

There's a Watershed in My Backyard

www.ksagclassroom.org

Grade Level: 3-5,6-8

Academic Area(s): Science, Social Studies

Topic(s): Earth Science, Geography



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Overview:

Students will connect to information about conservation and protection of natural resources. They will understand how each person in a watershed – all of us – can work together to protect the quality and quantity of water for our use.

Objectives:

Students will be able to:

1. Define a watershed and vocabulary represented in a watershed.
2. Explain how water moves in a watershed.
3. Discuss point source and nonpoint source pollution and ways to reduce pollution of water.

Background Information and Facts:

A watershed is the land that water flows across or under on its way to a stream, river or lake. Landscape is made up of many interconnected basins or watersheds. Within each watershed, all water runs to the lowest point such as a stream, river or lake. On its way, water travels over the surface and across farms, fields, forest lands, suburban lawns and city streets; or it seeps into the soil and travels as groundwater. Large watersheds like the ones for the Mississippi River, Columbia River and Chesapeake Bay, are made up of many smaller watersheds across several states.

Watersheds come in many different shapes and sizes. A watershed can be affected by many different activities and events. Construction of cities and towns, farming, logging and the application and disposal of many yard, garden and household chemicals can affect the quantity and quality of water flowing from a watershed.

Everyone lives in a watershed and we are a part of a watershed community. The animals, birds and fish are, too!

People influence what happens in watersheds, good or bad, by how the natural resources – the soil, water, air, plants and animals – are treated.

Contents:

- Activity 1 - What in the World is a Watershed?
- Activity 2- There's a Watershed in My Backyard!
- Activity 3: Explore Your Watershed

Handouts:

- Watershed Diagram

Estimated Teaching Time:

- Activity 1: 20 minutes
- Activity 2: 30 minutes
- Activity 3: 40 minutes



The quantity and quality of water draining from a watershed are dependent upon the climate, vegetation, soils, geology and development of that watershed. Activities that change the vegetation and surface characteristics of some watersheds will affect the quantity and quality of water contributed to a stream. For example, a greater volume of water, perhaps of poorer quality, will flow from a parking lot than from a forest or pasture because plants filter the water and hold soil in place. A heavy rain will increase the volume of water from a parking lot and result in increased flooding in a watershed because the greater volume exceeds the natural ability of the stream to transport the water. What happens in small watersheds, such as pollution, also affects the larger watersheds downstream. Point source pollution is water pollution from an activity originating from an identifiable source. Nonpoint source pollution is water pollution from sources not easily identified or located. For example, pesticide runoff from the yard.

There are three different types of watersheds:

Underdeveloped watersheds are drainage basins that have no development affecting the quality or quantity of water in that watershed. These watersheds are primarily on public-owned lands in national forests, national parks and wilderness areas. Underdeveloped watersheds provide scientists with areas to study the natural processes of a watershed.

Planned watersheds are drainage basins that contain planned development. Planning the development within a watershed requires consideration of the entire drainage basin. Actions such as controlling surface runoff and protecting stream channels help preserve the quality and quantity of water flowing from a watershed. Limiting the number and type of structures on a flood plain is one method of preventing loss of property from floods. Placing parks, golf courses or farmland on a flood plain can reduce building and property loss caused by floods.

Unplanned watersheds are drainage basins that do not contain planned development. Unplanned development within a watershed has the potential for degradation of water quality and increased loss of property from flooding. Runoff from city streets, farms and logging techniques and residential and industrial chemical disposal practices can all affect water quality. Locating homes and businesses on flood plains greatly increases the chance of damage from flooding. Levees or dams may need to be put in place to protect development already located on the flood plain.

Important Facts:

The earth is covered with water yet only 1% is available for drinking water.

Take short showers instead of baths. Showers use an average of five to seven gallons of water per minute, three times less than the water used for a bath.

Turn off the water to brush your teeth! This can save up to four gallons of water during each brushing.

