

Lesson 22

Water Checks

What abiotic tests will indicate the health of a stream?
What factors contribute to higher levels of dissolved oxygen in a stream?
Why is it important to monitor the stream?

GOAL To understand that chemical tests provide a snapshot of the health of a stream

OBJECTIVES Students will:

- ✓ conduct abiotic tests at a stream site
- ✓ collect data that can be used to determine the health of a stream
- ✓ compare sites

MATERIALS water and air thermometers, dissolved oxygen kits, pH kits, nitrate kit (optional), clipboards, data collection sheets, pencils

CORE CURRICULUM CONTENT STANDARDS

- Language Arts 2(4)
- Science 3(4), 8(2), 11(6), 14(1)
- Social Studies 10(1,2)

VOCABULARY abiotic, dissolved oxygen, pH level, acidic, alkaline

PROCEDURES

1. Select a site within the watershed for a field visit. Have students study site to determine health of stream by conducting abiotic or chemical tests. Prior to site visit, consider safety precautions and access to stream.
2. Before the site visit, lead a discussion about the tests that will be conducted at the site and their significance.
 - a. Dissolved oxygen (DO) – Aquatic organisms such as the macroinvertebrates require high levels of dissolved oxygen. Swift, well aerated rivers and streams usually have higher levels of dissolved oxygen than slower, meandering rivers. Additionally, photosynthesis from aquatic plants produce dissolved oxygen in the water. Healthier streams tend to have higher levels of dissolved oxygen.
 - b. pH – Aquatic organisms adapt to certain pH ranges and any fluctuation in the levels could lead to stress or death to the organism. A pH scale of seven is neutral. If the pH is above seven, then the water is more alkaline, whereas if the pH is lower then it becomes more acidic. The scale is logarithmic, therefore for one unit of change on the scale, there is a tenfold change. For example if a river has a pH of 5, it is 10 times more acidic than a pH of 6 and 100 times more acidic than a river with a pH of 7.

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- c. temperature – temperature influences the water body because cold water is able to hold more dissolved oxygen than warmer waters. Aquatic organisms’ metabolic rates increase in warmer waters, thereby demanding even more dissolved oxygen. If cool waters are replaced with warmer waters, then cool water species are replaced as well. The organisms would either have to adapt, move on or perish.
 - d. turbidity levels – Turbidity levels test the clarity of the water. Turbid waters would indicate a greater level of sediments in the water. Since some species of benthic macroinvertebrates are bottom dwellers, a higher turbidity level would adversely affect their survival.
3. Have students break up into smaller groups.
 4. Upon arrival at the site, distribute pH kits, dissolved oxygen kits, water and air thermometers, turbidity tubes, nitrate kits (if available), data collection sheets, clipboards, pencils and wading boots (optional).
 5. Choose different areas of sites for students to test. Have different groups conduct tests.
 6. After completion of tests, lead discussion on results and significance.
 - a. a DO higher than 5 can support aquatic life
 - b. pH between 5 and 9 can support aquatic life
 - c. temperature ranges should be between 48°F and 78°F
 - d. turbidity – water that is clear allows sunlight to penetrate through
 7. Discuss the health of the stream with the students based on the results.
 8. Compare results.

EXTENSIONS

1. Find out how streams are monitored in your area and join a stream monitoring group.

RESOURCES

Wow! The Wonder of Wetlands, Environmental Concern, Inc., St. Michaels, Maryland 21663
www.globe.gov.

GLOSSARY

abiotic - nonliving

acidic - having a pH of less than 7

alkaline - having a pH of greater than 7

dissolved oxygen - measurement of oxygen that is passed into a solution (or water)

pH level - a measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity; the pH scale commonly used ranges from 0 to 14

Stream Study – Data Collection Sheet

Names in group _____

Name of stream/brook/river _____

Name of Watershed _____

Data Collected

Air temperature

Water temperature

Dissolved Oxygen

pH

Nitrates