Watershed Models

Investigative Question: What is a watershed?

Goal: Students build a model to explore watershed characteristics and use the model to learn how landscape characteristics (such as elevation, slope) determine the flow of the water in a watershed.

Learning Objectives:

Knowledge- Students learn that water flows from high elevations to low elevations and that the highest elevations (such as ridge lines) define the upper boundaries of a watershed and the lowest elevations (such as rivers, ponds, or lakes) define the lower watershed boundaries. Students also learn that slope influences erosion.

Skills- Students practice inquiry investigations and questioning skills, making predictions and observations.

Values - Landscape dictates human use and humans change landscapes to suit building needs.

Virginia SOL: Science 4.1, 4.9; VS.2

From VA Science SOL 4.9 Curriculum Framework:

- A watershed is an area over which surface water (and the materials it carries) flows to a single collection place. The Chesapeake Bay watershed covers approximately half of Virginia's land area. The other two major watershed systems are the Gulf of Mexico and the North Carolina Sounds.

- Virginia's water resources include groundwater, lakes, reservoirs, rivers, bays, and the Atlantic Ocean.

Materials (per group)
- Aluminum pan (turkey roasting pan)
- Plastic table cloths
- Squirt bottles with water and food coloring
- Newspaper/recycled paper
- Sticky post-it notes or arrows
- Pepper shakers filled with pepper
- Virginia Relief Map
- Virginia's Geographic Regions (one region per group) Cards

Set Up

For each team/group of 4 students, place a set of the materials listed above at each work table/location.

Special Safety

Floor can become wet from the spray.

Watershed Models

Procedure/Instructional Practice

1. <u>Inquiry Engagement, Part 1</u>: Ask students some of the following questions: How does water get to your house? Where does the water go after you use it? Where does water go after it falls on land?

2. <u>Inquiry Engagement Part 2</u>: Once students are thinking about water and how it gets to different places, inquire: What is a watershed? Describe a watershed. Do you know your watershed address (i.e., Do you know what watershed you live in)? A watershed is an area of land over which water flows to a single collection place. Ask students for examples of watersheds.

3. <u>Explore (investigation instruction)</u>: Each student group will pick a geographic region card from a bag. Instruct students that they are to build a landscape, based on the geographic region card they picked, using the materials found on their tables (see the materials list). Model the following process :

   a. Quickly describe a landscape for the students, such as the Rockies or the Himalayas or a desert valley. Ask students to describe how that landscape will look.

   b. Place crumpled paper in a turkey pan to lay the foundation for mountains and valleys.

   c. Form the landscape by placing the plastic table cloth over the paper form (tuck in the sides so the water stays inside the tray).

   d. Tell students to use the post-it arrows to predict the ways water will move over the landscape; i.e., what direction will the water flow when it rains?

   e. Once the landscapes are built, students use the spray bottles to simulate rain on their landscapes. They observe how the water moves over their landscapes to determine if their predictions about water flow were accurate. After students have made their initial observations and have evaluated their predictions about water flow, they can sprinkle pepper on their landscapes to model erosion of soils and/or rocks. When the students use the spray bottles again to create "rain", they can explore the process of erosion and how the angle of slope (steepness) affects erosion.

   f. As students work in their teams, go to each group and ask:
      i. Where are the high and low elevation points?
      ii. Where are the steepest slopes? The more gentle slopes?
      iii. What determines where the water will go?
      iv. How would you describe some of the water resources? (are there lakes, rivers, a bay? An ocean?)
      v. Did the water move as you predicted?

   g. Tell student teams that at the end of the activity, they will share their model with the rest of the class and answer the above questions during a gallery walk.

