THERE'S A WATERSHED IN MY BACKYARD

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.

Suggested Grade Level:
5th-6th

Time:
2 hours

Subjects:
Physical Science
Life Science
Geography

Background Information

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 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. 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. This volume of water from a parking lot may 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.

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Lesson 1: What in the World is a Watershed?

Objectives

1. Students will learn the definition of a watershed.
2. Students will learn how water moves in a watershed.

Materials

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

Background Information

There are three different types of watersheds:

Underdeveloped Watersheds are drainage basins that have no development affecting the quality of 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. Planned actions consider the effect on the natural resources of the watershed and help preserve the quality and quantity of water flowing from the watershed. 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.

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 improper farms and logging techniques, poor 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.

Instructional Format

1. Share background information with students.
2. This lesson will be a class demonstration with student participation.
3. Upon completing the lesson, students will answer conclusion questions and discuss the activity.

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Procedures

1. Share background information with students, and show them the diagram of a watershed.
2. This part of the lesson may be done outside to prevent carpet 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, high points, or ribs in the umbrella.
3. Have students hypothesize how water, if sprayed on the umbrella, would move.
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 this is how it is on earth, too.
6. Have student volunteer spray water on a bath towel, and have students compare the water activity between the umbrella and the towel.
7. Discuss activity and answer conclusion questions.

Conclusion Questions (Assessments)

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?

Permeable surfaces, like soil.

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

Less permeable or non-permeable surfaces, like pavement or house roofs.

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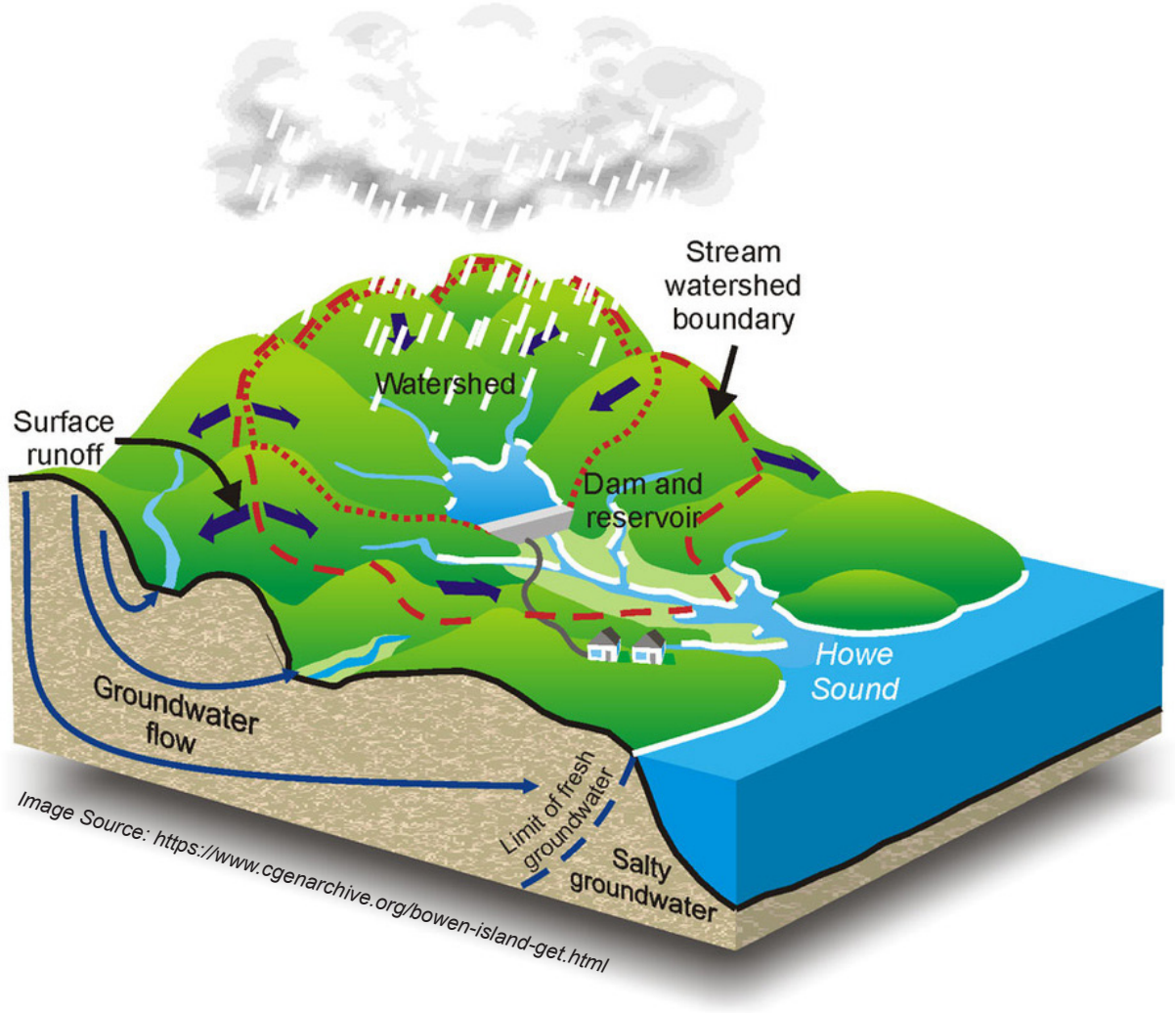
Watershed Diagram



