Observing A Stream

Virginia SOL

- *Science* K.2, K.4, 1.8, 3.6, 3.10
- *Social studies* K.3, 1.5, 2.6
- *Language arts* K.2, K.11, 1.2, 1.12, 3.1
- *Math* K.10, K.17 1.12, 1.20, 2.12, 2.19, 3.14, 3.17
- *Technology* C/T5.2

Objectives

- Discuss different water places that give students pleasure
- Predict characteristics of a local stream site
- Make observations of the local stream site with prompting from the teacher
- Observe stream surroundings, stream water, and stream bottom
- Describe the stream site in words, writing, and by drawing
- Generate questions of interest about the stream for further study
- Discuss stream observations and what they indicate about stream health
- Create a poster display to communicate observations and questions

Materials

- Copies of *Observing a Stream Worksheet*
- Notebooks and pencils
- Cameras
- Compass and measuring string
- Clear plastic cups or bottles for water
- Other collecting equipment (plastic bags, tweezers, buckets, nets, etc.)
- Magnifying lenses
- A large map of the community
- Drawing materials and poster supplies

Safety & Regulations

Follow guidelines in the Introduction section *Planning a Safe Trip*. Adult chaperones are needed for the field trip. Students should not taste anything.

Time Needed

One class period, plus time for field trip

What are the detailed characteristics of a local stream?

Students will visit a site close to school that is suitable as a local water study site. The students will carry out a preliminary survey to discover information about local land use and water quality. After the visit, the students will document their fiindings by drawing and mapping the site. Students will also generate questions about the stream relating to land use or water quality that require further study.

The stream is part of a larger catchment basin or watershed. A watershed is the area drained by a water body. For example, thousands of creeks, streams, and rivers in Virginia ultimately drain into the James River. The land that these streams and rivers drain is considered the James River watershed. Some watersheds are very large, including the Chesapeake Bay watershed that drains 64,000 square miles of land in New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia. Other watersheds can be very small, measuring just a few acres.

For example, the parking lot of your school may drain into a nearby stream or pond that has a small watershed area. The topography of an area determines the shape of the watershed. The surrounding land and uses of the land influence the water quality of streams, ponds, and other water sites within the watershed. Field observations at the stream increase the students' ability to make connections between land characteristics in their watershed and water characteristics.

Vegetation beside the stream can decrease the amount and speed of water running off the land into the stream. This will help maintain water quality by reducing erosion, trapping soil particles, and absorbing nutrients from the runoff water. The vegetation also provides habitat for wildlife. Shade trees over a stream improve water quality in at least two ways. The shade lowers water temperature, which increases the dissolved oxygen content of the water. Also, leaves that fall into the water provide food for organisms living in the stream.

Inside the stream, diversity of water flow, with both slower pools and fast riffles, provides a variety of habitats for different animal species or the same species at different stages of its life cycle. Rocky stream bottoms are found in much of Virginia, including the Valley and Ridge and Blue Ridge Mountains. These streams offer a variety of current velocities as the water flows around the cobbles and pebbles. The rocks also provide attachment sites and hiding places for many animal species (mostly aquatic insects) and surfaces for algae to grow. For all these reasons, aquatic insects are usually found in great abundance and species diversity in Virginia's rocky bottom streams. In the Coastal Plain of Virginia streams are more likely to have sandy or muddy bottoms, and in Virginia's Piedmont the streams vary from rocky to sandy to muddy bottoms.

People often depend only on their sense of sight for making observations. In this lesson students should use other senses (hearing, smell, and touch) to obtain additional information about their environment. Using more of the senses provides a broader range of information and therefore an opportunity for greater learning. Students will create a display of the different observations they make at the stream site. A stream provides an ideal opportunity for people to use senses other than sight. Water can be heard as it moves through riffles and against stream banks. Wind makes sounds in vegetation around a stream, and insects and other wildlife also make sounds. Various chemicals in the water can cause it to smell, and there are also smells from earth and plants. The water can be touched, as well as other materials around the water. At all times, while exploring the stream, it is important to follow established safety procedures, and students should never be allowed to taste anything.

LESSON INTRODUCTION

Begin by asking students what they already know about local bodies of water. Include

questions such as the following.

