



March | Activity of the Month

Water Science: What on Earth is groundwater? Where does it come from? How can it get contaminated?

What's it about:

Water – think of the number of times you drank it or used it today? Just like your dog or the plants outside, humans need water to survive. With bodies that are about 60% water, and every system, like our blood, digestion, cooling (think sweat!) depending on water to work properly, drinking plenty of clean water is important. Scientists like [Asit Mazumder](#) and [Terry Prowse](#) at the University of Victoria know how valuable fresh water is and they do research to help us understand water quality, and how climate change might impact our water resources. While some of our water comes from rivers and lakes, most of the world's freshwater supplies come from water underground – called groundwater. Let's model how groundwater (or an aquifer) works and see how easily it can get contaminated. Ugh!

What you need:

- For the aquifer - clear plastic bottle (2 litre) with flat sides, some white gravel, a bucket or dishpan, water, and some blue food coloring
- For the rain supply - 1 litre clear plastic bottle with a cap, a pin, and a little masking tape
- For the well – a wide drinking straw, and a spray bottle pump
- For the contaminant source – a small plastic cup (e.g. medicine cup), water, red food colouring

What to do:

1. First let's set up the aquifer. Cut open one whole side of the large plastic bottle, and tape the drinking straw (your well) to the side as shown in the picture below. Position the bottle near the edge of a table or chair and fill the bottle two thirds full of the gravel. Now add water (mixed with a few drops of blue food coloring) so that it comes half way up the gravel. Last, position the bucket or dishpan under the cap of the bottle so when we open the cap the bucket catches the water that flows out. Great, now you have an aquifer model!
2. Make the rain supply by filling the small bottle with blue water. Put the cap on and turn the bottle upside down. Carefully poke some holes in the bottom of the bottle and cover the holes with masking tape.
3. For the contaminant source, make a small hole in the small plastic cup and cover the hole with masking tape. Fill with water and a few drops of red food coloring.

Now let it rain!

4. Peel the masking tape from your rain supply bottle and hold it over the end of the aquifer model away from the cap. Open the aquifer bottle cap and let the water flow. Notice how water flows from the model into the bucket. The bucket represents the ocean. As often as you like, fill the 'rain' bottle and keep the water flowing in your groundwater aquifer. See what happens in the model when it doesn't rain – representing a drought. Or try a sudden huge rainstorm – pour the blue rain out of the rain supply. What is the effect on the aquifer?

Using the well

5. What is the effect of pumping water out of your well? Try normal rain fall and pump the well at the same time. What happens in the aquifer? Now stop the

rain and pump the well? What happens in the aquifer during an extended drought?

Oops – some contaminants are leaking!

6. Remove the masking tape from the bottom of the little medicine cup (containing the red water), and place it on the aquifer model. Observe what happens to the water in the aquifer. Make a sketch of where the contaminants go. If the well was used for drinking water for the house or farm, what kind of water is being pumped out if the contaminated water contains bacteria or harmful products?

Cleanup!

7. Remove the contaminant supply. Have it rain again and see what happens in the aquifer. Some aquifers, like yours, clean out quickly, but if the aquifer is deep, rainwater may take many years to flow into the rocks and replace the dirty water. What would this mean for the people who use the well?

What's going on?

All the water on Earth moves from one place to another in what scientists call the water cycle. Water evaporates from the oceans, and comes down again as rain or snow. If the precipitation falls on land, water flows back to the oceans via rivers, lakes and groundwater. We sometimes see groundwater flowing out at springs but usually we have to sink wells to get to it. Guess what? All of this water is the same as cycled around millions of years ago, so, wow, we could be drinking the same water as the dinosaurs!

Most groundwater comes from rain, but other liquids percolate into the ground too and contaminate the fresh water in our aquifers. Think about where these contaminants might come from in your community or home.



This activity is brought to you by the University of Victoria Faculty of Science, EdGEO and Pacific CRYSTAL.

What else you can do?

Find out what places in BC rely on groundwater for their water supply. Do you get water from a well? Does anyone you know?

Think about the potential sources of groundwater contamination in your community, what could be done about them?