4. <u>Gallery Walk/ Explain</u>: Instruct students to put down spray bottles. Remind students that they will share the above details with the rest of the class during the gallery walk. Ask the class to hover over the table while each of the student teams describe and SHOW how water moves (using the spray bottle; nice visual).
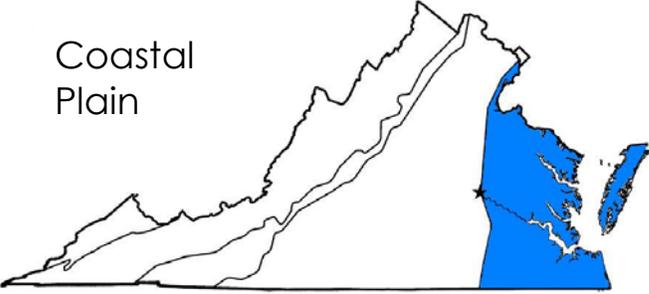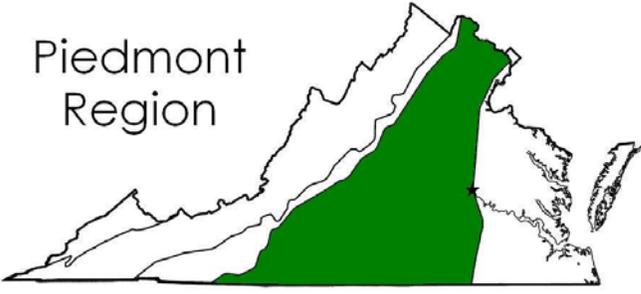
Watershed Models

5. <u>Clean up:</u> While students are working on their paragraph (if you choose to do the extension activity), ask your instructional helpers to bring the entire model to a designated place to empty the water and either discard or save for future models the recycled papers. The plastic table cloths should be taken outside and shaken to remove as much water as possible. At the end of the instructional day, hang the tablecloths outside to dry, if possible. If no instructional helpers, you can designate roles in the student teams.

Extensions

After the gallery walk, ask students to provide details on what they learned about watersheds from this modeling activity. Ask them to raise hands and give responses to 'What is a watershed?' they can use the key words and concepts they generate to write an explanatory paragraph to help develop skills in writing.
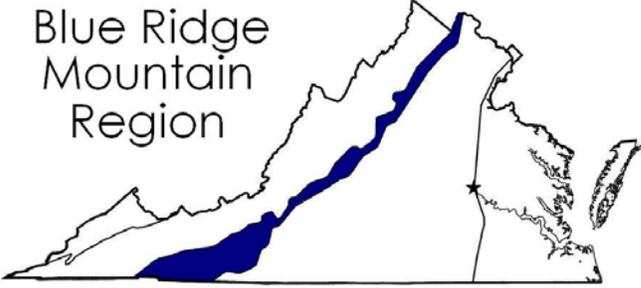
Watershed Models

Coastal Plain

Characteristics

- Land is low in elevation flat & close to the ocean
- Location near Atlantic Ocean and Chesapeake Bay
- Includes Eastern Shore
- East of the Fall Line

Products
- Seafood
- Peanuts

Industry
- Shipbuilding
- Tourism
- Military

Piedmont Region

Characteristics

- Land at the Foot of Mountains
- Gentle, rolling hills
- West of the Fall Line

Products
- Tobacco
- Corn
- Information Technology

Industry
- Farming
- Horses
- Federal & state government

Watershed Models

Blue Ridge Mountain Region

Characteristics

- Old, rounded mountains
- Part of Appalachian mountain system
- Located between the Piedmont & Valley and Ridge
- Source of many rivers

Products
- Apples
- Small Family Farms

Industry
- Recreation
- Farming
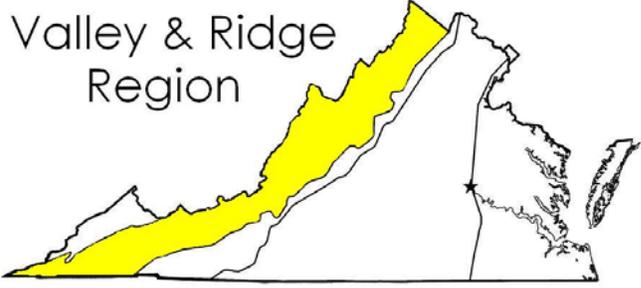
Valley & Ridge Region

Characteristics

- Includes the Great Valley of Virginia and other valleys separated by ridges
- Part of Appalachian mountain system
- Located west of Blue Ridge Mountains

Products
- Apples
- Poultry
- Dairy

Industry
- Farming

Watershed Models

Appalachian Plateau Region

Characteristics

- Located in Southwest Virginia
- Plateau makes this region higher in elevation than other VA regions
- Only a small part of the plateau is located in Virginia

Products
- Coal

Industry
- Coal Mining

Region maps accessed 2/10/16 at
http://www.lcps.org/cms/lib4/va01000195/centricity/domain/5598/varegionsstudyguide-key.pdf