

Missouri Regions – Shaped by Land Forms and Geology

Lesson Abstract

Summary: The students will use various resources to compare and contrast the geology of each Missouri region to complete a chart. The lesson provides students with cooperative opportunities to review in groups and expand content knowledge.

MO GLE: SC 4.1.D.6; 5.1.A.6,8;5.2.A.6;5.3.A.6

Subject Areas: Science, Social Studies

Show-Me Standards: Performance Standards – 1.4, 1.6, 1.8
Knowledge Strands – SC 5, 8; SS 7

Skills: Observation, analysis, synthesis, inquiry, compare and contrast

Duration: 2 class periods (50 minutes)

Setting: Classroom

Key Vocabulary: Topography, geography, geology, Ozarks, karst, Southeastern Lowlands (Bootheel), Osage Plains, St. Francois Mountains, Dissected Till Plains

Rationale:

The land forms, geology, and topography of each Missouri region both defines and outlines the watershed boundaries within each region. The watershed boundaries, in turn, define the stream and river flow patterns within them. This lesson provides students with the opportunity to access their present knowledge of Missouri geography and expand their knowledge of the state's natural resources.

Student relevance:

- Students live in a designated region of the state.
- Land forms and topography of each region determine the watershed boundaries.
- The geology of a region partly affects the groundwater quality and quantity.
- The mined minerals and energy resources in a region affect land use practices and, thus, surface and subsurface water quality.
- Humans are dependent on water and natural resources.

Learning Objectives:

Upon completion, students will be able to . . .

- Identify the five physiographic regions of Missouri.
- Compare and contrast each region's basic topographical and geological characteristics.
- Identify the major geological natural resources of each region.

Students Need to Know:

- The general location of Missouri in relation to other central states in the USA.
- General land forms in their surrounding geographical area.
- Differences between plains, plateaus, flood plains, hills, and mountains.
- The earth provides natural resources that humans use for the production of goods and services.
- How to read information from various resources and chart the contents.

Teachers Need to Know:

- The locations, geographical and geological information about the five physiographic regions of the state of Missouri.
- How to outline watershed boundaries given stream/river patterns from a map.

(The location of the various regions can be identified by the *Physiographic Regions of Missouri* map provided in this lesson).

Resources:

The following materials are available from the Missouri Department of Natural Resources, Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65402, (573)368-2125.

Books

Missouri Geology – Three Billion Years of Volcanoes, Seas, Sediments, and Erosion

Geologic Wonders and Curiosities of Missouri

Available from the Missouri Department of Natural Resources, Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65402, (573)368-2125.

Pamphlet

Introduction to the geologic History of Missouri

Brochure

Missouri's Hidden Waters

Fact Sheets/8.5" x 11" Maps Can be found on-line at the addresses listed below:

Physiographic Region of Missouri,
<http://www.dnr.mo.gov/geology/adm/publications/ShdRelief.pdf>

Geologic Map of Missouri
<http://www.dnr.state.mo.us/geology/adm/publications/GenGeoMap.pdf>

Mineral Resources Map of Missouri
<http://www.dnr.mo.gov/geology/adm/publications/MinRes.pdf>

Missouri Groundwater
<http://www.dnr.mo.gov/geology/adm/publications/MoGrndH2O.pdf>

Topographic Relief of Missouri
<http://www.dnr.mo.gov/geology/adm/publications/TopoMo.pdf>

Land Relief of Missouri (Surface elevation)
<http://www.dnr.mo.gov/geology/adm/publications/LandRelief.pdf>

Wall Maps/Scale 1:500.000 – 42" x 54" *Shaded Topographic Relief Map of Missouri*
(one per group if possible) Available from USGS in Rolla, MO they are expensive

Website for DNR publications:
<http://www.dnr.mo.gov/geology/adm/publications/pubscatalog.pdf>

Materials Needed for Lesson:

Student Handouts

Missouri's Regions and Their Geology Chart – copy provided
Missouri's Hidden Waters Obtained from DNR
Physiographic Regions of Missouri Map – copy provided
Mineral Resources Map of Missouri - DNR
Shaded Topographic Relief map of Missouri

Other Materials

Five large sheets of butcher paper or poster board
Five different colored markers

Procedure:

Part One: Missouri Bird's Eye View

- Display the shaded relief wall map of Missouri.
- Have students identify their town/city.
- Have students discuss the topography of their area.

- Describe specific land forms and compare those to the shaded relief map.
- Allow students to share their travel experiences to other areas of the state and compare and contrast their travels to the shaded relief map and their home area.
- Allow students to examine the shaded relief map closely. (If possible, provide one map per group of three to four students).
- Have students identify areas that have similar and different shaded relief on the map. (Students should be able to recognize the differences in the shaded relief patterns of the Ozarks, Bootheel and Dissected Till Plains).
- Direct students to look closely at the river patterns on the map. (This will help them identify the three different distinct regions).
- Provide students with copies of the *Physiographic Regions of Missouri* map.
- Have students identify the three easily recognized regions — Ozarks, Bootheel, and Dissected Till Plains — and compare these regions to the two other less obvious regions — St. Francois Mountains and Osage Plains — to the shaded relief map. (Point out the flood plain areas along the Missouri and Mississippi rivers. Note how these rivers are a rough outline for some of the regions).
- Option – Have students color each region a different color on the Missouri physiographic map, cut out the regions, and practice putting it all back together.

