EarthCircles

Water at Work

LESSON 3: FINDING FRESH WATERUNDERGROUND

OVERVIEW:

Concept: Groundwater is a major source of fresh water. Like water in lakes and reservoirs on the surface, the amount of groundwater depends on rainfall and snowmelt. We need to care for groundwater just as we care for surface water.

Lesson At A Glance:

Materials

Preparation

Background

Lesson plan:

Opening Circle

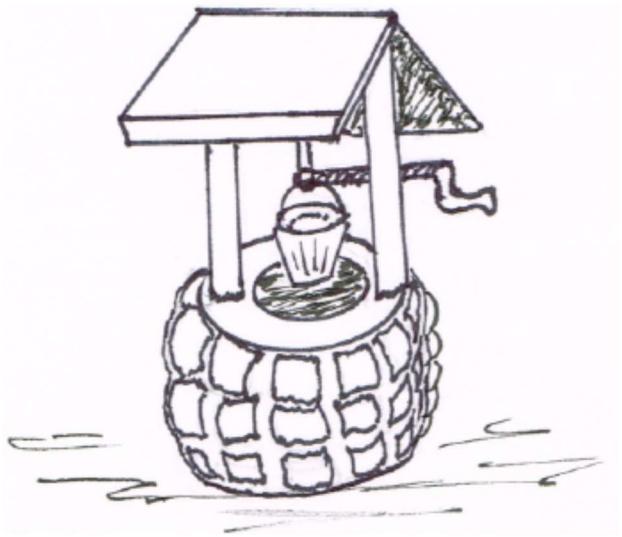
Activity: Kids make groundwater models and investigate the use of wells.

Discussion

Principles in Practice

Story

Closing Circle



Materials:

For Aquifer Model:

For each team of 3-4 Kids you need:

- Cup of small pebbles or gravel
- Plastic shoe box
- Blue food coloring
- Water

For investigations:

- Spray Bottle
- Water
- Deep dish/or bucket for collecting water

Book: ***One Well: The Story of Water On Earth*** by Rochelle Strauss

Preparation:

- Put a set of materials for the Aquifer Model together for each team of 3-4 Kids.
- Put a few drops of blue food coloring in the bottles of water to make water more visible.
- For your community's water supply history, you may contact the local Historical Society, the Conservation Commission, the Water Department in your Town Hall, and/or the town library. An interested volunteer may be able to help you with this research. Or recruit a local expert to visit your class and discuss local water supply with the Kids.
- http://www.youtube.com/watch?v=b3NrnuzR5-0 to access video clip.

Background for Teachers:

Groundwater is water that seeps into the ground and is stored in aquifers below the surface. An ***aquifer*** is an underground area of loose soils and gravel where water that sinks into the ground from surface runoff collects. Shallow groundwater (up to 300-400 feet down) has a renewal rate of about 300 years. Deep down groundwater (over 1000 feet down) scientists think renews in about 4,600 years.

People have dug wells for hundreds of years to get fresh water. More recently, towns have developed well fields for a community water supply. As population grows and people use more water, the well fields sometimes do not yield enough water for the needs of a town or the wells sometimes become polluted.

A water supply timeline for any community probably has a similar history.
Early settlers accessed surface water nearby.

- Later they brought a water supply from a lake or river in the area.
- Individual families dug their own wells for a water supply.
- They dug a town well, often for fire fighting.
- The town developed well fields for a larger local supply; first to control fires, then for residents' access to water.
- Well fields became polluted, or were inadequate for a growing population.
- The town became dependent on large regional reservoirs.

Where is your community's water supply in the above series of developments? With a little help from the local Historical Society, Conservation Commission, the library and/or the Water Department in your Town Hall, you and/or your students can find out about your town's water supply history.

LESSON PLAN

Opening Circle: To begin, exchange greetings and note who is present.

