

Water Flows, Our Rivers Grow

www.ksagclassroom.org

Grade Level: 3-5, 6-8

Academic Area(s): Science

Topic(s): Earth Science, Geography



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Overview:

Students will have the opportunity to find their river basin and sub-basin. They will then create a river that flows from start to finish.

Objectives:

The student will be able to:

1. Identify the name of the river basin and sub-basin in which they live.
2. Demonstrate the flow of a river from beginning to end.
3. Explain the importance of rivers in the state of Kansas.

Background Information and Facts:

Everyone lives in a watershed, no matter where they live. A watershed is an area of land that drains towards a downhill point. That point can be a stream segment, river, pond, lake or the lowest place within the watershed. Since gravity directs the movement of water, land with higher points of elevation separates the watersheds.

Precipitation patterns, topography, soil types and land use patterns are features that make each watershed unique. The treatment of natural resources- the soil, water, air, plants and animals- influences what happens in each watershed.

A watershed has two, sometimes three, basic components: tributaries, a main channel and, in some cases, a delta. A watershed contains a network of tributaries (streams that collect water and flow into larger streams). Each of the drainage areas, or smaller watersheds, contributes to the watershed of the larger stream or river. The second component of a watershed is its main channel. The main channel transports most of the water and other materials collected in the drainage area which consists of the main stream and the larger tributaries. When precipitation falls in a watershed, the amount of water that reaches the main channel is determined by the size of the drainage area, the number of tributaries, the soil's ability to hold water, the climate, the number and size of water storage areas and the slope of the stream channel.

Contents:

- Activity 1 - Find Your River Basin
- Activity 2 - Create a Living River

Handouts:

- Kansas River Basins

Worksheets:

- Find Your River Basin

Estimated Teaching Time:

- Activity 1: 20 mins.
- Activity 2: 30 mins.



The third feature of a watershed is the network of branches that may form at the mouth of a stream. A stream that flattens out near its junction with a big body of water may deposit silt, sand or fine rock particles the water has been carrying. Water flows around these deposits, creating a broad network of branches called a delta.

A river basin is also a watershed or a portion of a larger watershed. A bird's eye view of a river basin would show that as the water moves downstream in the river basin, many drainage channels form a pattern of branches with the smaller streams joining together to form progressively larger streams.

From the largest viewpoint, the state of Kansas is part of the Mississippi River basin. This river basin covers 41% of the continental United States. It originates as an outlet stream from Lake Itasca in northern Minnesota. This tiny stream goes on to become one of the world's greatest river systems, draining 1.25 million square miles before it finally reaches the Gulf of Mexico.

Kansas lies within the drainage basin of the Mississippi river system. Two major rivers in the state are the Kansas River, a tributary of the Missouri River, and the Arkansas River, a major tributary of the Mississippi River.

There are twelve major river basins in Kansas: the Cimarron, Kansas Lower-Republican, Lower Arkansas, Marais des Cygnes, Missouri, Neosho, Smoky Hill-Saline, Solomon, Upper Arkansas, Upper-Republican, Verdigris, and Walnut river basins. Each of these river basins can be divided into several smaller watersheds based on topography. Each of the twelve river basins is also part of a larger multi-state river basin or watershed-either the Missouri River basin or the Arkansas River basin.

To distinguish between the two "Missouri River" basins, remember that the smaller of the two only covers about 1,600 square miles in the northeast corner of Kansas. It includes part or all of only four Kansas counties-Doniphan, Atchison, Leavenworth, and Wyandotte counties. The larger Missouri River basin covers part or all of several states, including Kansas.

The largest bodies of water in Kansas were created by building dams on rivers. Milford Lake, the largest in Kansas, was built in the 1960s by constructing a dam across the Republican River. Tuttle Creek Lake, the second largest lake in Kansas, is a long, winding reservoir behind Tuttle Dam on the Big Blue River. Lakes or reservoirs have been built on most, but not all, of the major rivers in Kansas. Although there are dams on their tributaries, lakes or reservoirs do not impound the Arkansas or Missouri rivers in Kansas. There are no man-made dams on the Cimarron River.

