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Modeling an Aquifer and Groundwater Contamination

Adapted from: The EPA's "Thirstin Builds an Aquifer in a Cup"

http://www.epa.gov/ogwdw000/kids/grades_k-3_thirstin_builds_an_aquifer.html

1, 45 minute class period

Goals:

- Understand aquifers as a source of drinking water for communities
- How water is retrieved from aquifers
- How certain rocks and soils are porous and can retain water
- Understand the importance of preventing contamination of community drinking sources

Objectives: SWBAT...

- Demonstrate how water is stored in aquifer
- Understand how groundwater can become contaminated

Prior knowledge:

Watersheds

Water cycle

Materials:

1. 1 clear plastic cup for each student (suitable size is 2 3/4" deep x 3 1/4" wide)
2. 1 piece of modeling clay that will allow a 2" flat pancake to be made by each student for their cup
3. Sand that will measure 1/4" in bottom of each student's cup
4. Gravel (small rocks) that has been rinsed of its residue
5. Food coloring
6. 1 bucket of clean water and small cup to dip water from bucket

NJCCCS Standards: 5.7.8.C.1, 5.7.10.B.1

Procedure:

1. Have students pour 1/4" of sand in the bottom of each cup
2. Pour water into the sand, wetting it completely with no standing water.
3. Have students observe that the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately forms part of the aquifer.
4. Have each student flatten the clay (like a pancake) and cover 1/2 of the sand with the clay (have each student press the clay to one side of the container to seal off that side).
5. Discuss with students how this clay represents a "confining layer" that keeps water from passing through it.
6. Pour a small amount of water onto the clay.
 - Let the students see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.

7. Next, place the rocks over the sand and clay, covering the entire container. To one side of the cup, have students slope the rocks, forming a high hill and a valley.
 - Explain to students that these layers represent some of the many layers contained in the earth's surface.
8. Next, pour water into your aquifer until the water in the valley is even with your hill. (Students will see the water stored around the rocks.)
 - Explain that these rocks are porous, allowing storage of water within the pores and openings between them.)
9. Students will hopefully notice a "surface" supply of water, which may be referred to as a small lake.
 - This will be an example of a surficial hydrologic source.
10. Next, put a few drops of the food coloring on top of the rock hill as close to the inside wall of the cup as possible.
11. Ask students what might contribute to a contaminated water source?
 - farm chemicals, trash, and used motor oil.
12. Students should examine how the color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of their cup.

Homework:

Discuss with students ways in which their own community's water supply could become contaminated. Instruct students to copy these ideas in their notebook to discuss in class the next day.

Students may drain the water out of their cup and take home to illustrate the activity to their parents.

Adaptations:

For SLD have materials prepared to assemble into the cup. Follow the procedure step by step if need be. For ELL prepare a copy of the procedure worksheet with key words in Spanish next to English words in parenthesis. This way the students can make the connection between the words you are discussing in class. Encourage other students who may speak the same language as the ELL to discuss it in their native language.