



Virginia View Curriculum

Lesson Plan	Virginia's Water Resources: Aquifers
Grade Level	Elementary, Grade 4
Applicable Virginia SOL	Science 4.8a, Virginia Studies 1i, 2a, b, c
Summary	Students will learn about aquifers in Virginia by analyzing maps and locating key geographic features, including the physiographic provinces of Virginia.
Classroom Materials	Printed handouts and maps
Submitted by	Lisa McCray, retired High School Teacher, Consultant and Volunteer

Contact Information

James Campbell
Virginia View
Jayhawk@vt.edu
540-231-5841

John McGee
Virginia View
jmcg@vt.edu
540-231-2428



Teacher Guide

Applicable Virginia SOL:

Science 4.8 The student will investigate and understand important Virginia natural resources. Key concepts include

- a) watershed and water resources;

Virginia Studies 1. The student will demonstrate skills for historical and geographical analysis and responsible citizenship, including the ability to

- i) analyze and interpret maps to explain relationships among landforms, water features, climatic characteristics, and historical events.

2. The student will demonstrate knowledge of the physical geography and native peoples, past and present, of Virginia by

- a) locating Virginia and its bordering states on maps of the United States;
- b) locating and describing Virginia's Coastal Plain (Tidewater), Piedmont, Blue Ridge Mountains, Valley and Ridge, and Appalachian Plateau;
- 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);

Working definitions:

Aquifer – A subsurface reservoir that is saturated with water.

Teacher Preparation:

Review sources of fresh water and drinking water used in your area.

Consider having students work in groups to complete the exercise. The key for the student worksheet is attached.

Print out or access:

- The map “Aquifers in and Around Virginia” from the [Digital Atlas of Virginia](#), which can be accessed as:
 - PDF (4.24 MB) à http://gcp.frec.vt.edu/Digital_Atlas_PDFs/aquifers.pdf
 - Interactive Web Mapper - <http://arc.gis.vt.edu/Aquifers/> (note: May be slow to load, please be patient)
 - Data service to be used in ArcGIS (Add GIS Server <http://arc.gis.vt.edu/arcgis/services> , select the "VAView" folder, add the Aquifers data service).
 - Data service to be used in ArcGIS Explorer or ArcGIS Explorer online <http://arc.gis.vt.edu/ArcGIS/rest/services/VAView/Aquifers/MapServer>
- For each student, a student worksheet and the attached map “Provinces, Cities, and Rivers of Virginia.”

Student Worksheet: Virginia's Aquifers

Name: _____

Water sources

1. How do the people in Virginia use water? Think of 4 ways.

2. Why is it important to know where the water we use comes from?

3. Name three types of surface water features: _____, _____,

4. What is an aquifer?

5. How do you think aquifers (a ground water feature) might interact with surface water?

Aquifer Geography

1. Look at the map "Aquifers in and Around Virginia"

How many aquifers are there in Virginia? _____

2. Which aquifer is located where you live? _____
3. How many states does the Piedmont and Blue Ridge crystalline-rock aquifer go through?

Name the states:

4. On the map "Provinces, Cities, and Rivers of Virginia" label the 3 major rivers that are in bright blue. Also label the Chesapeake Bay, the York River (hint: a tributary to the Chesapeake) and the Atlantic Ocean.
5. On the map "Provinces, Cities, and Rivers of Virginia" label the five physiographic provinces of Virginia next to the corresponding colors on the map key. Also label the major cities of Virginia (listed on the next page).

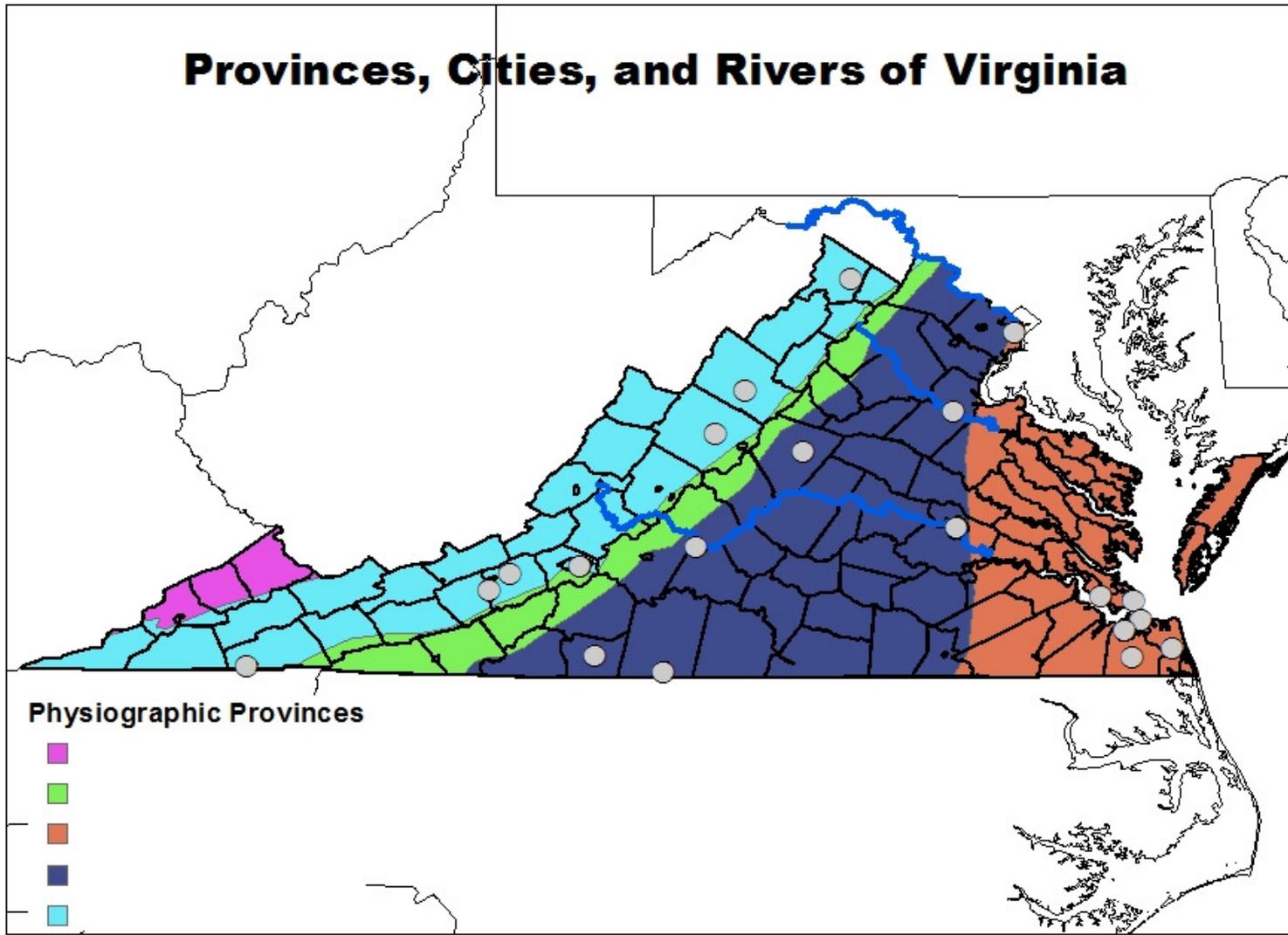
The cities to label are: Alexandria, Blacksburg, Bristol, Charlottesville, Chesapeake, Danville, Fredericksburg, Harrisonburg, Hampton, Lynchburg, Martinsville, Newport News, Newport, Portsmouth, Radford, Richmond, Roanoke, Staunton, Virginia Beach, Winchester.

