

TEACHER'S GUIDE

WATER WIZARDS

WICKED WASTE

Review

Remind students of what they learned in the last activity. Recall the many difficulties fish must avoid to survive.

Purpose

The purpose of this activity is to show the student how a landfill can pollute groundwater.

Materials

A clear, flat-bottomed pan or box (a deep baking dish, shoe storage box, clear loaf pan work well). Four or five sponges to cover the top, a water can, flour, clear jars, red and blue food coloring, a meat baster, and two quarts of sand. Note: The sand will need to be replaced each time the demonstration is repeated so figure total amount.

Experiment for "Do This"

To help you students visualize underground water and the problems with leaching landfills, try the following demonstration.

1. Fill clear container two-thirds full of sand. Place a layer of sponges top of sand to represent top soil. Soil is not used because it will discolor the water and prevent the food coloring from being usable. Elevate one end of the box to create a slope (see figure 1).
2. The layer of sand represents subsoil and the bottom of the pan represents bedrock. Use watering can to sprinkle a few cups of "rain" into the model. Note how the "topsoil" becomes saturated and then how the water percolates down to the underground water table (where sand and pan meet). Continue the "rain" until the model is saturated, but not standing in water (see figure 2). Ask students why groundwater is not visible. (It is stored between the pore spaces in the sand.)
3. Use a meat baster at the lower end of the model to stimulate the pumping of water from a well. Pump some of the water and place in a clean jar. Some sand will also come up, but will settle to the bottom (see figure 3).
4. Designate the elevated end of the model as a town's landfill. Mix approximately 10 drops of red and blue food coloring separately in two jars with 1/4 cup of water. These solutions will represent some pollutants. Use the meat baster to drop samples of food coloring onto the landfill. As you add up each drop, you can incorporate a little humor by referring to familiar products which end up in landfills. You could mention the half-used you tossed out because you didn't like the color, or the triple strength spot removes which worked so well it made a hole in your shirt. Encourage the class to join in as you alternate red and blue drops onto the landfill (see figure 4).
5. Simulate rain by pouring water over the surface. As the food coloring soaks through the topsoil suggest that the rain is washing the pollutants away. Ask students where "away" is. Then use the baster to pump water from the well again. What has happened to the groundwater? Keep pumping water out of the well until the well runs dry. then add more rain to see if the water is purified when it is pumped from the well again. It will still be polluted. Make the point that once groundwater is polluted it is very difficult to clean it up (see figure 5).

Reinforcement in Can You Tell Me..."

Have students answer questions individually or as a group. Encourage creativity. Let students complete Water Wizard Workout as time allows.

Extension

1. Review "Water Wizards Home Brew" for students. Encourage students to share with their parents and incorporate activities into their daily life. Let students share results with the class.
2. If a little landfill was made on the school grounds at the beginning of the year, dig it up and make observations.
3. Watch "The Rotten Truth" 3-2-1 Contact videotape (should be available at the Board of Education Office).