Water Testing

Strand	Living Systems	
Topic	Investigating wetlands	
Primary SOL	6.7	The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include g) water monitoring and analysis using field equipment, including hand-held technology.
Related SOL	6.5	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include f) the importance of protecting and maintaining water resources.

Overview

Prior to starting this lesson, students should have completed the "Water Quality" and "Virginia's Watersheds" lesson, which will provide them with background information necessary to complete this activity.

This lesson focuses on actual testing of water for various indicators of pollutants. Another lesson, the "Macroinvertebrates" lesson, will focus on using macroinvertebrates as indicators to help determine water quality. Both of these lessons will require students to be out in the field, collecting data from a local stream or other body of water. This can be done at the same time, perhaps with one group of students collecting data on pollutants and another group collecting data on macroinvertebrates. Accessibility to a body of water and time constraints will determine the amount of time you can allow students for data collection.

For background information on water-quality indicators, see Chapter 5 of the resource *Virginia's Water Resources: A Tool for Teachers* (available for download at www.vanaturally.com). This resource provides an excellent background for water-quality indicators. You may want to copy portions for students to use as a resource, or you might summarize the information for students in a chart.

Materials

- Water-quality field-test kit
- Test collection equipment
- Wastewater container
- Handheld technology for data collection
- Copies of the attached handout (The exact parameters being tested will change, depending on the parameters of your water-quality test kit. Change the Water Data sheet as needed.)

Vocabulary

abiotic, biotic

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Have students share their summaries from the lesson "Water Quality" lesson.
2. Lead a class discussion in which students propose ways to maintain water quality within a watershed; explain the factors that affect water quality in a watershed and how those factors can affect an ecosystem; and measure, record, and analyze a variety of water-quality indicators and describe what they mean.
3. Show students the water-quality test kits. Review directions for each parameter you will be testing. You may wish to have students practice using the kits in the lab before going into the field.
4. Take students on a field trip to a nearby stream or other body of water to give them hands-on experience testing water samples. Have them collect samples from at least three different areas of the water, perform the tests, and record their data on the data sheet.
5. Have students carefully examine the surrounding habitat, noting plants and animals that grow in or near the water and abiotic factors that might influence the living organisms. Have them record this information in their notebook or on the data sheet.
6. Upon return to the classroom, have students work in teams to write a summary of what they discovered about the area. Be sure to provide students with information regarding acceptable limits of the parameters they tested. Have students include the following:
   - Biotic and abiotic factors
   - Description of plant life in the water and near the water's edge
   - Description of any animals or insects in or near the water
   - Description of their first impression of the water: Did the water look dirty? Was there any litter around? What evidence was there that humans are affecting in the area?
7. Have the teams analyze the data collected. Have them decide whether the body of water is a healthy one or not and explain their reasoning. Also, have them describe their impression of the water after having taken a close look at it.
8. Have teams read their summaries to the class. Using the combined information from the summaries, discuss whether the body of water is healthy. If the water is deemed unhealthy, have each team develop an action plan that includes ideas for cleaning up the water and the reasons it is critical to do so.

Assessment

- **Questions**
  - What are some of the causes of poor water quality—i.e., the types of things that may cause the pH of water to be out of balance or the dissolved oxygen level to be very low?
- **Other**
  - Use students' data sheets and summaries of water quality for assessment.

Extensions and Connections (for all students)

- Follow this lesson with the one entitled "Macroinvertebrates."

Strategies for Differentiation

- Provide a variety of water samples for students who are unable to collect samples outside.
- Have students take pictures of the surrounding habitat for use back in the classroom and for use by students unable to go outside.
- Give students several examples of biotic and abiotic features, and have them sort the features into appropriate categories.
- Direct students to draw pictures of their discoveries in explored areas, labeling their findings instead of writing a summary.

Water Data

Name: _____ Date: _____ Class: _____

Name of body of water: _____

Date(s) of tests: _____

Air temperature during tests: _____

Water Test	**Location #1** _____	**Location #2** _____	**Location #3** _____	**Average**
Temperature				
pH				
Dissolved oxygen				
Nitrates				
Phosphates				
Turbidity				
Salinity				

Describe the biotic and abiotic factors that you observed in this area: