

Lesson 1

Water Values

How much water is available for human consumption?
What is the connection between surface and groundwater?
In what ways can drinking water be conserved?

GOAL To understand that water is a finite resource to be protected.

OBJECTIVES Students will:

- ✓ conduct a demonstration showing the amount of water available
- ✓ examine the interaction between surface and groundwater
- ✓ think of ways to protect water

MATERIALS three 5 gallon plastic containers, eyedropper, gravel (two - three cups), sand (one cup), two paper cups, food coloring, one plastic quart size container

CORE CURRICULUM CONTENT STANDARDS

- Language Arts 2(4)
- Math 1(1,2,4), 2(1), 4(1,2), 7(9)
- Science 1(1,6), 7(7), 8(2)
- Social Studies 10(2,3), 12(3,5), 13(4)

VOCABULARY finite, resource, percolate, groundwater, surface water, hydrologic cycle, recycle, reservoir, aquifer, hypothesize, stratified drifts, recharging

PROCEDURES

1. Begin by explaining to students that water is a *finite* resource to be conserved. There are many ways that water is used and water we use today has been *recycled* through the *water cycle*. We have the same amount of water today as we had millions of years ago. Discuss and list ways they use water.
2. Conduct a demonstration to the class having a student help.
 - a. Present a container filled with five gallons of water. This container represents all the water on Earth.
 - b. Explain to students that 97.2% of all the water is contained in the oceans. This is salt water and unsuitable for drinking or irrigating crops, etc. Remove 2.8% (2 ¼ cups) of the water.
 - c. Place the 2 ¼ cups of water in another five gallon clear container or have a student conduct this part of the activity. This amount represents the amount of fresh water. 2% of this fresh water is located in glaciers and ice caps and is not available, leaving a ½ cup.
 - d. Remove ½ cup from the 2nd container and place into another five gallon clear container. This is what is left for us to use. Explain that part of the water is trapped underground or is polluted, so therefore, unsuitable for drinking.

- e. That leaves approximately 5 drops of water for us to use.
Remove 5 drops of water with dropper and place into another container. The five drops represent the water available for all uses. Have students think of all the ways they use water. List on board.
3. Now that students are aware of how much water is available to them, have them think of how their day would be without water. What could they not do?
4. Ask students to think about where their *drinking water* comes from.
 - a. Drinking water either comes from surface *reservoirs* or underground sources, such as *aquifers*. Water is stored beneath the surface of the land in aquifers, which are rocks with pore spaces or breaks in bedrock that are filled with water. Major aquifers are in the floodplains between New Hartford and Tariffville because of stratified drift (*layered glacial deposits*). When groundwater enters a water body, it is called *re-charging*. Groundwater can recharge a river with new water and the surrounding riparian area or wetlands. The interaction between surface water (rain water, lakes, wetlands, rivers) and groundwater (aquifers) is important because the water quality of one may affect the other.
5. Break students into groups and have them participate in an activity that illustrates the interaction between *ground water* and *surface water*.
 - a. Have the groups fill a plastic container with gravel until it is a few inches from the top.
 - b. Then, have them pour water into the container until it reaches the top of the gravel.
 - c. Have students 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 represents an aquifer.
 - f. Have students hypothesize what will happen if they add a pollutant.
 - g. Place several drops of food coloring on top of the sand in the cup.
 - h. The food coloring represents a contaminant or pollutant that went into the soil.
 - i. The students simulate rain by pouring water into the second cup, holding the second cup over the cup with the sand and food coloring. Ask student groups the following questions:
 1. What is happening to the water? (*percolates* down through the sand)
 2. How is the contaminant impacting the soil on land and groundwater?
 3. Can the ground water affect the surface water? Explain.
 4. Where does your drinking water come from? (aquifer, reservoir)
 5. Knowing that surface and groundwater impact each other, how does that change your attitude about your treatment of water?
6. Read the two statements:
 - a. According to the *Farmington River Guide*, dated 2002 “approximately 90% of the towns in the Farmington River Watershed receive drinking water from aquifers.”
 - b. According to the *State of the Farmington River Watershed Report*, dated August 2003, “The river is a vital water supply and recharge area for drinking water for over 600,000 people in the greater Hartford region and Farmington Valley.”
7. Have students think about the meaning of these two statements.
8. Have them reflect on how to protect the quality of water. Have students write down their ideas and discuss with the class.

EXTENSIONS

1. Have students conduct research on drinking water sources in Farmington River Watershed.

RESOURCES

Haskin, Kathleen M., *The Ways of the Watersheds: An Educators Guide to the Environmental and Cultural Dynamics of New York City's Water Supplies*, 1995, Claryville, NY: The Frost Valley YMCA

Rosselet, Dale A., *New Jersey Waters: Watershed Approach to Teaching the Ecology of Regional Systems*, 1999, New Jersey Audubon, Bernardsville, NJ 07924

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

finite - having bounds; limited

groundwater - water beneath the earth's surface, often between saturated soil and rock, that supplies wells and springs

hydrologic cycle - the cycle of evaporation and condensation that controls the distribution of the earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water; also called the water cycle

hypothesize - a tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation

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

recharging - water overflow from precipitation into surface and groundwater receptacles

recycle - to extract useful materials from garbage or waste; to extract and reuse useful substances found in waste

reservoir - a natural or artificial pond or lake used for the storage and regulation of water

resource - something that can be used for support or help

stratified drifts - having its substance arranged in strata, or layers; as in stratified rock

surface water - water above the surface of the ground