



Watershed Lesson

Grade Span	Middle School Earth Science
Time Span	2 (70 minute) class periods
Standards	Obtaining, Evaluating, and Communicating Information Planning and Carrying Out in Investigation
Focus Question	What is a watershed and why is it important?
Overview	Students will take a look at different ways water makes its way to a pond/lake. Students will also be thinking about how that water carries contaminants and sediment and what impact that has on ponds/lakes.
Objectives	Students will be able to define what a watershed is. Students will be able to explain why a watershed is important. Students will be able to read and share science material.
Materials Needed	<ul style="list-style-type: none"> • What is a Watershed? • USGS Groundwater and Flow - Data sheet that goes along with USGS Groundwater and Flow • USGS Surface Run Off and Water Cycle - Data sheet for Surface Water • Snowmelt Runoff and Water Cycle - Data sheet for Snowmelt and Runoff • Infiltration and the Water Cycle - Data sheet for Infiltration • Mercury and the Aquatic Life - Data Sheet for Mercury and Aquatic Life • Sublimation and the Water Cycle - Data Sheet for Sublimation • Springs and Water Cycle - Data Sheet for Springs • Water Cycle for upper middle school kids • Watershed Simulations • Watersheds: Where we Live (Activities too) • Looking at your watershed in your backyard • What is a Watershed Activity • Exit Ticket <p>Newspaper Plastic wrap Tray Water bottle sprayer Blue colored water Paper Towels</p>



<p>Video Material</p>	<p>MIT good video on explaining DO which shows good background information as to what is happening. What is Eutrophication / Agriculture / Biology / FuseSchool Eutrophication Explained</p>
<p>Vocabulary</p>	<p>Aquifer -An underground body of porous sand, gravel, or fractured rock filled with water and capable of supplying useful quantities of water to a well or a spring . Drainage basin -land area drained by a river. Flood -Any relatively high flow of water that overflows natural or artificial banks of a stream, river, lake, or body of water. Flood plain -A strip of relatively flat land bordering a stream, river, or lake that conveys the overflow of flood waters. Groundwater - Water found in pores or cracks in sand, gravel, and rock beneath the land surface. Precipitation -Rain, snow, hail, or sleet. Recurrence interval---The average interval of time within which the magnitude of a given event, such as a flood, will be equaled or exceeded one time. Runoff -That part of precipitation that appears in surface-water bodies. Watershed -The land area that drains water to a stream, river, lake, or ocean. Limnology- the study of the biological, chemical, and physical features of lakes and other bodies of freshwater (according to Google Dictionary). Eutrophication - excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen. (According to Google Dictionary.)</p>
<p>Teacher Prep</p>	<ol style="list-style-type: none"> 1. Read through EPA What is a Watershed and other answers to questions about watersheds to help understand what a watershed is and some questions about watersheds. 2. Read over all the links that are provided that you are going to share with students to make sure you understand and that they work. 3. Break students into groups of 2-3. You might have them be the same groups for all activities today. 4. Make copies of the student sheets: <ol style="list-style-type: none"> a. Data sheet that goes along with USGS Groundwater and Flow b. Data sheet for Surface Water c. Data sheet for Snowmelt and Runoff d. Data sheet for Infiltration e. Data Sheet for Mercury and Aquatic Life f. Data Sheet for Sublimation g. Data Sheet for Springs h. Exit Ticket 5. Be prepared to show how to make a “What is a Watershed?” activity.
<p>Background</p>	<p>Watch this video: MIT good video on explaining DO which shows good background information as to what is happening.</p> <p>Good information about what is a watershed: EPA What is a Watershed and other answers to questions about watersheds</p>



Procedure

Engage:

1. Watch the video [What is a Watershed?](#).
2. Ask students:
 - a. Why do you think watersheds are important?
 - b. Do we have any watersheds around here?

Explore:

3. Break students up into groups of 2-3. Assign each group an article to read from USGS sites:
 - [USGS Groundwater and Flow](#) - [Data sheet that goes along with USGS Groundwater and Flow](#)
 - [USGS Surface RunOff and Water Cycle](#) - [Data sheet for Surface Water](#)
 - [Snowmelt Runoff and Water Cycle](#) - [Data sheet for Snowmelt and Runoff](#)
 - [Infiltration and the Water Cycle](#) - [Data sheet for Infiltration](#)
 - [Mercury and the Aquatic Life](#) - [Data Sheet for Mercury and Aquatic Life](#)
 - [Sublimation and the Water Cycle](#) - [Data Sheet for Sublimation](#)
 - [Springs and Water Cycle](#) - [Data Sheet for Springs](#)
4. Ask students to fill in the chart that goes along with their article to share out with the rest of the class at the end.