Important Facts

The Kansas River flows 170 miles downstream to Kansas City.

At 1,460 miles, the Arkansas River is the longest-tributary to the Mississippi-Missouri river system.

The Missouri River is the longest river in the U.S.- 200 miles longer than the Mississippi River.

The Republican River was named for the "Republican" Pawnee Indians who lived along its banks.

For about 100 miles, the Santa Fe Trail followed the valley of the Cimarron River.



Confluence: the place where two or more streams meet and begin flowing together.

Dam: a barrier constructed to hold back water and raise its level, the resulting reservoir being used in the generation of electricity or as a water supply.

Delta: the broad network of branches with water flowing in them created when a stream flattens and slows near its junction with a big body of water and deposits the silt, sand, or fine rock particles the water has been carrying.

Headwaters: the source from which a river rises.

River: often used to describe a larger stream with many tributaries.

River Basin: the area of land drained by a river and its branches.

Slope: a surface of which one end or side is at a higher level than another; a rising or falling surface.

Stream: a body of water confined within two banks and a bed that provides a physical path for flowing water through a channel.

Tributary: a stream that flows into a larger stream or other body of water.

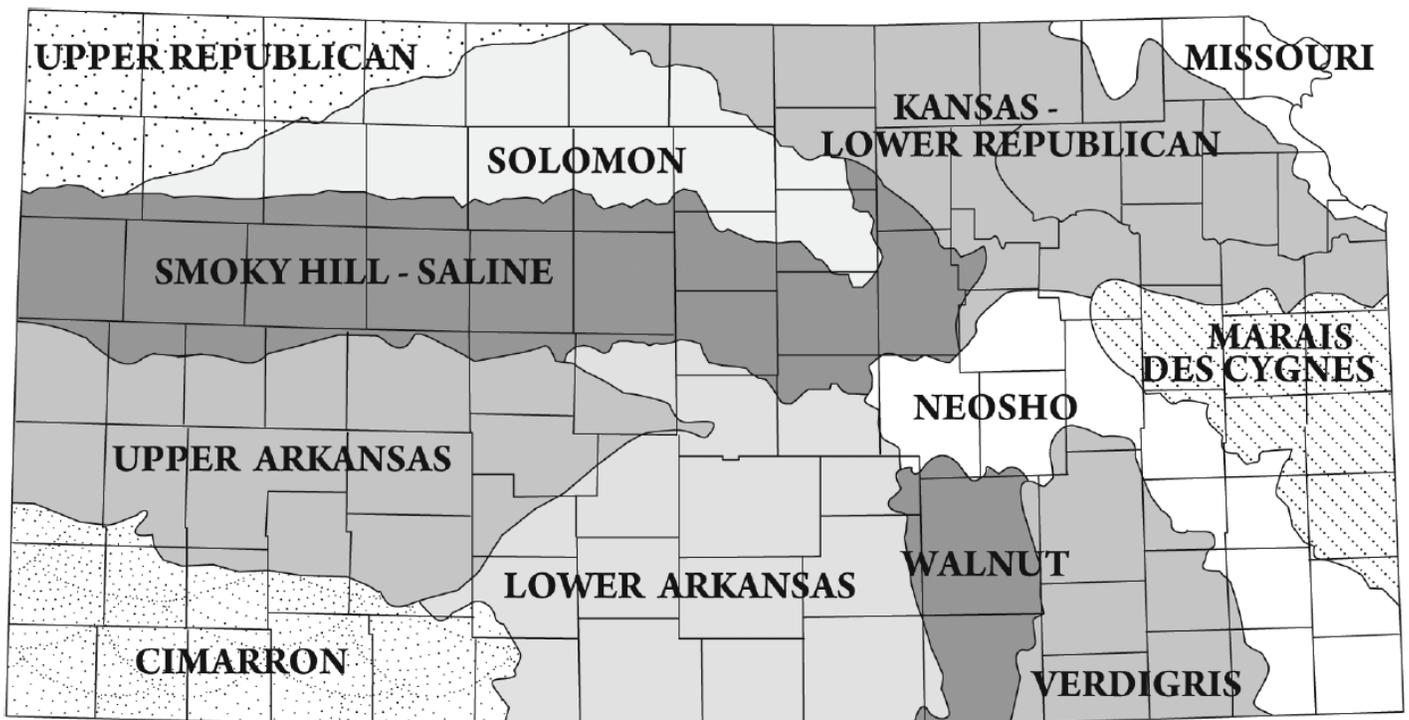
Watershed: a sloping area of land that collects, directs, controls, and discharges the flow of rainwater into a river, river system, or body of water.