- Is there a lake, river, pond, or stream that you visit?
- What is your favorite pastime at this place?
- Why is this body of water important to you?

Discuss some local water sites with the students and together choose a stream that is close to the school and suitable for a class visit.

Review the five senses with the students. Discuss how the senses are used in daily life. Ask students about previous visits they have made to natural areas, and ask them how their senses were involved in those visits.

Ask students about how they make observations and discuss with them how to make their observations rich with details. Ask students to predict what they expect to observe when they visit the stream site. Finally, review the safety rules for the visit to the stream site. Safety rules are suggested in the Teachers' Guide section of this packet, under the heading *Planning a Safe Trip*.

ACTIVITY PROCEDURES

At the water site:

For younger students...

Have the students walk around in groups, making observations and asking questions about the stream. Students can use the *Observing a Stream Worksheet* to record observations and questions. Ask the students to observe what is nearby the water and how the surroundings might affect the water. Collect a sample of water in a container and pour some of the water into clear plastic containers for the students to observe. Ask the students to observe the color of the water sample and what they see in the water. Ask students to observe whether the water in the stream is moving and how fast. Also ask students to observe the bottom of the stream. Ask groups to draw pictures of the study site. They should compare the water location to other features on the study site such as trees, hills, and buildings. Encourage the students to ask questions about the stream, including where the water comes from.

For older students...

Assign teams of students to observe different sections of the site. In teams made up of a journalist, a photographer, a sketcher, and a mapper, students should begin documenting observations for their section. Students should observe both the water in their section and the land bordering the stream. Students should record plants and animals observed in and around the water. Students should map the general contours of the land in their section and especially notice the slope of the land alongside the water.

Have students make observations of the stream and surroundings using four of their five senses. They should write observations on their *Observing a Stream Worksheet*, and also

draw pictures. Ask the students to look at the water and surroundings and record what they see. Ask the students to listen to the water and surroundings and record what they hear. Ask the students to smell the water and surroundings and record what they smell. Ask the students to touch and feel the water and surrounding materials and record what they feel. Encourage students to block other senses while using one sense to make observations. For example, they might close their eyes while listening. Ask the students if they could hear better when they were not able to see.

Prompt students as they work to help them make good, detailed observations. This will help the students later as they attempt to understand new concepts. The *Observation Guide* is helpful for forming followup questions prompting students to elaborate on initial observations. The matrix is adapted from the article *Oh Say Can You See*? by Checkovich and Sterling (listed in Resources). The matrix includes prompts for students to elaborate observations made using each of the five senses as well as suggestions for other areas they may not have thought to observe.

Back in the classroom:

For younger students...

Ask the small groups of students to work together and communicate their observations made at the stream by completing pictures and maps of the site. Ask each group of students to share their observations with the class. Discuss the observations with the class. Ask students what they think their observations can tell us about the water quality and health of the stream. Have the students continue to brainstorm questions about the stream site that they would like to try and answer.

For older students...

Students from different small groups should create a joint display of all their drawings and maps. Work with the whole class to discuss and record similarities and differences of different sections of the stream site. As you discuss the students' observations about the stream site, ask students to speculate what the observations might tell us about the water quality and health of the stream. Have students work in their small groups to form questions about where the water comes from, how it flows through the site, and where it goes next. Also have the groups of students ask questions about how the area surrounding the water influences the quality of the water, particularly during periods of heavy rain, flooding, and snowmelt. Record questions asked by the students on a poster for the classroom.

QUESTIONS

- What plants and animals did you see?
- Was the stream fast or slow moving?
- Was the appearance of the stream different in different locations?
- How would you compare the feel of rocks collected from the stream with rocks from outside the water?

- What land use activities were taking place around the water?
- How did the water appearance compare for different sections of the water site?
- Was there evidence of water use either by humans or by animals?
- How do you think the water appearance would change in different seasons or different weather conditions?
- Based on its appearance, how would you rate the quality of the water?

