

# Watershed

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<b>Strand</b>	Earth Resources
<b>Topic</b>	Investigating natural resources
<b>Primary SOL</b>	4.9 The student will investigate and understand important Virginia natural resources. Key concepts include a) watershed and water resources.
<b>Related SOL</b>	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which m) current applications are used to reinforce science concepts.

## Background Information

A watershed, also called a drainage basin, is a geographic area in which all water drains eventually into a common body of water. Water traveling over land can carry soil sediments, dissolved minerals, livestock and pet waste, fertilizers, pesticides, and other pollutants, including trash and litter. Each watershed has unique features and potential sources of pollution. Nonpoint-source pollutants are those that cannot be traced to a single source (e.g., run-off from fertilizer, air pollutants, fuel run-off).

In Virginia, the major regional watershed systems lead to the Chesapeake Bay, the Albemarle Sounds, the Atlantic Ocean, or the Gulf of Mexico (via the Mississippi River). A map is attached that shows the Virginia boundaries of these watersheds.

Watersheds connect towns, villages, cities and counties. What happens in the headwaters of a watershed has an effect on everyone downstream. Wildlife and plant species are often connected to a watershed and may not be able to move from one watershed to another without assistance from humans. An example would be zebra mussels which entered the Great Lakes through ballast water and have since moved through the rivers that connect to the lakes costing millions of dollars in damage. There is a national effort to delay the movement of these mussels into other watersheds including those in Virginia.

## Materials

- Copies of the attached Virginia's Watersheds map for each student
- For each group:
  - Aluminum foil
  - Shallow, rectangular pan of any material
  - Food coloring or powdered drink mix
  - Soil
  - Spray bottle
  - Rocks or blocks

## Vocabulary

*watershed, pollution, nonpoint-source pollutants*

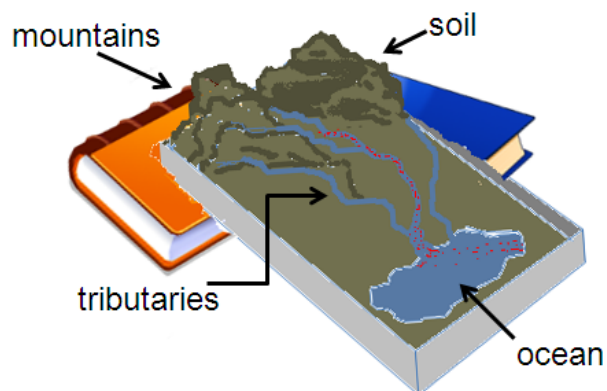
## Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

### Introduction

1. Ask students where water goes after it flows down the street during a heavy rainstorm. Discuss the concept of a watershed and how water travels over and through the land. Provide some examples of how individuals and businesses use water and how their actions might affect water running off the land, such as sewage treatment plants, homes, commercial and residential developments, farms, and factories. Help the students make the connection between people living in the watershed and the impact that they have upon water quality; especially, nonpoint-source pollution.
2. Discuss the speed at which water flows and how moving water changes the land. You may wish to refer to the branches on a tree, or the veins in a leaf, or the human nervous system to depict how bodies of water “branch out.” The smaller branches are analogous to streams branching into larger ones, such as rivers, and so forth. Explain that watersheds can be open or closed depending on where the water drains. In closed systems, there is no outlet for the water, so it leaves the system naturally by evaporation or by seeping into the ground to become groundwater. In open watershed systems, such as those found in Virginia, water eventually flows into outlet rivers or a bay or gulf and ultimately into the Atlantic Ocean.

### Procedure

1. Place students into small groups of two to three students to make a model of a watershed.
2. Tell students to tear off one piece of foil to fit inside the shallow, rectangular pan.
3. Have students crumble another piece of foil to make dips and gullies to represent streams and rivers. At one end of the foil, make a large pocket or basin. This will be a bay or ocean and will collect water that runs off from the dips and gullies that represent the tributaries.
4. Tell students to put rocks or blocks in the corner of one side of the pan to make mountains, and shape the foil over the blocks.
5. Ask students to pile the soil at the upper end of the watershed near the mountains on top of the raised sections of foil. Students can make the mountain end higher by putting a book under the pan to prop it up.



6. Have the students squeeze a few drops of food coloring in the soil to represent a source of pollution.
7. Students can make it rain over the mountains by gently misting the mountains and soil with a spray bottle.
8. Have students observe how the water runs off of the land into the tributaries and then to the bay or ocean, carrying the pollution with it.

#### *Observations and Conclusion*

1. Discuss with students how the water travels through the watershed:
  - Where does erosion occur?
  - How does the flow of water through the watershed affect choices for building sites?
  - What happens to the “pollutants”? Where do they end up?
  - What factors may lead to increased pollutants, such as run-off from sediments, industrial wastes, phosphates and nitrates from agricultural sources, sewage, and residential run-off including pesticides?
  - What are some ways to reduce or prevent these nonpoint-source pollutants? How could you slow down water so it would filter the run-off?
  - How does water conservation help water quality?

#### **Assessment**

- **Questions**
  - Where does erosion occur?
  - Why is it important to limit pollution in the city which we live?
- **Journal/writing prompts**
  - Have students evaluate the statement “We all live downstream.” and the effect this fact has on them.
- **Other**
  - Have students use the Virginia watershed map to determine how pollutants upstream would affect a particular location downstream.

#### **Extensions and Connections (for all students)**

- Have students keep a journal of a local waterway and note any changes in how the water looks or smells, the condition of animals, and things being built nearby.
- Have a representative from local forestry or conservation services speak to the class about natural resources, watershed, etc.
- Create “Chesapeake Bay Watershed Awareness” or “Clean Up the .....” posters to display in local businesses to raise awareness of things those members of the community can do to clean up the watershed.
- Create “Cause-Effect” graphic organizers that include items polluting the local watershed and the results that pollutant has on wildlife.

#### **Strategies for Differentiation**

- Direct students to create a watershed with a computer program or an online Web site.

- Complete this activity outside with a shower curtain and have physical toys represent certain things in an environment and then use a spray bottle to make it rain.
- Create roles for students in their group, such as Polluter or Builder.
- Research projects being conducted around the state to clean up a body of water in their neighborhood (Chesapeake Bay, Lake Gaston, etc.).