MISSOURI VS. ARKANSAS RIVER BASINS



Source: U.S. Geological Society

MAJOR RIVER BASINS IN KANSAS





Preparation:

Share background information with students. Provide students with "Find Your River Basin" worksheet (page 7).

Procedures:

1. Look at a map and help students find their school.
2. Once found, have the students study the map titled "Missouri vs. Arkansas." Help them locate their school on this new map.
3. Move on to the map titled "Major River Basins in Kansas." Help students locate their school and which river basin they are located in.
4. On the projector pull up the "USGS Streamer" website and follow the instructions provided.

<https://txpub.usgs.gov/DSS/streamer/web/>

5. Map the river closest to the school, upstream and downstream, to locate its beginning and end.
6. Have students color in their river basin on the worksheet and answer the questions located on the worksheet.

Materials:

- Student Handout
- Student Worksheet
- Basic Kansas map
- Colored pencils, markers or crayons



Preparation:

Share background information with students. Have newsprint paper on hand to stretch along the classroom.

Procedures:

1. Divide students into the following groups to model how water flows from small streams:
 - Eight youth line up single file and represent the headwaters and beginning of the river in your watershed. These students will each carry small cups.
 - Six youth form a circle and stand at the front of the line to represent a lake connected to the river in the watershed. These students will carry larger cups.
 - Four youth line up single file to represent the river on the overflow side of the lake as it moves towards the Mississippi River, getting larger. These students will carry even larger cups.
 - Three youth form another circle to represent another lake, dam or confluence of rivers. These students will carry small buckets.
 - Two youth represent the larger river into which the watershed drains. These students will carry bigger buckets.

You may choose others to represent a second river that joins with the first one to create a larger river that travels to the Mississippi River. Numbers in groups go from greatest to least.

2. Teacher begins to pour water into the smallest cups – those that represent the headwaters or beginning of the rivers. Helpers will add water to the cups and buckets to represent rain events along the way. Teachers can decide where, when and what kind of rain event they would like the students to create.
3. The students will then pour the water into the next size cups to simulate the flowing of the river. Continue until the water reaches the bigger buckets.
4. Have the students answer the following Discussion Questions:

What would happen to the water if there were three days of hard rain near the headwaters of the first river?

More water would flow through the watershed (the cups and buckets would be more full).

How would other weather conditions affect the water downstream?