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Lesson 2: There's a Watershed in my Backyard!

Objectives

1. Students will learn the definition of a watershed.
2. Students will learn how water moves in a watershed.
3. Students will learn the vocabulary represented in a watershed.
4. Students will learn about point source and non-point source pollution.
5. Students will identify ways to reduce pollution of water.

Materials

- Large, clear plastic tub
- Waxed paper or butcher paper – at least 2 feet
- Spray bottle filled with blue colored water
- Several 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 (Appendix A)

Preparation

Cocoa powder, chocolate sprinkles, colored sugar sprinkles and drink mixes should be poured into salt/pepper shakers before the demonstration is performed.

Instructional Format

1. Share background information and vocabulary words with students.
2. This lesson will be a class demonstration with student participation.
3. Upon completing the lesson, students will answer conclusion questions and discuss the activity.

Procedures

1. Share background information and vocabulary words with students.
2. Have a student crumple up the waxed/butcher paper to make a 3D topography, complete with hills and valleys, that is to be placed in the large, clear plastic tub.
3. Gently straighten out the paper leaving the "topography" and place it in the tub.
4. Block the tub up so that one end is higher that the other.
5. 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.
6. Have one student spray 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.

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Procedures Continued

7. 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 water shed. 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 poo at the local dog park, and cocoa powder may be the soil moved during construction in a new housing development that is unprotected. Have the student spray colored water over these "pollutants" and have the students 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.
8. Have students generate a list of water use activities that happen in their local watershed. These may also include natural events, such as flooding, drought, mudslides, and fire – examples are included below. Students may determine how these uses affect local water quality and quantity. Further, they may also determine best management practices or what changes in these activities could help protect the water in the watershed.

Agriculture
Crops
Animals
Golf Course
Horticulture Crops

Household
Individual homes: drinking, bathing, washing car
Housing Complexes
Waste Water Treatment Systems
Lawns & Gardens

Industrial
Factories
School
Storage Units
Ware Houses
Parking Lots
Gas Station
Shopping Mall
Offices

Recreation
Parks
Meadows
Woodlands
Swamp lands
Camping Areas
Bike Paths
Swimming Areas
Boating Areas
Softball Diamonds
Football Fields

9. Have students list possible contaminants that irresponsible land use could contribute to the watershed. Determine if the pollution is point source (direct pollution) or nonpoint source pollution (non-direct pollution).
10. Discuss activity and answer conclusion questions.

