



Lesson Plan



Grade: All - Adaptable and Hands-On Lesson

Title: A Stream Study with Macroinvertebrates

Summary: Students will collect live macroinvertebrates from a nearby river or stream. They will classify and tally the invertebrates in order to determine the water quality.

Supplies in the resource kit:

- Kick Seine Nets
- D- Nets
- Macroinvertebrate ID keys
- Collection Bins and Tubs
- Magnifying Lenses
- Spoons

Supplies needed:

- Copies of Handouts

Objectives

- Identify and describe several aquatic macroinvertebrates
- Define Water Quality and Identify ways a watershed can be polluted
- Explain the role of macroinvertebrates in a stream ecosystem

Background Information:

Many Macroinvertebrates make their homes in the bottoms of gravel-bed streams. Aquatic macroinvertebrates are often used as an indicator of water quality. Using found species, and calculating them on an EPT index, water quality biologists can determine the quality of the water. Finding certain species of aquatic invertebrates likely means that the water has not been heavily impacted by pollution; however it is important to remember that the absence of the species does not necessarily mean the water quality is poor. This could be due to other factors like poor collection, weather and water temperature.

Modifications/Ideas for implementation

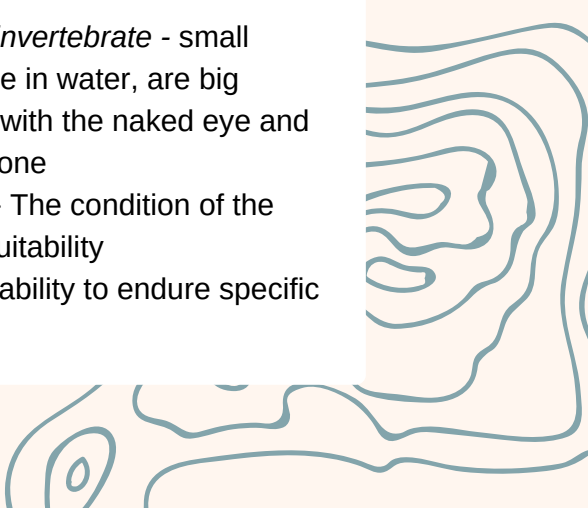
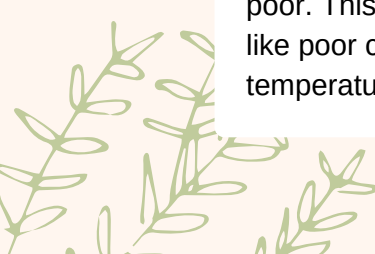
This hands-on learning experience can be modified by adding before and after lessons about Macroinvertebrates and their life cycles, pollution, the water cycle, and outdoor and summer safety.

Key Terms

Aquatic Macroinvertebrate - small animals that live in water, are big enough to see with the naked eye and have no backbone

Water Quality - The condition of the water and its suitability

Tolerant - The ability to endure specific conditions





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Other Resources:

- [Visual on using the Kick Seine Net](#)
- [Water Pollution for Kids video](#)
- [Macro-Invertebrates Informational Packet](#)

Interest Approach:

Start a conversation about streams and creeks with your students. Ask the following questions to build interest.

- What are some living things that you could encounter while at a stream or creek?
 - *Frogs and fish*
 - *Crawdads/Crayfish, Water penny, Mayfly, Stonefly, Snails*
 - *Bacteria*
 - *Pollution*
- What do you think a macroinvertebrate is?
 - *Lead students to the word by breaking it down into parts: Marco meaning large, invertebrate meaning without a spine*
- Ask students why they think Macroinvertebrates are important
 - *Explain how we can use macroinvertebrates to assess the quality of stream*
 - *Explain that by “clean” we don’t mean clear or not dirty. We mean unpolluted or something along those lines*
 - *Remind the students that just because an organism can live in almost any quality of water, they are not just associated with “dirty” water.*

Procedures

Get started:

1. Choose your sample site. Be sure to take into account the safety of your students and to provide clear boundaries. Feel free to use laminated Group cards to divide students.
2. Explain and demonstrate to your students how to collect macroinvertebrate samples.
 - a. Using a Kick Seine net -
 - i. *One student will wade into the stream and place the net so the mouth of the net is perpendicular to and facing the flow of water.*
 - ii. *Another student will stand upstream from the net and disturb the stream bottom with his/her feet and hands.*
 - iii. *Have the students lift the net and hold the sample over a plastic tub, and use a bucket of stream water to wash the organisms into the tub.*
3. Have students sort and identify the macroinvertebrates using the transfer pipettes, magnifying glasses, petri dishes, and identification keys.
4. Record the number of each type of macroinvertebrate found on the Assessment Form, and return them to the stream.
5. At the end of the collection and identification period, have students add up the total of each group and complete the rest of the assessment to form a hypothesis about the water quality.

Safety Tips:

- Keep good lines of communication
- Be aware of medical considerations
- Have access to first aid
- Avoid steep banks
- Scout for excessive trash or litter
- Don't let students enter water over their knees or in fast moving water

Safety Tips Cont.

- Never visit a stream during poor weather events
- Wear appropriate clothing, especially closed toe shoes
- Keep an eye out for poison ivy

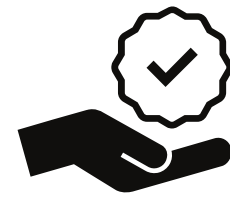
Optional Additional Activity Ideas:

- Sample different sites of the stream, or sample totally different streams
- Keep data each year and compare to previous years
- Have students create their own aquatic macroinvertebrate
- Have students research your own watershed and find ways that your community protects it?
- Many aquatic macroinvertebrates have very unusual feeding habits and can be classified into four groups, called functional feeding groups, depending on their feeding habits. They are shredders, collectors, scrapers (or grazers), and predators. Have your students research what these categories are, and which aquatic macroinvertebrates belong to each category.



Stream Quality

A hands on assessment



In this activity, you will form a hypothesis on the water quality of a stream after taking samples of macroinvertebrates

Group 1 - Only found in clean water

- Stonefly Nymph
- Mayfly Nymph
- Caddisfly Larvae
- Dobsonfly Larvae
- Riffle Beetle
- Water Penny
- Gilled Snail

Group 2 - Can live in a little pollution

- Scud
- Crayfish
- Clams
- Sowbug
- Beetle Larvae
- Crane Fly Larvae
- Damselfly Nymph
- Dragonfly Nymph

Group 3 - Can live in any kind of water, including polluted water

- Black Fly Larvae
- Aquatic Worm
- Midge Larvae
- Leech
- Pouch Snail
- Planaria
- Rat-tailed Maggot

Total # Group 1: _____

(X3) = _____ (Index Value)

Total # Group 2: _____

(X2) = _____ (Index Value)

Total # Group 3: _____

(X1) = _____ (Index Value)

Sum of all index values:

Stream Quality Assessment

Excellent (>22)
 Good (17-22)
 Fair (11-16)
 Poor (<11)

What factors or conditions could affect today's observations and results?

Make a hypothesis about the quality of water in the stream you assessed. Explain your reasoning.

What are some things that could be done in your community to promote stream health?