Explanation:

5. When students have finished reading and filling in their chart share/display the [Water Cycle for upper middle school kids](#) site. As you click around, have students share out what they read in their group.
6. [Watersheds: Where we Live \(Activities too\)](#) to each of the students. Look over the map and discuss with students. Then on the back have students do the ["What is a Watershed?" activity](#). (Overview: Students crumple up the newspaper, place it in the tray and squirt blue water onto the newspaper and observe what the water does.) Students should [answer the questions Provided](#).
7. Have students mess about with the [Watershed Simulations](#)
 - a. <https://runoff.modelmywatershed.org/>
 - b. <https://modelmywatershed.org/>
8. Watch one of the eutrifications videos provided:
 - a. [What is Eutrophication / Agriculture / Biology / FuseSchool](#)
 - b. [Eutrophication Explained](#)
8. [Exit Ticket](#)

Extension:

- Look at: [Looking at your watershed in your backyard](#).
- Use [Google Earth](#) and [this lesson](#) to look at watersheds all over the US.



	<ul style="list-style-type: none">• Watershed Activity for looking at how pollutants affect watersheds.• Classify what the watershed drainage patterns are for your area. Watershed Drainage Patterns
Wrap-Up	<p>Evaluate:</p> <p>Formative Assessment: Check for understanding when students share out about the articles they read. Listen to conversations when students are doing the “What is watershed” activity.</p> <p>Summative: Exit ticket with the focus question: What is a watershed and why is it important?</p>



What is a Watershed? Activity

This was taken **DIRECTLY** from [USGS site](#) so kids would have an easier time with this activity.

INTRODUCTION

A watershed is the land area that drains water to a stream, river, or lake. It is a land surface feature that can be identified by tracing a line along the highest elevations between two areas on a map. Everyone lives within a watershed that drains to a local stream or river. Large watersheds, such as that of the Mississippi River, contain thousands of smaller watersheds. Changes in small watersheds can affect the river systems downstream. The following activity is designed to demonstrate a watershed and the connection between small watersheds and larger watersheds.

OBJECTIVES--;-STUDENTS WILL:

1. Identify a watershed.
2. Observe how water flows from higher elevations to lower elevations in a watershed.
3. Observe the interconnection between watersheds.

MATERIALS----EACH GROUP WILL NEED-

1. One container at least 22 cm wide, 33 cm long, and 6 cm deep. One possible container is a metal baking pan.
2. Two sheets of newspaper.
3. One sheet of thin (0.5 mils) plastic at least 30 cm larger in all dimensions than the container.
4. One waterproof marker.
5. One spray bottle.
6. Colored water to fill a spray bottle.
7. One book.

TEACHER PREPARATION

1. This activity is designed for students to work in groups of three.
2. Display a copy of the poster titled "Watersheds : Where We Live" on the classroom wall several days prior to conducting this activity.
3. Fill the spray bottles full of water and add several drops of blue food coloring so that the water can be easily identified
4. Assemble one of the models as an example for the students.

PROCEDURE

1. Divide the class into groups of three. Provide each group with a container, two sheets of newspaper, one sheet of plastic, one waterproof marker, one book, and one spray bottle filled with blue water.
2. Have one student in each group crumple both sheets of newspaper separately and place them next to each other at one end of the container. Drape the sheet of plastic over the crumpled newspaper, causing it to form hills over the high places, and valleys in the low places. Put a book under one end of the container to allow water to flow down the valleys and pool at the front of the container. Place the sides of the plastic sheet down into the container to prevent water from overflowing the container.
2. Explain that the plastic sheet represents the ground surface covering the hills and valleys. Using the markers, have the students draw where they believe the main rivers will flow in their models. Have each student spray several pumps of water, using the spray bottle, on the model. Point out to students how water runs down one side or the other of the ridges and forms rivers in the valleys. The ridges divide individual watersheds. All the area from which water flows into a river is that river's watershed. Have the students count the number of small watersheds that drain into the main river they drew with the marker. All the watersheds should drain into a lake at the lower end of the container.



INTERPRETIVE QUESTIONS (student version at the end)

Have students examine other groups' models.

1. How are they alike and how are they different?
2. How many watersheds are above the lake that forms at the lower end of the model? ~: The answer will vary from model to model but will be at least four.
3. What happens to the size of the stream as the watersheds get larger? ~: The streams get larger.

DEFINITIONS

Aquifer-An underground body of porous sand, gravel, or fractured rock filled with water and capable of supplying useful quantities of water to a well or a spring .

Drainage basin----land area drained by a river. **Flood**-Any relatively high flow of water that overflows natural or artificial banks of a stream, river, lake, or body of water.

Flood plain-A strip of relatively flat land bordering a stream, river, or lake that conveys the overflow of flood waters.

Groundwater-Water found in pores or cracks in sand, gravel, and rock beneath the land surface.

Precipitation-Rain, snow, hail, or sleet.

Recurrence interval---The average interval of time within which the magnitude of a given event, such as a flood, will be equaled or exceeded one time.

Runoff-That part of precipitation that appears in surface-water bodies. **Watershed**-The land area that drains water to a stream, river, lake, or ocean



What is a Watershed Activity

Answer the following questions:

1. After examining each other's models, how are they alike? How are they different?
2. What is a reason or reasons the models would be different or alike?
3. How many watersheds are above the lake that forms at the lower end of the model? Why are they like that?
4. What happens to the size of the stream as the watersheds get larger?



Name:

Date:

Exit Ticket for Watershed Lesson

1. What is a watershed?
2. Why are watersheds important?
3. Name the watershed around where you live.
4. Name one way you could change something you do that would impact the watershed.