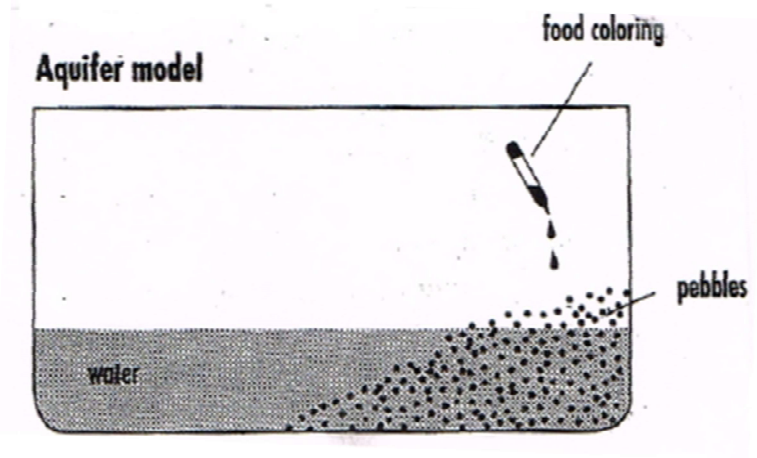
Ask if the Kids have heard the term "Water Wars"? Do they have ideas about why people might go to war over water? Tell them that in our own Far West neighboring ranchers often fought over access to water. A rancher upstream would dam a river or stream to insure enough water for his herds of cattle. The dam deprived ranchers downstream of an adequate water supply. Gunfire was not uncommon as angry ranchers confronted the dam builder.

Discussion:
How would our UU Principles apply in such a situation? Was it fair for one rancher to disregard the needs of his neighbors in this way? Eventually such practices were regulated by law.

Activity:
Do the Kids know what groundwater is? Use background information to introduce the term as needed.
Tell the Kids that now we are going to investigate groundwater as a water supply resource.
We will make models of groundwater in an aquifer and access it with a "well".
Divide the class into groups of 3-4. Each group will get a set of materials to build an aquifer.

You can easily explain how to make this model as they Kids creating it.

- Make a low pile of pebbles or gravel at one end of the plastic box, tapering it down towards the middle of the box.
- Add enough water for a 2" deep pool of water to accumulate on the side without the pebbles.
- Keep the box on a level surface. Make sure the pebble end is at least 1"-2" higher than the water end.

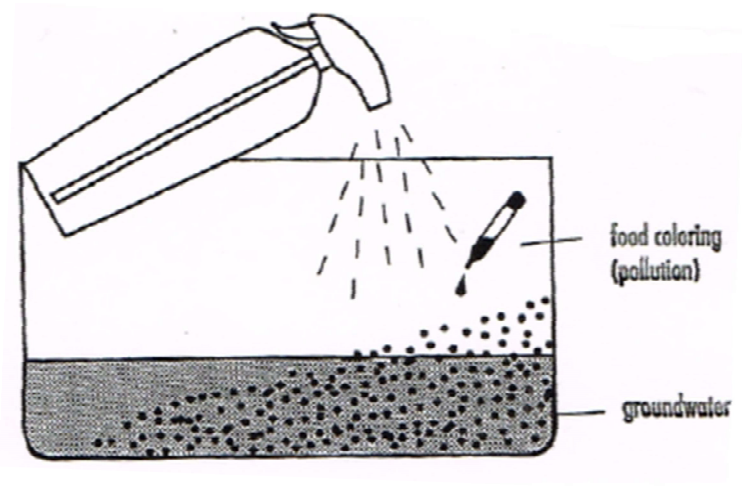


Point out that open water and water in the pebble area are continuous. The water between the pebbles is groundwater. Note that groundwater near the surface often connects to a lake or stream in this way.