According to the EPA, the average American uses 100 gallons of water each day but nearly 75 percent of the water that goes to homes in the U.S. goes down the drain.



Divide: points of higher ground that separate two adjacent streams or watersheds.

Drainage Basin: land area drained by a river.

Groundwater: underground water that is generally found in the pore spaces of rocks or sediments.

Gulf: a part of an ocean or sea extending into the land.

Lake: a body of water- usually over ten acres in size- that is too deep for plants to grow to the surface, except around the shore.

Levee: an embankment built to prevent the overflow of the river.

Nonpoint Source Pollution: water pollution from sources that are not easily identified or located.

Ocean: the whole body of salt water that covers nearly three-fourths of the surface of the earth.

Point Source Pollution: water pollution from human activity that can be identified and controlled that comes from a specific, identifiable source, such as a pipe, channel, ditch, tunnel or container.

Pond: a body of water less than ten acres in size which is shallow enough to allow rooted plants to grow in the water.

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

Run-off: rain, ice or snow that does not soak into the soil but flows across the land and eventually runs into streams and rivers when the intensity or volume of that precipitation exceeds the absorption and storage capacity of the land's surface caused by a major water event.

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

Topography: the features on the surface of the land such as hills, valleys, rivers, etc.

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 or melted snow into a river, river system or body of water.



Preparation:

1. Share background information with students.
2. Upon completing the lesson, students will answer conclusion questions and discuss the activity.

Procedures:

1. Show the students the diagram of a watershed found on page 7.
2. This part of the lesson may be done outdoors to prevent the floor from getting wet. Have a student volunteer hold an opened umbrella with the top of the umbrella waist high so the students can gather around to look at the top of the umbrella. Have the students count the number of "divides" or ribs in the umbrella.
3. Have students hypothesize how water, if sprayed on the umbrella, would move. Ask a student to use a piece of chalk to demonstrate (mark) where they think water will flow when the top of the umbrella is sprayed with water.
4. Have another student volunteer spray the top center of the umbrella and observe how the water moves down the ribs of the umbrella. Explain that each rib represents a divide with a watershed on each side.
5. Have students determine how many "watersheds" are on the umbrella. Explain there are many watersheds and divides on earth.
6. Have a student volunteer spray water on a bath towel and have students compare the water activity between the umbrella and the towel. The towel absorbs water while the umbrella repels water.
7. Discuss activity and answer conclusion questions.

Discussion Questions:

1. What force of nature causes the water to flow on the sprayed umbrella?

Gravity

2. How many watersheds are represented in the umbrella?

Depending on the umbrella, it is usually six or eight.

3. What in nature, in a real watershed, soaks up the water and slows the water down?

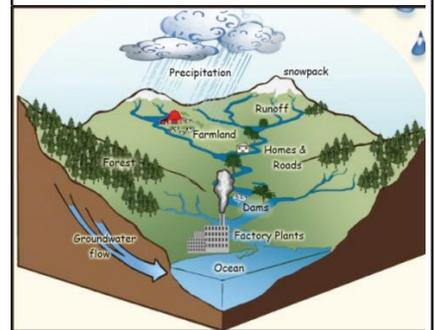
Absorbent surfaces, like soil and roots

4. What in a real watershed acts like the surface on the umbrella (where water does not soak into the earth)?

Less absorbent or non-absorbent surfaces, like pavement, house roofs or leaves.

Materials:

- Umbrella
- White chalk
- Spray bottle with water
- Large bath towel
- Supplemental watershed diagram (included with this lesson)





Preparation:

Cocoa powder, chocolate sprinkles, colored sugar sprinkles and drink mixes should be poured into salt/pepper shakers before the demonstration is performed. Share background information and vocabulary words with students.

