



Conservation Education Teacher Guide

WHAT'S UNDER YOUR FEET? GROUNDWATER

Participants will utilize the groundwater flow model to explore the hydrologic cycle, the water table, soil structure and how nonpoint source pollution can affect our underground water resources.

Groundwater...the water you don't see!

Groundwater is an important fresh water resource for all living organisms. Rain and snow melt are the main sources of groundwater. When it rains or the snow melts, the water is either evaporated, channeled into rivers, streams or lakes, or absorbed into the ground. Once the water is in the ground, it is either absorbed by plants and trees, remains contained in the soil or percolates farther down to replenish aquifers, which are large underground water reservoirs.

Groundwater is fresh water even though it may have a salty or mineral taste. These impurities are dissolved by the water as it moves through the ground.

Groundwater accounts for about 25% of the world's fresh water supply. Groundwater is stored in aquifers. Depletion of these aquifers, due to increased agriculture, manufacturing and household use, permanently reduces the number of usable aquifers.

Vocabulary

- **Aquifer**-an underground unit of saturated soil or rock that can transmit significant quantities of water to wells.
- **Groundwater**-water contained in saturated soil and rock materials below the surface of the ground.
- **Water Table**- the level below which the soil or rock is saturated with water. The upper surface of the saturated zone in an unconfined aquifer.
- **Confining Layer**- a layer of lower permeability material that overlies an aquifer.
- **Piezometer**- a well installed to monitor hydraulic head or to monitor groundwater quality.

Pre-Visit Activities- Pollution Pass

Select three or four students to be molecules of water, the rest of the class will be gravel. Students that are gravel stand with their arms outstretched so that they can turn around without touching anyone. The water molecules move through the gravel starting at one end and working through to the other. How long did it take to get through? How easy was it to get past the gravel?

Repeat the above steps changing the students to sand and have them stand elbow to elbow. Repeat again having the sand students become clay and stand close together.

Which material was the easiest for water to move through? Which was the hardest to move through? How would different material affect the quality of our groundwater supplies?

Pre-Visit Activities- Pollution Pass (Continued)

Extension activities: Repeat the three models, but this time have the water molecules put a small amount of flour or powder on their elbows. Some of the powder will be rubbed off onto the rock material, while some will remain on the water molecule.

Discuss what the powder could represent (for example, bacteria, nitrogen or contaminants) and what affect this could have on groundwater purity.

Discuss how the rock material can filter some sediments and contaminants but some is also carried through the groundwater. The rock type will determine how much is rubbed off as the water flows through.

Have some of the students secretly place the label of a known water contaminant in their pocket. Examples could include bacteria, nitrate or leaking landfills. Repeat the activity with the water moving through the rock materials.

Ask the students if they would be happy to drink the water? Do they think the water has been well filtered by the rock particles so that it is clean?

Then have the students with their hidden contaminants pull their labels out and discuss what might happen if we drink water that has these things in it.

Post Visit Activity- Going Down!

Use three clear containers where students can watch water move through the materials.

Fill each container with gravel, sand or clay.

Sprinkle powdered dyes (Kool-Aid or Jell-O) on top of the rock material to simulate contaminants that might move into the groundwater. Have the students identify what those contaminants might be. Replicate rain falling by using a watering can.

Have students contemplate their own questions about groundwater. What are some of the possible pollutants in your area? Hold a class discussion on ways to prevent groundwater contamination.

Pre/Post visit activities are adapted from Conservation Education Curriculum by Carlton and South St. Louis SWCD's and may need to be adjusted depending on the grade level.

Geauga SWCD Mission:
"To conserve, protect, and enhance the resources of Geauga County by providing leadership, education, and assistance to all."

Ohio Learning Standards, Ohio Revised Science Standards and Model Curriculum

First Grade

Earth and Space Science: 2

Second Grade

Earth and Space Science: 2

Third Grade

Earth and Space Science: 2,3

Fourth Grade

Earth and Space Science: 1,2,3

Fifth Grade

Life Science: 2

Sixth Grade

Earth and Space Science: 2,3,4,5

Seventh Grade

Earth and Space Science: 1

Life Science: 2

Eighth Grade

Earth and Space Science: 3