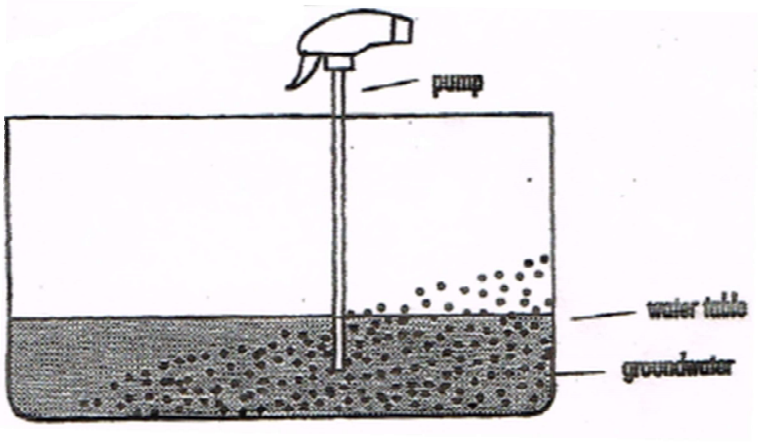
Investigations:

Next, teams follow these directions as you read them aloud.

- Drip a little food coloring onto the pile of dry gravel.
- Spray water onto the pile. What happens?
  a. How does the model show what happens underground when rain falls on a polluted area on the surface?
  b. What does it tell us about honoring our Seventh Principle?



- Next, take the spray mechanism from the water bottle. Push the stem down into the pebbles near the base of the plastic bin. Squeeze the trigger to pull up water from the bottom of the "well".



Can we get a water supply from the water underground in this way? What would be different?

Discussion:

Point out that wells are used to develop a water supply resource, whether for one household or in well fields to supply a whole town. Ask if Kids know of any wells in their community. Does the town depend on well fields, or do some homeowners have their own wells? When Kids go to camp in the summer, do they know how the camp gets a water supply? No matter where they are, people must have water.

Often, wells have had to be closed due to groundwater contamination. Explain that water in the ground is naturally filtered and cleansed as it moves through the ground. The soil is very good at removing organic waste and even disease organisms. However, if chemicals have been spilled on the ground above an aquifer, then rain water can dissolve the chemicals and carry

them down into the groundwater. This poisons the well water. Chemicals are not readily filtered out by moving water through the ground.

Ask Kids what they know about their local water supply.

- Is it from surface or groundwater? Or both?
- If groundwater, when did the town start using wells?
- Do they share a water supply with other towns?
- How can they find out?

Option: If you plan to do Lesson 8, the Local Water Supply Field Trip, introduce the plan to the Kids now. You will need to send permission slips home, to be returned at the next class. There is a sample permission slip at the end of this lesson.
Depending on distances and on class size, you will also need to recruit some volunteers to drive and to lead small groups of 3-4 Kids on the trip.
If no field trip is planned, ask groups of two or three Kids to each visit one town agency to find out about the town's water history. Help them form three or four questions to ask. For example:

- Where did the early settlers find a water supply?
- Do we have wells in our town, now or in the past?
- Where does our water supply come from now?
- Do we share a water supply with other towns?

Plan to share their findings next time you meet.

Principles in Practice:
In underdeveloped countries people usually are limited to surface waters for their drinking water. Even where water is plentiful this is a real problem because of widespread pollution that leads to disease. In arid regions, it is difficult even to find enough water. In either case people often do not have wells or the knowledge and resources to make them.

- How can UU congregations help with this problem situation?
- Do the Kids have suggestions?
- Which of our UU Principles do we use when we are mindful of the difficulties other people may have and we try to help them?

Story:

Read aloud from the book *One Well: The Story of Water on Earth* by Rochelle Strauss
This book is a timely and beautifully illustrated call to action on behalf of Earth's global water resources which we share with all living things.

Closing Circle:

Invite all to listen while the closing words are read. Ask Kids to repeat these words together.

"Water flows from high in the mountains.
Water runs deep in the Earth.
Miraculously, water comes to us,
And sustains all life."
Thich Nhat Hanh, Earth Prayers, Harper, San Francisco, 1991