What Is A Watershed?

Lesson 2
From Unit: Watershed S.O.S. (Saving Our Sources)

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3rd-5th Grade

Subjects:
Language Arts, Library / Technology, Math, Philanthropy, Science and Social Studies

Key Words/Concepts click to view

Purpose:

The purpose of the lesson is to help learners understand the importance of watersheds and ways in which water pollution occurs. After understanding the importance of the watersheds, they will recognize that wise usage of their local watershed is an example of stewardship.

Duration:

Two forty-five minute class periods

Objectives:

The learner will:

- write a definition for watershed. (the land area that drains into a particular lake, river, or ocean).
- draw a picture of their watershed.
- write a short story detailing at least one way their watershed could become polluted.
- list three reasons why it is important to protect their watershed.

Materials:

- Per group or individual:
  scrap paper, water-based markers (blue, black, brown, & red), paper towel, spray water bottle
- Computer access (for teacher)
- For water pollution demonstration (optional) – see instructions for details:
  two clear 2-Liter bottles, utility knife, drill, coffee filter, two inches of sand (six cm.) tape, water, red food coloring
- Maps of your local watershed (see Bibliographical References)

- Colored pencils for each student
- Overhead projector
- Markers
- Transparency of local watershed
- Drawing paper
- Examples of fish, plant life, or animals found in your watershed area
- Writing paper and pencils
- A recording of the song *Under the Sea*

Instructional Procedure(s):

Anticipatory Set:
While music from The Little Mermaid is playing ("Under the Sea"), ask learners to write five ways that they use water. They should use one self-sticking note for each response. After 3-5 minutes, discuss their answers and post various responses on a large sheet of paper. You may want to then create different categories for the various uses and give them labels (ex. Recreation, health, household, etc). They may place their self sticking note under the appropriate category.This should lead to a discussion of why water is so important to us.
Share the following information to further your discussion:

Water Usage	**Number of Gallons Used**
Flush a toilet	5
Full bath in tub	36-50
Wash hands (with water running)	2
Brush teeth (with water running)	2-10
Dishwasher	60
Wash clothes	50
Drinking water	2-12
Cooking	10
Washing the car	100

**On the average in the U.S., a person uses 100 gallons of water a day
**A dairy cow must drink 3 gallons of water to produce 1 gallon of milk
An ear of corn **needs 26 gallons of water to grow
**A meal at a fast food restaurant can take 1,400 gallons of water to make (burger, fries, and drink)
*Information from the Saginaw Bay Watershed Middle School **Curriculum** Guide- lesson "Some Ways We Use Water."*

- Ask learner where they think water comes from. (They may indicate a well or nearby lake.)

- Ask learners if they have ever heard of the term "watershed." Provide a simple definition for a watershed – the land area that drains into a river, lake, or other body of water. **Teacher Note** - boundaries are high points of land that slope downward toward the body of water. The Earth is made up of numerous watersheds, some containing more of the Earth's (fresh) water than others.

- Do the following activity to **demonstrate** what a watershed is. It can be done individually or in groups. Ask each group or individual to:
  - Crumple a piece of paper into a loose ball.
  - Partially open the paper, and place it on a desk. The paper should still be crumpled enough to have portions that resemble mountain ridges and valleys. Be sure there is a paper towel under the paper.
  - Using a blue water-based marker, have students mark streams or rivers on their papers, and also have them mark where they think the water will collect as it runs downhill. (This could represent a lake.).
  - Using a black water-based marker, have students outline the ridges that separate one stream or river from another.
  - Using brown water-based markers, have students draw exposed soil that could erode or wash away into the lake as the water flows through the watershed.
  - Using red water-based markers, have students draw in some pollutants that may be found in their watershed, such as soap from washing cars, pesticides from lawns, and animal waste from a nearby farm.
    Keeping the model on the desks, have students spray (or you go around with a sprayer and spray) a very light mist of water over it.
  - Observe where water runs down and collects.

  Questions to consider:

1. What do you think the paper represents?
2. What do you think the spray represents?
3. Why does water flow down into the creases?
4. What would you call the water that runs down in the creases
5. And the water that collects in "pools"?
6. What happened to the ink from the markers as the water flowed? Where did it end up?
7. How is this a problem if the inks represent pollutants?"