Procedures:

1. Have a student crumple up the waxed paper to make a 3D topography, complete with hills and valleys, that is to be placed in the large, clear plastic tub.
2. Gently straighten out the paper waxing side up leaving the "topography" and place it in the tub. You will create divides when you crumple and release the paper.
3. Prop the tub up so that one end is higher than the other.
4. Explain to students that we all live in a watershed. Have the students hypothesize about the movement of the water and what causes it to move from high to low points.
5. Have one student spray blue colored water on the high points or "divides" of the watershed. Encourage the students to notice the flow of the water and where the water pools and collects.
6. To make the point that many land uses affect the water (both quantity and quality) in the watershed, have the students shake on "pollutants" of the watershed. For example, orange Kool-Aid powder could be excess fertilizer on the golf course. Purple Kool-Aid could be a local dump site. Chocolate sprinkles could represent dog waste at the local dog park, and cocoa powder may be the unprotected or bare soil moved during construction in a new housing development. Have the student spray colored water over these "pollutants" and note the flow of the pollutants into the pools and collection areas. Discuss who is affected by these pollutants, and discuss best management practices that protect the water.
7. Have students list possible contaminants that could pollute the watershed. Determine if the pollution is point source or nonpoint source pollution. Some examples of point source pollution would be community sewage treatment plants that overflow with excess water, factories, food processors, chemical manufacturers, runoff from manure pits due to excess water and textile manufacturers. These industries are heavily regulated and have a plan in place to clean the water. Some nonpoint source pollution examples would be oil runoff from cement, pesticide runoff from yards, sediment from unprotected soils and waste like plastic bottles and wrappers.
8. Discuss activity and answer discussion questions found on the next page.

Materials:

- Large, clear plastic tub
- Waxed paper or butcher paper – at least 2 feet
- Spray bottle filled with colored water
- Salt/pepper shakers filled with cocoa powder, chocolate sprinkles, colored sugar sprinkles and different colors of drink mixes (e.g. orange, purple, etc., Kool-Aid)
- List of vocabulary words in large print





Discussion Questions:

1. What is a 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.

2. What force of nature causes the water to flow in a watershed?

Gravity

3. What is the difference between point source pollution and nonpoint source pollution?

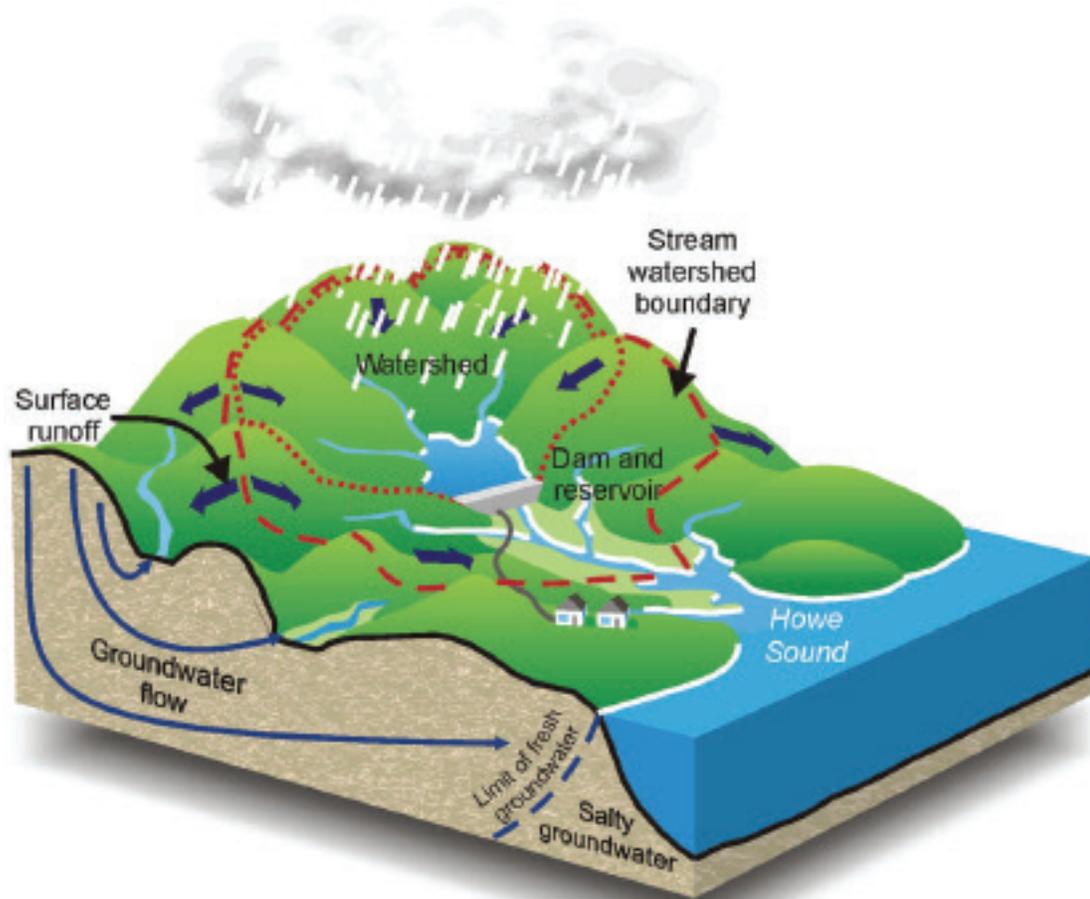
Point source pollution is water pollution from human activity that can be identified and controlled that comes from a specific, identifiable source, such as a pipe, channel, ditch, tunnel or container. Nonpoint source is water pollution from sources that are not easily identified or located.

