

Lesson 12

Water Finds

Why do we examine aquatic insects?
Why are they important to determining the health of the stream?
What other observations about the stream indicate health?

GOAL To understand that aquatic insects determine health of stream.

OBJECTIVES Students will:

- ✓ identify names of aquatic insects found
- ✓ work together to search for and collect insects
- ✓ use equipment in the proper manner

MATERIALS plastic containers, clipboards, worksheets, pencils, magnifying lenses, biotic index sheets, wading boots (optional)

CORE CURRICULUM CONTENT STANDARDS

- Math 1(2,3), 2(2), 7(1), 10(1)
- Science 3(1-3), 4(1-3), 5(3-7), 6(1)

VOCABULARY biotic index, magnify, identify, observations, macroinvertebrates, pollution tolerance index

PROCEDURES

1. Select a site for a field trip within the watershed. Have students study site to determine health of stream by examining *macroinvertebrates* found there.
2. Prior to site visit, determine safety considerations and access to stream.
3. Upon arriving at site location, distribute equipment and explain protocol.
4. Have students search for and identify aquatic insects. Have them conduct search with smaller groups with an adult leader.
5. Instruct students to look under rocks, in vegetation and bottom of streams. Have them use plastic containers, nets, clipboards, pencils and biotic index sheets. Provide wading boots, if available.
6. Explain to students how to use magnifying lenses or pocket scopes to observe some of the smaller insects.
7. Ensure that students put water in plastic containers and place macroinvertebrates there for further study.
8. Have students record insects on macroinvertebrate identification sheet and draw it.
9. After insects are identified and studied, have students return them to stream.
10. Explain identification process to students. Have students use the biotic index key to determine macroinvertebrate species found. Have them determine the pollution tolerance index by multiplying index value by number of species. (Sheet at end of lesson) This will help students determine health of stream.
11. Have students release macroinvertebrates into stream.

12. Discuss finds with students and determine health of stream.
13. If students are not able to visit a stream or as a follow-up activity, have students participate in a simulated stream field trip.
14. In the classroom, have students imagine they are going on a field trip to a stream bank. Have them “walk” down to the edge of the stream and listen to the ripples of the water. Instruct them to imagine the current of the stream flowing rapidly over the rocks and carrying cool, clear water downstream.
15. Have them draw a picture of the stream bank. Have them reflect on how the stream looked they had previously observed or have them imagine a healthy stream.
16. Once completed with their drawings instruct students to listen to two descriptions of insects to identify. Have them use on-line dichotomous key to determine insect type. <http://www.people.virginia.edu/~sos-iwla/Stream-Study/Key/MacroKeyIntro.HTML>
17. Descriptions are
 - a. insect has segmented legs, six legs, long body, 3 tails, and gills (*mayfly*)
 - b. insect has segmented legs, six legs, long body, no tail, hard, wide abdomen and large eyes (*dragonfly*)
18. Have students find web-site and click on components of (a): segmented legs, six legs, long body, etc. to identify mayfly. Have students click on components of (b) to identify dragonfly.

EXTENSIONS

1. Have students use water thermometers to take temperature of water. Ask what conclusions they can infer regarding the temperature and insects that live there. Ask if the insects require a cool or warm environment.
2. Have students ponder what the absence of insects indicates about the stream. (*problem with water quality*) Ask students if the stream had only one type of insect what does that indicate.

RESOURCES

Edelstein, Karen, *Pond and Stream Safari: A guide to the Ecology of Aquatic Invertebrates*, 1993, Cornell Cooperative Extension.

Etgen, John E. and Garver, Keri, *Healthy Water, Healthy People, Water Quality Educators Guide*, 2003, The Watercourse, Bozeman, Montana 59717-0575.

<http://fluvarium.ca/bioticindex.html>, The Fluvarium, St. John's, Newfoundland.

GLOSSARY

biotic index - an index of or having to do with life or living organisms

identify - to ascertain the origin, nature, or definitive characteristics of

macroinvertebrate - an invertebrate animal (animal without a backbone) large enough to be seen without magnification

magnify - to increase the apparent size of, especially by means of a lens

observations - the act or faculty of observing

pollution tolerance index - a measurement of how much pollution an organism may bear or tolerate

Macroinvertebrate Identification Chart

Macroinvertebrate	Count	Index Value
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Sensitive

Mayflies (Order <i>Ephemeroptera</i>)	_____	X 3 = _____
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Stoneflies (Order <i>Plecoptera</i>)	_____	X 3 = _____
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Caddisflies (Order <i>Trichoptera</i>)	_____	X 3 = _____
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Somewhat Sensitive

Dobsonflies (Order <i>Megaloptera</i>)	_____	X 2 = _____
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Dragonflies (Order <i>Odonata</i>)	_____	X 2 = _____
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Craneflies (Order <i>Diptera</i>)	_____	X 2 = _____
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Snails (Class <i>Gastropoda</i>)	_____	X 2 = _____
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Tolerant

Midges (Order <i>Chironomidae</i>)	_____	X 1 = _____
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Tubifex worms (Class <i>Oligochaeta</i>)	_____	X 1 = _____
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Scuds (Order <i>Amphipoda</i>)	_____	X 1 = _____
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Leeches (Class <i>Hirudinea</i>)	_____	X 1 = _____
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