FIRST GREEN
A GCSAA PROGRAM

Macro Invertebrates

Water is essential to all life. Water is a place to explore and understand the aquatic habitats that water supports. The aquatic environment may be in lakes, ponds, streams and wetlands. Aquatic wildlife, macroinvertebrates, depend on aquatic habitats for survival. Why do these bugs matter?

Aquatic species and ecosystems give humans early warnings about the quality of the environment in which they live. The absence or presence of certain species tells us about the quality of the water. This is called the biotic index.

Explanation of biotic index: In many streams and ponds, several organisms called indicator species tell us about the quality of the water in that area. The macroinvertebrates comprise a biotic index. Their absence or presence tells us something about the water quality. Water with a varied number of creatures is healthy. Water with only a few species indicates the water is less healthy.

Student Learning Objectives

1. **Describe macroinvertebrates, aquatic wildlife and habitats.**
   (Organisms that lack internal skeletons, and are can be seen with the naked eye. They live in ponds, streams and other places where there is enough water, and they are an integral part of stream ecosystems)

2. **Identify several macro invertebrates with help from pictures.**
   (Examples of macroinvertebrates might be; sow bug, scud, backswimmer, mayfly, caddisfly, damselfly, crayfish, beetle and stoneflies.)

3. **Understand the relative environmental quality of the stream or pond.**

4. **Be able to explain the biotic index.**

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Student Worksheet Questions

Review the worksheet questions with students at the beginning of lab and at the end. It may also be printed out for students to complete as part of the field trip.

1. Describe a macroinvertebrate. Name 3 different ones.
2. Why is water important to aquatic species and habitats?
3. Where does the aquatic environment happen?
4. What is the Biotic Index?

Note: The teacher may want to have additional material covered which can be added to these questions. Take time to talk with the teacher in advance of the field trip.

Field Trip Requirements

The day before, make sure you find in your stream or pond, enough macroinvertebrates to have in all your tubs. Each tub should have approximately the same amount, but can all be different types.

1. Ask the teacher to have the students in groups of four.
2. 2 or 3 waist-high tables, for groups to be able to work on both sides.
3. Four to five 12” square white plastic tubs (Bugs show up better in white tubs.)
4. Low, clear plastic cups, 2 per group.
5. White plastic soup spoons to retrieve bugs (4 per group).
6. Wet wipes and garbage bags.
7. Laminated pictures of all possible macro invertebrates – 1 set per 2 groups (included with this lab).
8. Clip board and pencils for each group.

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Field Trip Outline

1. Ask students, “What kind of bugs do you think you’ll see?”

2. Show students the laminated pictures of the macroinvertebrates. Identify each one, and let them look at them close up. (Body type, legs, hairy, exoskeleton, tails etc.)

   (Examples of some invertebrates that they might see in your pond or stream could be: mayflies, stoneflies, dragonflies, caddisflies and worms, beetles, crayfish, scud, backswimmers, aquatic sow bugs.)

3. Explain how fragile the aquatic bugs are, and that students need to be gentle when handling them with the spoons and cups. When they are done with one type, gently place them back into tubs and look for more.

4. Ask students to observe the water first, to see what invertebrates might be on the surface. What are they doing? They might see backswimmers, worms, water boatman, water spiders or crane flies.

5. Students will be excited to start collecting invertebrates with their spoons and placing them in their clear cups for observation.

6. If time allows, have students record on the attached worksheet which macro invertebrates they found and how many of each kind.

7. After the observation time, and if time allows, ask students to finish up their worksheets with their group members.

Wrap Up

1. Tell students you are going to review the lab. While reviewing, ask kids to tell you the answers.

2. Ask students what macro invertebrates they saw and learned about today. Ask students how many macroinvertebrates they saw. Ask them which they liked the best and why.

3. Ask students if they think the water from where you retrieved the bugs is healthy.

4. Ask students, “What could make the pond or stream polluted or hard for macroinvertebrates to live in?” (Some answers might be: soap in the water, oil, fertilizers, sewage, construction, etc.)

5. These pollutants go down a storm drain, and how it ends up in streams and ponds. Briefly explain the difference between storm water and sewer drains. Ask the students how they could help keep the water clean for these organisms and have healthy streams. See our learning lab on water that has this information. (Wash the car on the grass, or go to the car wash, be careful about fertilizers and keep them away from driveways and walkways, scooping the poop, etc.)

6. Ask students what they learned, and how many new words they learned in today’s lab. (macroinvertebrates, biotic index, aquatic species)

Remember to take pictures – the permission forms are on our field trip page.

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Additional Resources

If you'd like to purchase any of the resources listed below, *see http://www.thefirstgreen.org/resources-cited for more information.*

Project Wild, Western Association of Fish and Wildlife Agency, and Western Regional Environmental Education.

Project Wet, Curriculum and Activity Guide, by Montana State University, 1995.

Murdoch, Thomas, Martha Cheo, and Kate O'Laughlin. Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods. Adopt-A-Stream Foundation, 1996. Print.

Freshwater Habitats Trust Identifying Creatures in Your Pond. Web. 8 Nov. 2015.
LaMotte Aquatic Insect Identification Flash Cards, Pkg. of 18, Mfr. Model #:5882-SA1.

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Worksheet for Macro Invertebrates Learning Lab

Lab Extension for older students

Date_____ Golf Course_____

Student Name_____

Weather Conditions: ☐ Clear ☐ Cloudy ☐ Rainy ☐ Other _____

MACROINVERTEBRATE	HOW MANY DID YOU SEE?
Mayflies	
Stoneflies	
Caddisflies	
Other:	

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Worksheet for Macro Invertebrates Learning Lab

Date_____ Golf Course_____

Student Name_____

1. Why is the water important to the aquatic species and habitat?

2. Where does the aquatic environment happen?

3. Explain the biotic index?

4. Describe a macroinvertebrate.

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Print, laminate to make bug identification sheets.

Mayfly

Stonefly

Aquatic Earthworm

Aquatic Sowbug

Freeliving Caddisfly

Case Makers

Scud

Crayfish

Water Boatman

Backswimmer

Crane Fly

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