Surface Water Model

GRADE LEVEL:
K-12

SUBJECT AREAS:
Science

DURATION:
15-20 minutes

SETTING:
Classroom
Outdoors

LINK TO THE UTAH CORE CURRICULUM:
Science –

Fourth Grade
Standard 1 (Indirect)
Standard 2
Standard 3

USU Water Quality Extension

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 Colorado River watershed, or small, such as all the water that drains to a small farm pond. Large watersheds are often called basins, and contain many small watersheds.

Watersheds can transport nonpoint source and point source pollution. Nonpoint source pollution refers to pollutants that are brought into the water system by rainfall runoff and snowmelt 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 nonpoint 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.

MATERIALS:

- Surface Water Model
  - Available on loan in most counties in Utah.
  - For a complete list, see www.extension.usu.edu/waterquality/education
- Spray Bottles
- Pollutants
  - Red drink mix (pesticides)
  - Green drink mix (fertilizers)
  - Cocoa (sediment)
  - Soy sauce (gas and oil)
- Best Management Practice Materials
  - Strips of green felt
  - Modeling Clay
  - Small sponges

NOTE: It is best to use sugar free "pollutants" on the models as they are less sticky.

PROCEDURE:

PART ONE

1. Position the model so it is visible to all the students.

2. Ask the students what the model represents. Ask the students what they think would happen if water fell on the model. Where would the water go?

3. Have the students spray water on the model to simulate a rain event. Where does all the water go?

4. Discuss the concept of a watershed with the students. Ask the students where the water in their area ends up. What watershed do they live in? (For more information on watersheds in your area, see http://www.epa.gov/surf/)

5. 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 if the lake looks clean or dirty. Ask if it looks like they would like to swim in it.

6. Dry off the model.

PART TWO

1. Ask the students to define the word pollutant. Ask them if they can think of any places on the model which might contribute to water pollution.

2. 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.

3. Have the students spray the model to simulate a rain event.

4. Ask the students to compare the results of this rain event with the rain event before the pollutants were added. What was different? Where did most of the pollutants end up?

5. Ask the students to think about ways that the water pollution could have been prevented.

6a. Discuss "best management practices":

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

WHAT ARE BEST MANAGEMENT PRACTICES (BMPs)?
BMPs are management or land practices that reduce nonpoint source pollution. See examples in 6a.

6b. You may want to demonstrate Best Management Practices on the 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: Check to see if there are different models available in your area (i.e., wetland, lake, one with best management practices). If these are available, compare the movement of water and contaminants and accumulation in different parts of the watershed.

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).