Watershed Models

Investigative Question: What is a watershed?

Goal: Students build a model to explore watershed characteristics, using the model they 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 SOLs : SOL and skills for all grades can be found in the table at the end of the document.

Materials (per group)

- Aluminum pan (turkey roasting pan)
- Plastic table cloths
- Squirt bottles with water and blue food coloring
- Newspaper/recycled paper
- Sticky Post-It notes arrows
- Pepper shakers
- Towels (for clean up)
- Virginia Relief Map (http://www.onlyglobes.com/Virginia_Maryland_Delaware_Raven_Raised_Relief_Map_p/958.htm)
- Virginia's Geographic Regions Cards (one region per group, at end of document)

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.

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Procedure/Instructional Practice

1. Inquiry Engagement, Part 1: 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. Inquiry Engagement Part 2: 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. Explore (investigation instruction): Each student group will select a geographic region card. Instruct students that they are to build a landscape, based on the geographic region card they selected, using the materials found on their tables (see the materials list). Model the following process :
    a. Quickly read the geographic region card for the students. 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 slope (steepness) affects erosion.
    f. As students work in their teams, ask each group:
        i. Where are the high and low elevation points?
        ii. Where are the steepest slopes? The more gentle slopes?
        iii. Did the water move as you predicted?
        iv. If this was your landscape, were would you put a building and why?
        v. What are some landscape factors we need to consider when we build?
    g. Tell student teams that at the end of the activity, they will share their model with the rest of the class and answer these questions during a gallery walk.

4. Gallery Walk/ Explain: 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).

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5. Clean up: 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 the recycled papers for future models. 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.

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Watershed Models

Watershed Models	4th	5th	6th	Skills
Language Arts (2017)	4.1 The student will use effective oral communication skills in a variety of settings.	5.1 The student will listen, draw conclusions, and share responses in subject-related group learning activities.	6.1 The student will participate in and contribute to small-group activities.	
	4.7 The student will write in a variety of forms to include narrative, descriptive, opinion.	5.7 The student will write in a variety of forms to include narrative, descriptive, expository, and persuasive.	6.7 The student will write in a variety in a variety of forms to include narrative, descriptive, persuasive, reflective.	
Social Science (2015)	VS.2.b locating and describing Virginia's Coastal Plain (Tidewater), Piedmont, Blue Ridge Mountains, Valley and Ridge, and Appalachian Plateau VS.2.c locating and identifying water features important to the early history of Virginia (Atlantic Ocean, Chesapeake Bay, James River, York River, Potomac River, Rappahannock River, and Lake Drummond and the Dismal Swamp)	USI.2 The student will interpret maps, globes, photographs, pictures, or tables		Skills Progression: 1b Applying Geographic Skills Skills Progression: 1i Exercising Civic Responsibility

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Watershed Models

	4th	5th	6th	Skills
Science (2018)	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations	6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations	Scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted. (ES.1c) (Modeling, Analyzing Data)
	4.8 The student will investigate and understand important Virginia natural resources. Key concepts include a) watersheds and water resources	5.8 The student will investigate and understand how Earth's surface is constantly changing d) weathering, erosion, and deposition	6.6 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment	The components of a system are defined. (PH.1a)
	4.3 human impacts on ecosystems		6.8 The student will investigate and understand that land and water have roles in watershed systems.	Length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques. (3.1e)
			6.9 The student will investigate and understand public policy decisions relating to the environment	Predictions are made based on patterns of observations. (1.1h) Questions are developed to formulate hypotheses. (3.1g) Inferences are made and conclusions are drawn. (3.1j) Models are constructed to clarify explanations, demonstrate relationships, and solve needs. (4.1l)

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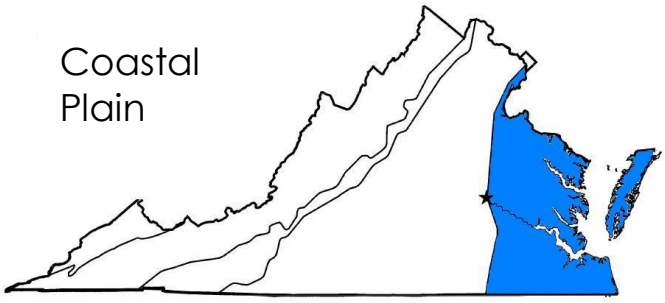
Watershed Models



Characteristics

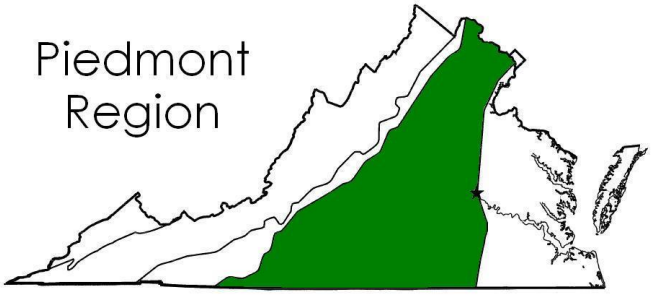
- Land is low in elevation
  flat & close to the ocean
- Location near Atlantic Ocean and
  Chesapeake Bay
- Includes Eastern Shore
- East of the Fall Line

Products

- Seafood
- Peanuts

Industry

- Shipbuilding
- Tourism
- Military



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

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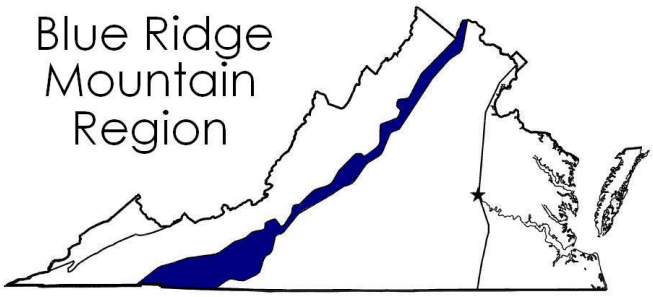
Watershed Models



Characteristics

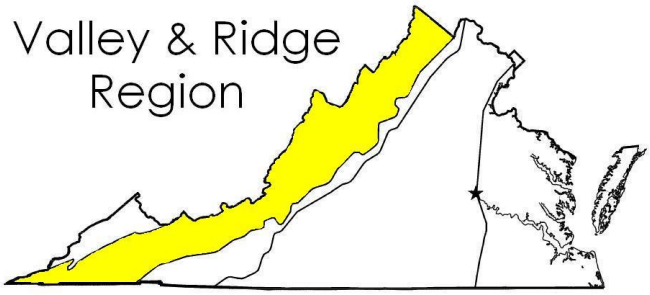
- Old, rounded mountains
- Part of Appalachian mountain system
- Located between the Piedmont & Valley and Ridge
- Source of many rivers

Products

- Apples
- Small Family Farms

Industry

- Recreation
- Farming



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

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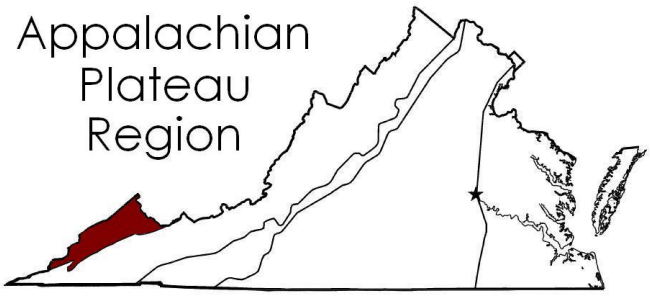

Characteristics

- 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

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