4. How could you protect your drinking water supply for your local town?

Answers will vary.

5. How could you reduce pollution in your local pond, lake, stream or river?

Answers will vary.





Preparation:

1. Share background information with students.
2. This lesson will require computers for students to conduct research.

Procedures:

1. Students will get onto their device and download a local watershed map from this URL:
<https://cfpub.epa.gov/surf/locate/index.cfm> or
2. Students will be able to type in their zip code to look at their watershed.
3. Students will then look at a general Kansas travel map of their town and compare the watershed to it.
4. Students may also go to other reliable websites to get a better picture of their watershed.
5. Students will then draw their watershed on a poster board. The map needs to be complete with all creeks, ponds, rivers and lakes. Have the students use the following color code:
 - Blue: major water collection point, large pond or lake
 - Green: large river
 - Orange: smaller rivers
 - Red: very small rivers and creeks
 - Yellow: the high points of the watershed, like the tallest hills or mountains (this is called a drainage divide)
6. For a student driven project: Students could create their local watershed using the newsprint paper, permanent markers and other supplies (found in activity one) to represent local landmarks. As they determine land and water use in their local watershed, they can model the pollution control methods that affect local water quality.

Materials

- Markers
- Poster board for each student
- Computer for each student



Recommended Resources:

Kansas Foundation for Agriculture in the Classroom (KFAC):

www.ksagclassroom.org

Look for other lesson plans, resource materials and teacher training opportunities!

“Exploring Kansas Natural Resources” Educator’s Guide Unit 6 - Water

“Awesome Aqua” Kids Connection Magazine
<http://www.ksagclassroom.org/files/waterissue.pdf>

Other resources/websites:

Drinking Water for Kids:

U.S. Environmental Protection Agency

www.epa.gov/safewater/kids/index.html

H2Ouse Water Saver Home:

California Urban Water Conservation Council

www.h2ouse.org

Kansas Water Office:

www.kwo.org

Water Science for Schools:

U.S. Geological Survey

<http://ga.water.usgs.gov/edu/index.html>

WaterWise Resource Action Program:

www.getwise.org

U.S. Environmental Protection Agency:

<https://www.epa.gov/environmental-topics/water-topics>

USDA Watershed:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/>