- Ask learners to consider how this is similar to and/or different from local areas. Where in the **community** would there be the most pollutants?

- Ask learners to identify where the rain, snow, etc. in their area drains. They may name local rivers streams, lakes, or bays, etc.

- Provide them with a county or state map which indicates the streams and rivers flowing through their watershed. Indicate the lowest point in the watershed – the point to which all water flows - and have them trace the path they believe the water would flow to get there.

- Use an overhead projector to **demonstrate** the process, frequently asking for student input. You could have the rivers already listed on the map.

- Start by marking their town with a red dot, and then find the river nearest to their school or town and draw a blue line from there to the lowest point in the watershed - indicating any rivers it may flow through along the way. Be sure they include arrows showing the direction the water flows. **Teacher Note:** Maps can be found at the EPA Surf Your Watershed site http://cfpub.epa.gov/surf/locate/index.cfm background info on your watershed can be found at the Know Your Watershed site http://www.ctic.purdue.edu/Know%20Your%20Watershed/

Day Two

Anticipatory Set:
Think/Pair/Share: (Think about your answer, pair with a partner and discuss and then share with the class.) Tell the learners: "Yesterday, we discovered what our watershed is. Think of at least one way you use our watershed and one way our watershed could be harmed."

- Look at yesterday's maps and continue the discussion of pollution.

- As you look at this map, discuss how the health of a watershed is determined by many factors, including the use of land throughout the watershed, and what pollutants each uses that may be put into the watershed.

- Discuss what types of land use are present within your **community** and your overall watershed. Ask: "Are there factories that produce heavy metals such as mercury and cadmium and organic chemicals like PCBs (Polychlorinated Biphenyls) and PAHs (Polyhydroxyalkanoates)? Are there farms that use nitrates from fertilizers and livestock waste? Are there small businesses using things that might pollute the watershed?" **Teacher Note:** You may need to do some advance research about your individual **community**, and share the information with the learners.

- Discuss how each of these uses could lead to pollution, not only by being directly put into the drainage area, but also indirectly through other streams, rivers, lakes, and even through groundwater. Define ground water as water that soaks into the ground.

- Discuss ways in which pollution could occur: run-off from crop and forest land, failing septic systems, construction sites, irrigation drainage systems, automobile exhaust, etc. How can waste materials like old motor oil, pesticides, and raw sewage (from overflowing septic tanks and sewage systems) get into the watershed?

- Do a water pollution demonstration at this point to show how easily contaminants can get into the water source.
    - Using two clear two liter bottles, create a model of the water table. Using a utility knife cut off the bottom two inches of a two liter bottle, recycle the top.

- Drill six holes in the bottom of the remaining piece. This can be done with a low speed drill or a hot nail.
- Cut off the top two inches (five cm) of the other bottle. Insert the bottom of the first bottle into the second bottle with the holes pointing up.
- Cut a coffee filter to fit into the second bottle. Cover the coffee filter and the bottle bottom with two inches (five cm) of sand. You may tape the top of the second bottle back on, but it is not necessary. You now have a working model of ground water and pollution.
- To **demonstrate** how water pollution seeps into ground pour one cup of water on the sand. The water will filter through the sand and collect at the bottom of the bottle.
- To **demonstrate** pollution, place five drops of red food coloring on the sand to simulate a pollutant. Slowly pour one cup of water on top of the food coloring. It will filter through the sand and appear in the bottom of the bottle. The ground water has been polluted.

- Generate a list of why it is important to protect the local watershed.

- Explain to learners that it is important to know that the responsible use of watershed is an example of **stewardship**. We live on Mother Earth and we need to take care of her for ourselves and for those who come after us.

Assessment:

Draw a picture of your local watershed and include some of the fish, plant life, or animals that use it. (Provide pictures of flora and fauna from your watershed area and also include maps of the watershed. Maps can be located at http://cfpub.epa.gov/surf/locate/index.cfm

Have learners write a short story detailing at least one way their watershed could become polluted, and three reasons why it is important to protect their watershed.

School/Home Connection:

- Interactive Parent / Student Homework:
  The learners will write a letter to the family members at home, explaining their study of the watershed and asking them to help devise a plan to reduce water usage in their household. Learners should share information from their family's plan with the class. The entire class can brainstorm a list of ideas for saving water, which can be sent home with the letters as a springboard for discussion. If families have other ideas, they can be shared with the class.