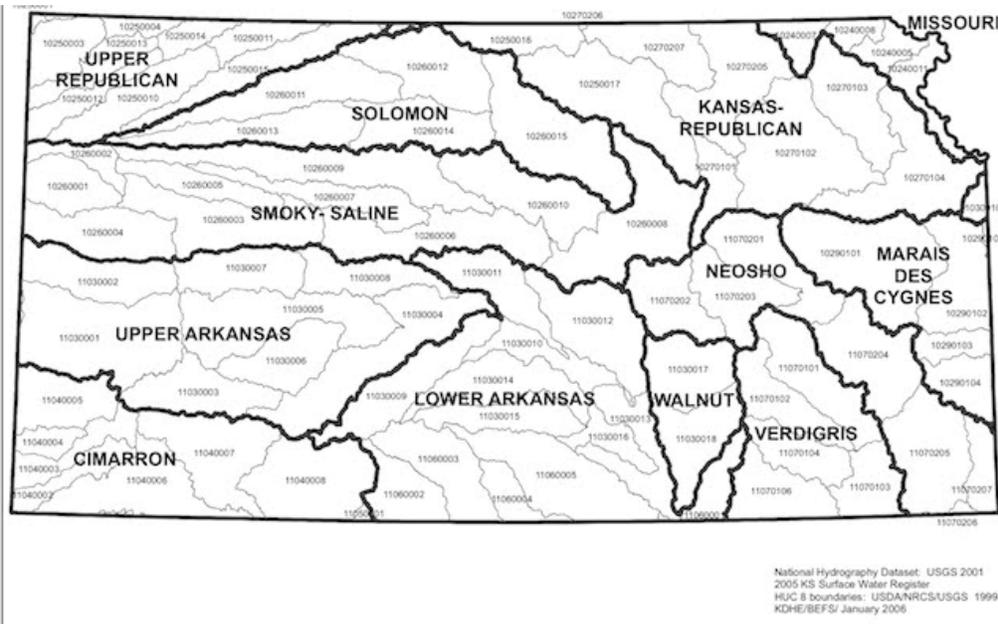
Melting snow may result in more water flowing through the watershed (the cups and buckets would be more full). Drought conditions near the headwaters may eventually cause a decrease in water flowing through the watershed (the cups and buckets would be less full).

Materials:

- Blue newsprint paper long enough to stretch across the classroom (optional for visual aid)
- Small paper cups
- Small plastic cups
- Solo cups
- Small buckets
- 5 gallon buckets
- 2-4 large pitchers for teacher
- Water



Using the handout find what river basin and sub-basin your school is located in. Please color in your sub-basin on the map below.



In what river basin is your school located (see Page 4 Handout)?

What is the name of the sub-basin your school is located in?

What river is closest to your school?

Where does the river start?

Where does the river end?

What is one fun fact about the river closest to your school?



Extensions:

Social Studies: Examine the relationships between major rivers and early settlements in Kansas or other states. Locate the larger cities and towns in Kansas and investigate which rivers contributed to their success.

Investigate how many river basins impact the county where your school is located or if your students live in multiple counties, chart the number of river basins represented by your students.

Math: Estimate, compare and contrast the size of each river basin in Kansas. Graph and compare one river basin by estimates and actual size.

Count and chart the number of counties included in two or more river basins.

Technical Writing: Have the students create a story describing the journey of a water drop from the beginning of a river to the ocean. They can be as creative as they wish by even naming the water drop.

Recommended Resources:

Kansas Foundation for Agriculture in the Classroom (KFAC):

www.ksagclassroom.org. Look for other lesson plans, resource materials and teacher training opportunities!

“Awesome Aqua” Kids Connection Magazine

<http://www.ksagclassroom.org/files/waterissue.pdf>

“Exploring Kansas Natural Resources” Educator’s Guide Unit 7: Streams & Rivers

Other resources/websites:

Kansas Forest Service. What is a watershed?

www.kansasforests.org/stream-side_forestry/watershed.html

Kansas Water Office.

<http://www.kwo.org/>

Kansas Watershed Restoration and Protection Strategy (WRAPS). <http://www.kswraps.org/>

State Conservation Commission. Welcome to the SCC. <http://www.scc.ks.gov/>

U.S. Environmental Protection Agency (EPA). Environmental kids club. <http://www.epa.gov/kids/index.htm>

U.S. Geological Survey. USGS real-time water data for Kansas. <http://waterdata.usgs.gov/ks/nwis/rt>

Natural Resources Conservation Service. www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/

Resources from Educator’s Guide www.lewis-clark.org
www.bowersockpower.com
<http://cfpub.epa.gov/surf/locate/index.cfm>