

Surface Water Model

PURPOSE: To demonstrate the concept of a watershed and how pollutants move within a watershed. To show how best management practices reduce pollutants in a watershed.

SUMMARY: Through a visual presentation, students will learn how water moves through a watershed, the pollutants that can enter the water system from different land use activities and ways that people can help prevent water pollution.

BACKGROUND: A watershed is an area of land from which all the water drains to the same location such as a stream, pond, lake, river, wetland or estuary. A watershed can be large, like the Mississippi River watershed, or small, such as all the water that drains to a small pond. Large watersheds are often called basins, and contain many small watersheds.

Watersheds can transport non-point source and point source pollution. Non-point source pollution refers to pollutants that are brought into the water system by rainfall and snowmelt runoff moving over and through the ground to a water source. There is typically no single source of these pollutants, and they often accumulate over a large area. Examples of non-point source pollutants are pesticides, fertilizers, sediment, and gas and oil (e.g., from car leaks). Point source pollutants refer to pollution that enters the water from a pipe or ditch. Often the pollution has a single source such as chemical waste entering a stream from a pipe.

Best Management Practices (BMPs) are ways to manage the land in order to reduce or prevent non-point source pollution to surface and groundwater. Examples of best management practices include:

- Native vegetation along streams and lakes to prevent sediment and other contaminants from washing into the water.
- Using the appropriate amount of pesticides and fertilizers to prevent chemicals from becoming runoff and entering bodies of water.
- Keeping automobiles in good condition and fixing leaks to prevent oil and gas from contaminating the water.
- Reforesting after a logging event, or practicing selective logging.
- Placing hay bales or silt fences around a construction site to prevent sediment runoff.

MATERIALS:

- *Surface Water Model
- Spray Bottles
- Pollutants (it is best to use sugar free pollutants on the model because they are less sticky)
 - Red drink mix (pesticides)
 - Green drink mix (fertilizers)
 - Cocoa (sediment, sewage-add water to make sludge)
 - Soy sauce (gas and oil)
- Best Management Practice Materials

Suggested grade level:
K-12

Duration:
15-20 minutes

Setting:
Classroom
Outdoors



* Available for loan at USU Water Quality Extension or through your local Extension office. Please contact USU Water Quality Extension for details 435-797-2580 or <http://extension.usu.edu/waterquality>

- Strips of green felt
- Modeling clay
- Small sponges

PROCEDURE:

PART ONE

1. Position the model so it is visible to all the students.
2. Ask the students: What does the model represent? *A Watershed. A watershed is an area of land from which all the water drains to the same location such as a stream, pond, lake, river, wetland or estuary.* For more information on watersheds in your area, see <http://cfpub.epa.gov/surf/locate/index.cfm>.

3. Have the students spray water on the model to simulate a rain event. Ask students: Where does all the water go? *Most of the water eventually flows through the river and to the lake.*
4. Discuss how water moves through a watershed (i.e., runoff, groundwater). Be sure to point out that some water never runs off, but stays in the watershed. Ask the students: Does the lake look clean or dirty? Would you like to swim in it?



Picture 1: Children spraying surface water model to simulate rain.

5. Dry off the model.

PART TWO

1. Ask the students: What do you think of when you hear the word “pollution”? Discuss the two types of pollution (point source and non-point source, see “background” section on pg 1 for more information).
2. Ask students: What places on the model might contribute to point source pollution? *Industrial plant and sewer treatment plant.* What places might contribute to nonpoint source pollution? *Plowed field, construction site, stream bank, lawns and golf course, forest, areas with livestock, roads and parking lots, and household waste.*
3. As you discuss possible pollution sources, sprinkle the contaminants onto the model.
 - Red drink mix – pesticides can be found on a farm, or on gardens in the residential areas.
 - Green drink mix – fertilizers can be found on the golf course, lawns in the residential area or on farms.
 - Cocoa – sediment can be found on the mountain (which may have had logging activity), on farms (where the farmer has recently plowed the field) or on a construction site.
 - Soy sauce – gas and oil may be found on the road ways, driveways, or the construction site.
4. Have the students spray the model to simulate a rain event.
5. Ask the students: How does this rain event compare with the rain event before the pollutants were added? What was different? Where did most of the pollutants end up?

6. Ask the students: How can water pollution be prevented? *Permits and regulations are used to mitigate point source pollution. Best management practices (BMPs) are used to reduce non-point source pollution.* See the "background" section for more information on Best Management Practices.
7. Demonstrate Best Management Practices on the surface water model. Use green strips of felt to create vegetation along the stream banks and lake shores. Use small sponges to represent hay bales at a construction site. Use the modeling clay to create berms to prevent runoff. Repeat the procedure in "PART TWO". Have the students compare the amounts of pollutants that entered the lake with the BMPs in place and without.

EXTENSIONS: Landfill and wetland models are available through USU Water Quality Extension (<http://extension.usu.edu/waterquality/htm/contact>).

WRAP-UP: Discuss strategies on how to reduce water pollution and why reducing water pollution is important. Have the students brainstorm how they can help reduce water pollution on a large scale (in their community) and on a small scale (in their own homes). *Large to small scale: practice selective forestry, maintain vegetation to filter water, properly manage lawns by having them tested for nutrients before adding fertilizer, better containment of contaminants like manure and sewage, dispose of used oil and chemicals properly.* For more information about how to reduce pollution around your home visit <http://water.epa.gov/polwaste/nps/dosdont.cfm>.