6. Look again at the map “Aquifers in and Around Virginia” and compare it to “Provinces, Cities, and Rivers of Virginia.” Fill out the following table.

Province Name	Aquifer(s) located in this province

7. Are there similarities between the physiographic provinces and the aquifers? Why do you think they might be similar or different?

Provinces, Cities, and Rivers of Virginia



Key for Selected Answers on the Student Worksheet

Groundwater Basics

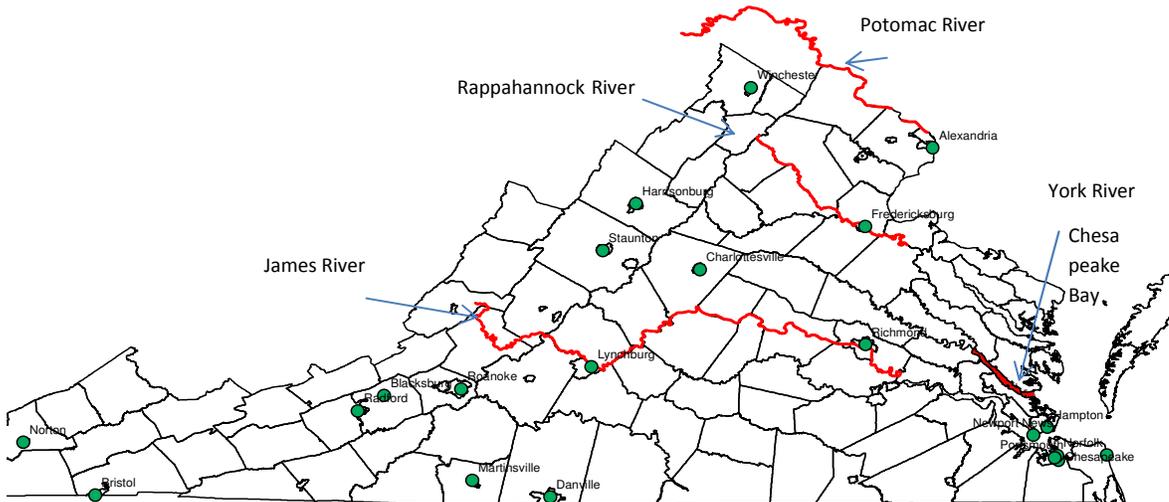
3. Surface water features can include: lakes, streams, rivers, oceans, ponds, etc.
4. Use the definition of aquifers listed under Teacher Guide, or add your own explanation of aquifers.

Aquifer Geography

1. Look at the map “Aquifers in and Around Virginia”
How many aquifers are there in Virginia? 8 Penn, Valley and R, Valley and R carbonate, Piedmont and R crys, Early Mesozoic, NA Coastal Plain, Miss, other.
2. Which aquifer is located where you live? vary
3. How many states does the Piedmont and Blue Ridge crystalline-rock aquifer go through?

_____ Name the states: New Jersey _____ **Virginia**
Georgia
Delaware _____ **N. Carolina** **Alabama**
Pennsylvania _____ **S. Carolina** **West Virginia**
Maryland _____ add more lines if you need them

4. (And number 5) Major cities and rivers are shown below. Provinces (from West to East): Alleghany Plateau, Valley and Ridge, Blue Ridge, Piedmont, Coastal Plain.



Resources

Digital Atlas of Virginia: http://virginiaview.cnre.vt.edu/digital_atlas.html

A map-based resource designed for Virginia teachers. The Digital Atlas contains many different maps pertinent to Virginia in several accessible formats.

National Atlas: <http://www.nationalatlas.gov/>

A Federal source of national-scale maps and geographic data of many different themes, including base maps.

Ground Water in Virginia: <http://www.virginiaplaces.org/watersheds/groundwater.html>

A nice overview of aquifers and ground water, specific to Virginia geology.