Cross-Curriculum Extensions:

For additional activities go to http://www.epa.gov/safewater/kids/gamesandactivies.html

Bibliographical References:

- Bay Area Community Foundation and Others, Saginaw Bay Watershed Middle School Curriculum Guide
- The Little Mermaid: Original Motion Picture Soundtrack. Disney Studio, 1997. ASIN: B000001M3Z.

- Know Your Watershed http://www.ctic.purdue.edu/Know%20Your%20Watershed/
  Surf Your Watershed: http://www.epa.gov/surf/

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Academic Standards:

State/Country: Pennsylvania View Standards

Grade: 3	Subject: Arts Education
STANDARD	9.1.3.B.4. Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts. Visual Arts: paint; draw; craft; sculpt; print; design for environment, communication, multi-media

Grade: 4	Subject: Arts Education
STANDARD	9.1.5.B.4. Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts. Visual Arts: paint; draw; craft; sculpt; print; design for environment, communication, multi-media

Grade: 5	Subject: Arts Education
STANDARD	9.1.5.B.4. Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts. Visual Arts: paint; draw; craft; sculpt; print; design for environment, communication, multi-media

Grade: 3	Subject: Language Arts
STANDARD	1.9.3.A. Use media and technology resources for directed and independent learning activities.

Grade: 4	Subject: Language Arts
DESCRIPTOR / STANDARD	1.4.4.B.1. Use relevant graphics (maps, charts, graphs, tables, illustrations, photographs).
STANDARD	1.8.4.B. Conduct inquiry and research on self selected or assigned topics using a variety of teacher guided media sources and strategies.
STANDARD	1.9.4.A. Use media and technology resources for directed and independent learning activities and problem solving.

Grade: 5 Subject: Language Arts

DESCRIPTOR / STANDARD	1.4.5.B.1. Use relevant graphics (maps, charts, graphs, tables, illustrations, photographs).
STANDARD	1.8.5.B. Conduct inquiry and research on self selected or assigned topics using a variety of teacher-guided media sources and strategies.
STANDARD	1.9.5.A. Use media and technology resources for problem solving, self directed learning, and extended learning activities.

Grade: 3 Subject: Mathematics

STANDARD AREA / STATEMENT	2.3.3.A. Demonstrate an understanding of measurable characteristics and the need to quantify those characteristics.

Grade: 3 Subject: Science

DESCRIPTOR / STANDARD	4.2.3.A.1. Identify the watersheds in which you reside.
STANDARD	4.5.3.C. Identify different types of pollution and their sources.

Grade: 4 Subject: Science

DESCRIPTOR / STANDARD	3.3.4.A2. Identify basic properties and uses of Earth's materials including rocks, soils, water, and gases of the atmosphere. 3.3.4.A4b. Describe phase changes in the forms of water on Earth.
DESCRIPTOR / STANDARD	4.2.4.A.1. Identify and explain what determines the boundaries of a watershed. 4.2.4.A.2. Identify water systems and their components as either lotic or lentic.
STANDARD	4.5.4.A. Identify how people use natural resources in sustainable and non-sustainable ways. 4.5.4.C. Describe how human activities affect the environment.

Grade: 5 Subject: Science

STANDARD	4.2.5.C. Identify physical, chemical, and biological factors that affect water quality.
STANDARD	4.5.5.C. Explain the difference between point and non-point source pollution.

Grade: 3 Subject: Social Studies

DESCRIPTOR / STANDARD	5.2.3.A. Identify personal rights and responsibilities.
DESCRIPTOR / STANDARD	7.4.3.B. Identify the effect of people on the physical systems within a community.

Grade: 4 Subject: Social Studies

DESCRIPTOR / STANDARD	7.4.4.B. Identify the effect of people on the physical systems within a community.

Grade: 5 Subject: Social Studies

DESCRIPTOR / STANDARD	7.4.5.B. Identify the effect of people on the physical systems within a community.

Philanthropy Framework:

Strand	Standard	Benchmark	
II. Philanthropy and Civil Society	PCS03. Philanthropy and Economics	E	5. Recognize the wise use of resources as *stewardship*.

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