

WHAT'S GOING ON UNDERGROUND?

3RD-
5TH

OBJECTIVES

- Demonstrate how the water table can change.
- Examine how non-point source pollution contaminates groundwater.
- Discuss how different types of rock affect groundwater movement.

BACKGROUND INFORMATION

Groundwater is any water located beneath the earth's surface. Groundwater is important because it is used for drinking, eating, bathing, and more. Groundwater accumulates beneath the earth's surface in underground cave systems called aquifers. The highest level of water in the aquifer is known as the water table. The water table can be seen above earth's surface depending on depletion and repletion of water into the system. People use wells to reach these water reserves but must be careful to maintain a balance between using the water and rainfall recharging the groundwater supply to prevent it from running out of water. Pollutants can travel from earth's surface into the aquifer, leading to a contaminated groundwater supply. This can affect people and animals alike.

MATERIALS (PER GROUP OF 4)

- | | | |
|------------------------|------------------|------------------------------|
| • 4 Clear Plastic Cups | • Gravel | • Water |
| • Clay | • Rocks | • 1 Teaspoon Kool-Aid Powder |
| • Sand | • Nylon Stocking | • 1 Pie Tin |
| • Aquarium Gravel | • Spray Bottle | • Food Coloring |

ANTICIPATORY SET

Before students arrive, add orange and green food coloring to a glass of water to make it appear dirty. When the students arrive, inform them that you took this water from the dirtiest local water supply in town. Ask why they think the water is discolored. Remind the students that all water sources have some level of pollution, even groundwater. Then, watch the following videos. Links under Resources.

PBS: Groundwater Beneath the Surface

YouTube: What Is Groundwater

GROUNDWATER SCAVENGER HUNT

1. Beginning in the classroom, have students work in groups to draw a cross section of what they think groundwater may look like.
2. Take the class outside and have them look for locations where water moved after the last rain event. Off the roof? On the road? In the grass? Through a crack? Walk around the school grounds looking for different escape routes the water may have taken.
3. As a demonstration, pour a cup of water onto pavement and onto unpaved ground. Observe what happens. Ask your students to discuss why the water acted this way.

AQUIFER IN A CUP

1. Give four clear cups to each group of four students. Students will add a different earth base about half way up each cup (clay, sand, gravel, and rock).
2. Groups should spray water on the surface of each cup to simulate rain. Record what happens after three "rain storms" on each earth base. How does this connect to what they observed outside?
3. Using a spray bottle nozzle with nylon stocking material over the bottom of the tube, have the students examine how efficiently a water well would pump water out of the ground for each earth base type. Which base is the easiest for the well to draw water from?

WATER QUALITY CONNECTIONS

1. Give each group of students a pie tin and aquarium gravel. They will spread the gravel into the pie tin and create a small depression in the center.
2. Carefully, fill the tin with water along the pie tin wall until the water seeps and rises into the depression. This represents a man-made pond or lake!
3. Use the spray bottle nozzle with nylon hose as a water well, and pump (spray) water out of the tin into a cup until you can see the water level change in the central pond. This example shows how the water table can change. The level below the water table is called the saturation zone while the level above is called the unsaturated zone.
4. Sprinkle red Kool-Aid powder on the gravel away from the pond. "Rain" on this gravel with your spray bottle and observe what happens to the water table and the water quality (color) in the pond. This demonstrates how groundwater can become contaminated.

PONDER

What do you think happens to the level of the water table between spring and summer? Did you notice how easily the water became contaminated even when the pollution source was a distance away from the pond? This is called non-point source pollution. Discuss with your class how can this be prevented.

All of the groundwater in an aquifer is connected. Pollution in one area can have negative impacts on water everywhere.

PROJECT

Have the students research the history of groundwater or surface regulations for your state, county, or city. Have students write a short report on why groundwater and surface water regulations are important. How have these regulations improved our water quality?

RESOURCES

- That Magnificent Ground Water Connection: Deep Subjects: Well and Ground Water, 1-8. Retrieved from <https://www.epa.gov/sites/default/files/2015-08/documents/mgwc-ww-well.pdf>
- Northern California Public Media: What is Groundwater. Retrieved from <https://www.youtube.com/watch?v=83qBb7KRkAE>
- PBS: Groundwater Beneath the Surface. Retrieved from <https://klru.pbslearningmedia.org/resource/20196d0e-5cab-408c-8ee0-9141a7d28b83/groundwater-beneath-the-surface/>

TEKS ALIGNMENT

Science, Adopted 2021:

- 3rd: (a) 1Ai, 1E, 3A, 3B, 5. (b) 1A, 1B, 1C, 1D, 1E, 1G, 2D, 3B, 3C, 4A, 5A, 5B, 5D, 11B, 11C.
- 4th: (a) 1Ai, 1E, 3A, 3B, 5. (b) 1A, 1B, 1C, 1D, 1E, 1G, 2D, 3B, 3C, 4A, 5A, 5B, 5D, 5E, 11B, 11C.
- 5th: (a) 1Ai, 1E, 3A, 3B, 5. (b) 1A, 1B, 1C, 1E, 1G, 2D, 3B, 3C, 4A, 5A, 5B, 5D, 11, 12C.



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06/2023