

Lesson 5

Water Underground

How do surface water and ground water interact?
What happens if a pollutant enters the surface water?
From where does drinking water come?

GOAL To understand that surface water and ground water should be monitored and protected from contamination.

OBJECTIVES Students will:

- ✓ create a model that demonstrates the interaction between surface and ground water
- ✓ determine how surface water and ground water interact

MATERIALS plastic container, 2 paper cups, sand (one cup), food coloring, water, gravel

CORE CURRICULUM CONTENT STANDARDS

- Science 7(2,5,8), 8(2), 14(1)
- Social Studies 9(1,3), 10(1-3), 13(5)

VOCABULARY run-off, permeable, impermeable, percolate, aquifer

PROCEDURES

1. Begin by asking students, “Where does water go when it rains?” Some of the water may evaporate, flow over land as runoff into the waterways, or soak into the soil and become ground water.
2. Explain to students that as rain water soaks into the ground it slowly percolates down into the soil through layers of soil and rock. The permeability of the soil affects how quickly or slowly the water is able to pass, or soak, through the soil.
3. Examples of permeable soil include sand and gravel because there are pores or spaces between the soil. Clay is an example of an impermeable surface because it can effectively block water from flowing through it.
4. Water percolates downward until it reaches an impermeable layer. Then, the water begins to accumulate, or fill up. The underground pockets of water held in the rocks are called aquifers. Aquifers are important sources of fresh water. The drinking water supply of many households comes from aquifers. Wells are drilled to pump water from aquifers.
5. Protecting this resource is extremely important as water carrying pollutants may contaminate water supplies.

6. The interaction between surface water (rain water, lakes, wetlands, rivers) and ground-water (aquifers) is important because the water quality of one may affect the other.
7. Break students into groups and have them conduct the following exercise so as to illustrate the interaction between ground water and surface water.
 - a. Fill a plastic container with gravel until it is a few inches from the top.
 - b. Pour water into container until it reaches the top of the gravel.
 - c. Poke small holes in the bottom of two paper cups.
 - d. Place an inch of sand in one of the cups. Set this cup in the bowl, resting on the gravel.
 - e. Explain that the cup in the gravel represents soil on land and the plastic container with the gravel and water represent an aquifer.
 - f. Place several drops of food coloring on top of the sand in the cup.
 - g. The food coloring represents a contaminant or pollution that went into the soil.
 - h. The students simulate rain by pouring water into the second cup, holding the second cup over the cup with the sand and food coloring.
8. Students may answer the following questions:
 - a. What is happening to the water? (*percolates down through the sand*)
 - b. How is the contaminant impacting the soil on land and groundwater?
 - c. Can the ground water affect the surface water? Explain.
 - d. Where does your drinking water come from? (*aquifer, reservoir*)
 - e. Knowing that surface and groundwater impact each other, how does that change your attitude about your treatment of water?

EXTENSIONS

1. Have students research the geological formations, such as stratified drift and bedrock that help in the storage of underground water reserves.
2. Have students try different types of soil in the cup to test percolation of the various types of soil.

RESOURCES

Etgen, John, *Healthy Water, Healthy People, Water Quality Educators Guide*, 2003, The Watercourse, Bozeman, Montana 59717 - 0575

GLOSSARY

aquifer - an underground layer of earth, gravel, or porous stone that yields water

impermeable - preventing especially liquids to pass or diffuse through

percolate - to cause (liquid, for example) to pass through a porous substance or small holes; filter

permeable - that can be permeated or penetrated, especially by liquids or gases: *permeable membranes; rock that is permeable by water*

run-off - rainfall not absorbed by soil