

Aquatic Ecology: Aquatic Macroinvertebrate Inquiry

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Purpose: Students make deep observations about aquatic life. When we study macroinvertebrates (somewhat large insects - animals without backbones), we can learn about the watershed and its ability to support life, if the water is just right for these “critters.”

Materials: hula hoops, white plastic sheeting, white plastic spoons, white plastic cups, pond guides, macroinvertebrate pages (keys, field guide), microscopes, hand lenses, dip net, bucket with aerator.

The Big Picture:

Phenomena: Aquatic (water) “bugs” are very common, can be found and seen easily, and make us curious about the water world.

Guiding Questions:

- If you were to design a water insect, what would it look like and how would it survive in its water environment?
- What do we notice when we take time to carefully observe aquatic life? How many kinds of aquatic macroinvertebrates are there? How do their characteristics compare to our creative designs?
- What can aquatic macroinvertebrates tell us about the watershed and its conditions?

Anticipatory Set with Independent Thought about Design (Engineering) (10 minutes)

Share with students that “Today we will be studying interesting aquatic macroinvertebrates from [name the body of water and describe where it is].” These are insects and other animals without backbones that live in, on or around the water. For short, we can call them “water bugs,” but today we are really being scientists who ask questions about aquatic macroinvertebrates.

Ask students: what would a bug need to live in and survive in a water environment, like a pond, lake, river, or wetland? List these on the board (air [oxygen], food, water, hiding/shelter from predators, places to mate, ways to move around). Invite the students to draw in their journals, their own design for a water bug that lives on or underwater. Give 5 minutes for drawing.

Direct Instruction (20 minutes)

Have the students share their designs (with partners or whole group) and to give their designer insect a name.

Move the group to the ponds you created in the hula hoops. Ask them to do a quiet, 1 minute observation while they stand and look at the ponds. Next, ask them each to silently scoop out one insect with their spoon and to place that insect in the plastic container. Have them add several spoonfuls of water to the container. Take their bugs back to their seats. Now do a 3 minute silent observation and drawing/journaling time with the students.

Next, the students will do a “Pass-and-Watch”.....to do this, tell the students that they will now move from their insect to the next insect, and then continue to examine each insect for the set amount of time, designated by the teacher’s signal to move to the next insect. As they examine each new bug, they will choose to observe, draw, and/or write notes in their silent observation of the bug. Do this quiet Pass-and-Watch so that each student sees about 6-10 bugs (or more, if there is time).

Guided Discussion

What did you notice about your own bug? What did you notice about the other bugs? What are their shapes? What characteristics or features did the bugs have? How did they move (if they moved)? Did you see any similarities? Differences? Patterns? What explanations do you have for what you saw?

Independent Practice

Handout one color ID page (Macroinvertebrate Field Guide) to each pair of students. Can they find their own macroinvertebrate on the ID guide to learn its name? (If you wish, show, then let students practice using the Key to Macroinvertebrate Life dichotomous key – which is a branching ID guide for comparing characteristics of things in order to identify what they are or “key them out.”)

Closure

Take the group to the hula hoop ponds. Look for and talk about the kinds of macroinvertebrates already examined by the students. Look for and talk about other macroinvertebrates. Finally, invite students to use the Stream Insects and Crustaceans handout. Explain that there are three types of macroinvertebrates. Group One can only be found when the water is unpolluted and healthy for animals that live in it. Are any of the macroinvertebrates in Group One? If yes, then our water is not heavily polluted. If you have some macroinvertebrates from Group Three, you might have water pollution and the insects do not have enough oxygen to survive.

Wrap-up/Debriefing

Ask a think-pair-share question: Talk to a partner: What surprised you about this aquatic macroinvertebrate inquiry?

Whole group question: What was it like being a scientist today studying aquatic macroinvertebrates? Fun, a little “icky,” interesting, maybe a career or a job you’d like? Who else in your life would like to do this activity?