertebrates can be ‘biological indicators’ because some are more sensitive to pollution and habitat changes. The presence of certain creatures will indicate if the water quality of where they live is excellent, fair, or poor.

	V. SUPERVISOR GUIDE	STUDENT GUIDE
OBJECTIVES	To guide students through the process of collecting, identifying, and assessing the macroinvertebrates found on the site’s waterways.	To know what macroinvertebrates are and to understand that they can be useful indicators of water quality.
BACKGROUND INFORMATION	What is an aquatic macroinvertebrate? Let's break down the term. "Aquatic" means water, "macro" means big (or big enough for us to see without using a microscope) and "invertebrate" means without a backbone. So, an aquatic macroinvertebrate is an insect, crustacean, arachnid, or mollusk that lives in the water and we can see with our naked eye. Many of these macroinvertebrates make their homes in rocks, leaves, and sediment in stream beds rather than in the open water.	
COMPREHEND	The process of collecting, resources for identifying various invertebrates, and the meaning of pollution tolerance for the macroinvertebrates.	The definition of a macroinvertebrate, the definition of water quality, why we should care about water quality, and how it affects the ecosystem (and vice versa).

EQUIPMENT	RESOURCES	TAKEAWAY
- nets - magnifying glass viewers - tubs - ice trays	- iPad with Macroinvertebrate ID app - ID Posters	- The quality of water affects what organisms can live there. - These organisms can help to show us how safe water is (swimming, drinking) and how healthy it is for animals who live there.

	V. SUPERVISOR GUIDE	STUDENT GUIDE
ACTIVITY	1. Before students arrive, have your station set up with sampling supplies: bucket, nets, ice tray/viewing containers, magnifying glass, etc. 2. When students arrive to your station, explain to them what they will be doing. Get them excited! Introduce the water body and give background information about aquatic macroinvertebrates and how these organisms can be affected by water quality. 3. Show and explain the equipment. Go over the procedure on how to collect and identify macroinvertebrates. 4. Organize your students in one of two ways: • All students collect for a period, then switch to identification of their and their classmates samples. • Half of the students collect while the other half identify as organisms are collected. Half way through your allotted time, switch the students so everyone has a chance to do each activity (collect and identify) 5. When identifying and sorting the collection, organize them into groups of: Tolerant, Mild, and Intolerant – their tolerance levels to pollution. **TIP:** Macroinvertebrates are rarely found in the open water. Check under floating mats of leaves, in the sediment (bottom of stream), under rocks, and in "weedy" areas (high in aquatic vegetation).	1. Use the bucket to collect a good amount of water (half way). This is where you will place any macroinvertebrates found. 2. Take turns using the nets to find macroinvertebrates. Do this gently, by using a foot/object to stir up and loosen the organisms from the rocks and sediment. Place the net close to the stream bottom or bank. Make sure that no macroinvertebrates can pass beneath the net. 3. Hold the net downstream (if there is flow), so that the current is flowing into the net. 4. Remove large debris from your net and carefully inspect for clinging invertebrates. 5. Carefully empty your net into your water bucket or tray. 6. Look for organisms that may be caught in the netting. Carefully rinse these bugs into your bucket. 7. Transfer the sample to a separate tray for sorting and identifying. 8. Identify the chosen macroinvertebrates using a magnifying glass and identification sheet. 9. Write down notes on what you found onto your datasheet.
QUESTIONS TO ASK AT THE END	What is the purpose of finding and identifying macroinvertebrates? Where on the food chain are these organisms? How could this affect the ecosystem? Does this affect only the aquatic ecosystem? Why or why not?	