ASSESSMENTS

- Observe students working in groups at the stream and back in the classroom. Informally evaluate students on their group skills, their observations, their descriptions of the site, and the questions they ask.
- Have students make entries in their science journals/learning logs describing their observations and what they have learned about the stream. Students should list examples of sights, sounds, smells, and feelings observed at the stream site.
- Have students work in small groups to create displays of their observations. These should include observations about the surroundings of the stream, the water itself, and the stream bottom or substrate. Students can include both drawings and written descriptions.
- Have the whole class work together to create a visual display of what they have learned about the stream site. This should include information about the body of water, the surrounding land uses, and the impacts (positive and negative) of land uses on the water quality. This display can then be shared with others at the school and in the community.

EXTENSIONS

- Record measurement observations. The water and air temperatures could be measured at different locations at the stream site. Also, the speed of water flow can be measured by timing how long it takes for an object to float a certain distance. For example, if a colored ball or piece of wood held by a long string takes 10 seconds to float 20 yards downstream, then the water speed is 2 yards per second.
- Take students back to the stream periodically and have them record further observtions, then compare observations and note changes over time.
- If there are any signs of pollution or litter at the stream site, discuss this with the students. Talk with parents and other teachers about organizing a stream clean-up to collect and dispose of litter. Consult with experts first to ensure safety as well as proper disposal of collected litter.
- Have students prepare a written report of features and characteristics of the water site.

- Have students write stories describing adventures of different creatures living in the stream.
- Have students research how streams in other geographic regions of Virginia may differ from their own stream site.

RESOURCES

For the teacher...

- At Home with Water. *Waterways: Links to The Sea.*
  Drawing favorite local water sites and learning of new ones.
- *Bay FAQ*. The Chesapeake Bay Program. *www.chesapeakebay.net/about.htm*
- Geology of Virginia. Virginia Department of Mines, Minerals, and Energy. *www.mme.state.va.us/dmr/DOCS/Geol/vageo.html*
- Life in the Fast Lane. *Project WET*.
  Investigating temporary wetlands in the neighborhood.
- Oh Say Can You See? Checkovich, B. H., & Sterling, D. R. (2001). *Science & Children, 38*(4), 32-35.
  An article at the elementary school level, describing a simple strategy for improving students' observation skills.
- Puddle Wonders. *Aquatic Project Wild*.
  Observing water and associated wildlife accumulated in puddles on or near the schoolgrounds.
- Stream Sense. *Project WET*.
  Using multiple senses to observe a stream.
- The Nature Walk: Looking for Animals. *Activities for Elementary School Science.*
- Water Walk. *Globe*.
  Exploring a local water site, observing the water and surrounding land use, and asking questions relating to the water and water quality.

For the student...

- *Wonders of Rivers (Learn About Nature).* Bains, R. (1989). Troll Communications.
- *Life is an Adventure.* A play for students about riparian habitats. Available from *www.vanaturally.com*

Observation Guide

(Adapted from Checkovich & Sterling, 2001)

This Observation Guide provides suggested prompts for helping students make better, more detailed observations. The additional details will help the students later as they attempt to understand new concepts. The matrix is adapted from the article *Oh Say Can you See?* by Checkovich and Sterling (listed in Resources). The matrix includes prompts for students to elaborate observations made with each of the five senses, as well as other suggestions for enriching observations. Students should not be allowed to taste anything during the Observing a Stream lesson.

Making More Detailed Sense Observations				
Look	**Listen**	**Taste**	**Smell**	**Touch**
Color?	Volume?	Sweet?	Sweet?	Texture?
Size?	Pitch?	Sour?	Sharp?	Density?
Shape?	Tone?	Bitter?	Rotting?	Hardness?
Position?	Rhythm?	Salty?	Burned?	How is it made?

Different Things to Observe		
What is it you are describing?	Temperature?	Movement?
Can you compare it to something else?	Reflections?	Speed?
Patterns?	Shadows?	Sequence in time?
Markings?	Shiny?	Time of day?
Location?	Age?	How many?
Health?	What is happening?	Measurements?
How is it being used?	Behavior?	Geometrical shapes?
Wet or dry?	Expressions or gestures?	Neat or messy?

STUDENT HANDOUT

Observing A Stream Worksheet

What can you observe about the stream?

1. STREAM SURROUNDINGS

Describe what is on the banks of the stream and nearby.

2. STREAM WATER

Describe the water as well as how the water is flowing.

3. STREAM BOTTOM

Describe the bottom of the stream.

What are some questions you would like answered about the stream?