

Ages:

10 & up

Canaries of the Pond and Stream

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Main idea: Youth will explore ponds and/or streams to collect and identify the various species that are living there. The diversity of organisms found in an aquatic environment is an indicator of habitat quality and overall environmental quality. The presence or absence of certain macroinvertebrates (large organisms that don't have backbones, such as insects) tells us something about the health of the aquatic ecosystem.

Objective: Youth will use sampling techniques to observe and collect aquatic macroinvertebrates. They will apply biological diversity indexes to classify the health of the aquatic ecosystem.

Materials:

- q ice cube trays
- q shallow white-bottomed pans
- q D-nets
- q plastic spoons

- q magnifying glasses or cubes
- q identification charts

Motivator: Share the following anecdote: Because canaries are more sensitive than humans to dangerous gases in the air, coal miners used to take them into the mines to measure air quality. Their death indicated when the air was not safe to breathe. Aquatic organisms can play a similar role as the absence or presence of certain species is an indicator of water quality.

Questions:

At the start of the activity, ask the students these questions. See Background for help with the answers:

- q How can you minimize the impact you may have on the environment (stream banks, spawning sites, vegetation, etc.) with your collection activities?
- q What is biological diversity?
- q What might a high diversity of life suggest about a habitat? A low diversity?
- q What environmental conditions are important for organisms to survive in an aquatic environment?
- q What might affect those conditions?

Activity:

1. Divide your group into pairs and provide each pair with some collection gear and identification books/charts. Demonstrate collection techniques with the D-net, scoop nets, etc.
2. Allow the pairs to collect their own samples and/or observe collected specimens.
3. Record findings and discuss what everyone found.

4. Combine everyone's observations and decide what to rate the quality of the ecosystem.
5. Demonstrate returning the contents of a pan to the pond or stream from which it came and have everyone do the same with their collections.

Learning checks:

q Compare the insects found in the pond with those found in the stream. Are they different? How?

q How would you rate the water quality in each spot? Give support for this rating.

Background:

Ecologists use biomonitoring as an indicator of how polluted a body of water might be. Biomonitoring involves the temporary collection and identification of aquatic invertebrates. In streams and ponds, the presence or absence of certain organisms reveals a lot about the water quality. Water with a rich diversity of creatures is usually a healthy environment whereas water with just a few different species usually indicates a lower water quality.

Invertebrates are a food source for a lot of other life in ponds and streams. It is important to recognize the connection of these creatures to the larger environment. Although some insects may die during the collection, care should be taken to return as many as possible to the place where they were found.

When sampling in a stream, you will find many immature insects clinging to rocks. In a pond, you will find the most insects near the aquatic plants along the edge. . If you are sampling in a sensitive trout stream or intend to collect specimens without releasing them back into the water right away you will need to obtain a permit from the New York State Department of Environmental Conservation.

Vocabulary:

aquatic: Pertaining to water.

biological diversity: Variety of different species.

biomonitoring: Determining the health of a water body by taking a count of the number of different types of stream organisms and their tolerance to pollutants.

macroinvertebrates: Stream organisms large enough to be seen without a microscope:

water quality: A measure of the health of a water body (can be measured with chemical, biological, or physical parameters).

Extensions:

1. Conduct some chemical tests to measure water quality (pH, dissolved oxygen, etc.).
2. Keep written records of your work so that your group (or a different one) can compare results in the future.