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Conclusion Questions (Assessments)

1. What is a watershed?

The land that water flows across or under on its way to a stream, river, or lake.

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

Gravity

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

Point source pollution is water pollution from an activity originating from an identifiable source. Non-point source pollution is water pollution from sources not easily identified or located.

4. What are ways to reduce pollution in a watershed?

Answers will vary.

Watershed Vocabulary

Divide: points of higher ground that separate two adjacent streams or water sheds

Drainage Basin: land area drained by a river

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

Lake: considerable inland body of standing water

Non-point Source Pollution: Water pollution from sources 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 activity originating from an identifiable source

Pond: A small body of water fed by a stream or spring

River: a natural stream of water with volume larger than a stream or creek

Run-off: part of precipitation that appears in surface-water bodies

Stream: a body of water that moves from higher to lower ground along well-defined paths

Tributary: a stream that contributes its water into another stream or body of water

Watershed: the land that water flows across or under on its way to a stream, river, or lake

Resources

U.S. Environmental Protection Agency

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Lesson 3: Exploration Watershed

Objective

1. Students will learn the definition of a watershed.

Materials

- Computer(s) with Internet access
- Mississippi Watershed map

Instructional Format

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

Procedures

1. Show the students a map of the Mississippi Watershed available from http://commons.wikimedia.org/wiki/File:Mississippi-map.gif and a map of the Missouri Watershed available from http://www.water-activities.org/index.php/maps-posters/missouri-river-watershed-map.html
2. Download a local watershed map from http://cfpub.epa.gov/surf/locate/index.cfm or http://www.terraserver.microsoft.com. This map will allow your students to look at a topographical and aerial map of your town and area. You may also investigate what is your latitude and longitude and enter that data into the search; however, some of the smaller towns are not listed. The terra server information will help with mapping your watershed. Compare these with the watershed maps you are able to download.
3. Locate your watershed by going to the following website: http://cfpub.epa.gov/surf/locate/index.cfm. Type the name of your town and Kansas, and a Kansas map will appear.
4. Click on your general area on the map, and it will show your watershed and adjacent towns in your watershed.
5. You will need to "superimpose" this map over a map of Kansas to determine all the stream and river names in your watershed. You may also refer to the map on page 117 in Exploring Kansas Natural Resources Educator's Guide, provided by Kansas Foundation for Agriculture in the Classroom.
6. Using the information from several maps, have students combine them to create their own watershed map complete with all the creeks, ponds, rivers, and lakes. Have students use the following color code:
   Blue: major water collection point, such as a large pond or lake
   Green: large river
   Orange: smaller river
   Red: very small rivers or creeks
   Yellow: the high points of the watershed, like the tallest hills or mountains – this is called a drainage divide
7. As a class, discuss activity.

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Lesson 4: Be a Watershed - Create a Living River

Objective

1. Students will learn how water moves in a watershed.

Materials

- •A series of cups that hold small to large volumes
- •A series of buckets that hold small to large volumes
- •Water source – a large pitcher of bucket of water
- •Mississippi Watershed map

Instructional Format

1. Share background information with students.
2. This lesson will be a class demonstration with student participation.
3. Upon completing the lesson, students will answer conclusion questions and discuss the activity.

Procedures

1. Divide students into the following groups:
   Four youth line up single file and represent the headwaters and beginning of the river in your watershed. These students will each carry small cups.
   - Three 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 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.
   - Four 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.

2. Teacher begins to pour water into the smallest cups – those that represent the headwaters or beginning of the rivers.
3. The students will then pour the water into the next size cups to simulate the flowing of the river which gets larger and larger and finally ends up the Mississippi River which ends at the Gulf of Mexico. Continue until the water reaches the bigger buckets.

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Conclusion Questions (Assessments)

1. 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).

2. 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).