Part Two: Fact Finding Mission

- Pass out copies of the brochure *Missouri's Hidden Waters* and the *Mineral Resources Map of Missouri*.
- Read and discuss pages 1 – 4 as desired.
- Pass out copies of the handout *Missouri's Regions and Their Geology Chart*.
- Have students work in pairs, teams, or as individuals to find the designated information for the chart using the brochure and map. The degree of detail transferring information from the maps to the chart will vary according to grade.
- Discuss findings.

Part Three: Region Rotation

- Divide students into five groups and review the information they have collected on the charts.
- Using five large sheets of paper or poster board, place the name of each one of Missouri's region at the top.
- Give each group a different colored marker.
- Rotate the region sheets among the groups (or rotate groups to sheets).
- Tell students that they are to list everything that they can remember about the region on the sheet in one word descriptions or short phrases
- Give students only a few minutes to write down information before calling for the groups to stop and rotate (either sheets or groups).
- When students are rotated to a new region sheet, they cannot repeat any information recorded by previous groups. (However, they can make corrections

by writing what they think is correct next to any information they perceive as incorrect).

- Encourage students to take turns writing.
- At the end of the activity, go over each sheet with the class and review points made by each colored marker group.
- Optional – Keep track of correct facts for each colored marker group and award one point for each correct fact.

(Note: Students will find that this activity gets increasingly harder as the sheets get rotated and class knowledge becomes exhausted. All students should have the opportunity to read their first region sheets and look at the additional knowledge the other groups added to theirs).

Evaluation Strategies:

Have students choose one of the following assessments using their completed and corrected charts:

- Create a concept map which compares and contrasts Missouri's regions.
- Write a story or describe what a bird would see as it flew over each region of the state.
- Write a poem, rap, song, or newspaper article about one or more of the regions.
- Write a one page paper comparing and contrasting the regions.

Extension Activities

- Have students either independently or in small groups, create a collage, poster, or mobile on a given region.
- Have students write a paper on land uses of a particular region (i.e. differences between soil, users — commercial, residential, farming).
- Invite the county soil scientist from the Natural Resource Conservation Service (NRCS) to come to class and demonstrate the use of stereoscopic photos and the use of a field stereoscope.

The Watershed Knowledge Questionnaire

Previous knowledge and preconceived notions are both important factors when evaluating the approach an educator will take when initiating course work on a subject as complex and diverse as the module on Watersheds and Geology.

A Watershed knowledge Questionnaire will help in evaluating preconceptions and previous knowledge your students may have on the subject of watersheds. This tool can help in determining the direction your lessons may take.

- Explain to the students that the Watershed Knowledge Questionnaire is not a test and will not effect their grade. Explain that there will be questions on subject matter that you have not discussed in class before.
- Have the students complete the Watershed Knowledge Questionnaire.
- Evaluate the previous knowledge and any preconceived ideas your students have on the material to be taught in this module.
- Can be used as a scoring guide if given again post activities

Watershed Knowledge Questionnaire

On a separate sheet of paper please answer these questions in complete sentences.

1. What is a watershed?
2. What kinds of test are performed to determine the health of a stream?
3. What things in the natural environment do you think would influence the health of a stream?
4. What human made things do you think would influence the health of a stream?
5. If you suspect abuse to a water source, who or what organization should you contact?
6. What is the difference between a riparian zone and a floodplain?
7. What is a relationship between surface water and ground water?
8. By collecting and studying macroinvertebrates, what can they tell us?
9. What does GIS stand for and what is it?
10. Why is stewardship to our environment so important?
11. What are storm drains used for and where do they go?
12. Where does wastewater go?
13. Give a brief description of what you know about wastewater treatment.
14. What natural surrounding will help maintain a healthy stream?
15. What is the difference between point and non-point pollution?
16. What is/are evidence of a healthy watershed?
17. What are problems with surface runoff?
18. What are ways you can conserve water?
19. What can you write about the hydrologic cycle?
20. Why do we need to conserve water when we have so much here in Missouri?

Suggested Scoring Guide:

Missouri Regions – Shaped By Land Forms and Geology

Teacher Name: _____

Group Name: _____

CATEGORY	4	3	2	1
Time Management	Group defined own approach, effectively managing activity.	Defined useful roles not mentioned before hand. Group adjusted roles to maximize individual capabilities and interests.	Group made specific efforts to involve all group members.	One or more students in the group did not participate in or contribute to the activity
Role Performance	Each student in the group can clearly explain what information is needed by the group, what information s/he is responsible for locating, and when the information is needed.	Each student in the group can clearly explain what information s/he is responsible for locating.	Each student in the group can, with minimal prompting from peers, clearly explain what information s/he is responsible for locating.	One or more students in the group cannot clearly explain what information they are responsible for locating.
Worked together as a team and all ideas were valued	Group independently identifies at least 4 reasonable, insightful, creative ideas/questions to pursue when doing the research.	Group independently identifies at least 4 reasonable ideas/questions to pursue when doing the research.	Group identifies, with some adult help, at least 4 reasonable ideas/questions to pursue when doing the research.	Researchers identify, with considerable adult help, 4 reasonable ideas/questions to pursue when doing the research.

Rubric Made Using: **RubiStar** (<http://rubistar.4teachers.org>)

Missouri's Regions and Their Geology Chart

Directions: Complete the following chart with single words or short phrases using the provided reference sources.

Region	General Location	Rocks	Water Quality/Yields	Minerals	Energy
--------	------------------	-------	----------------------	----------	--------

Physiographic Regions of Missouri



Source: *Missouri Water Atlas* (map updated 1997), Missouri Department of Natural Resources, Division of Geology and Land Survey