

ACTIVITY PAGES

Edible Aquifer

Adapted by Tonya Bronleewe of EARTH from the Groundwater Foundation's "Making a Bigger Splash"

Background Info:

In most areas of the world, if you dig deep enough you will find water. It seeps into the ground until it reaches a layer of rock that it can't get through. Water under the ground is called ground water. Ground water that settles in an underground reservoir of loose gravel and sand is called an aquifer. Wells can be drilled into aquifers to bring water to the surface. The point at which a drill reaches an aquifer is called the water table. Aquifers with a high water table are near the earth's surface. Aquifers with a low water table are far below the earth's surface.

Many communities obtain their drinking water from aquifers. Water suppliers or utility companies drill wells through soil and rock into aquifers to provide the public with drinking water. A large natural aquifer called the Equus Beds, located in Sedgwick County, provides many people in Wichita with at least part of their drinking water. It has a very high water table (the water is close to the surface) and is located under very porous sandy soil.

Even though soil, sand and rocks naturally purify water, sometimes water carries pollutants that cannot easily be removed from the water cycle through natural filtration. Groundwater can become contaminated by improper use or disposal of harmful chemicals, such as lawn care products and household cleaners. These chemicals can percolate down through the soil and rock into an aquifer and eventually into the wells where they pose a serious threat to human health.

Starting Questions:

- Where does water go after it rains?
- What is an aquifer?
An aquifer is water that has seeped through the soil and settles in the spaces between the loose gravel and sand underground.
- How would a city get water out of an aquifer to use for drinking, bathing, washing, etc?
- Is the well water safe to drink?
- What does it mean if water is contaminated?
To ruin the water or make it unusable for drinking, bathing, washing, etc. Contaminated water is polluted.
- What things contaminate an aquifer? How do the contaminants get to the water stored in aquifers way below the Earth's surface?
- How could polluted water in a aquifer affect your drinking water?
- Does polluted water in an aquifer concern you? Why or why not?

Objectives:

- Learn about the geologic formations in an aquifer
- Learn how pollution can get into groundwater

Materials:

Red soda pop
Clear soda pop
Vanilla ice cream
Gummy Bears
Variety of colored cake decoration sprinkles
Straws (cut in ½) & Clear plastic cups



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Activity Steps:

1. Each student will construct an aquifer.
2. Fill the plastic cup 1/3 full of gummy bears, which represent gravel and soils.
3. Add enough clear soda to cover the gummy bears.
4. A layer of ice cream is added as the "confining layer" over the water filled "aquifer".
5. Add a few more gummy bears on top of the "confining layer".
6. Colored sprinkles represent top soil and should be sprinkled on top.
7. The red soda is added to represent contamination. As students watch the colored soda infiltrate the confining layer, discuss contaminant movement and overall vulnerability of aquifers to spills upon the earth's surface.
8. Talk about percolation, groundwater, aquifers, pollution (ask about runoff from parking lots, dumping motor oil on the ground, etc).
9. Straws can be used to drill a well into the aquifer. Pumping (sucking) the well demonstrates a decline in the water table.
10. Students should also notice the contaminants can get sucked into the well area and end up in the groundwater by leaking through the confining layer.
11. The aquifers can be recharged with additional clear soda, "rain", and re-polluted with more red soda.

Follow up Questions:

- Have you ever seen water after a rain in the gutter?
- What does it look like?
- What pollutants might be in rainwater runoff?
- Where does the runoff go?
- Do you think all the pollutants are filtered out before it gets there?
- Where do we get our drinking water?
- If there are pollutants on the land, are there other ways they might get into the ground water? How?
- How far do you think pollutants can travel in the groundwater? Why do you think so?
- How fast do you think pollutants can get into our drinking water? Do you think the depth of the aquifer and the type of soil over it make a difference? Why or why not?
- Would you consider this type of pollution point source or non-point source pollution? Why? What is the difference?
 - *Point Source*- pollution caused at a specific point. This is seen when large amounts of pollutants are released into the environment from industrial or municipal sources.
 - *Non-Point Source*- pollution caused by widely dispersed sources. This is usually rain and snow runoff, leaks, and spills.
- Is non-point source pollution in the local aquifer something that you and your family affect? How? What are some ways to reduce harmful effects?
- What if we pulled up most of the water from an aquifer?
 - Did you know that we have aquifers in Kansas? Underneath over 1/2 the state of Kansas is an aquifer. In many places right here where you live, there are people arguing over who has the right to drill into it and use the water inside these aquifers. Wichita wants to use it for the people living in the city and the farmers want to use it to irrigate crops that feed thousands of people. People are concerned that there is not enough water for both uses. Who do you think should get the water?
- Can you refill an aquifer? How?
 - The process of refilling an aquifer is called **recharge**. Rain, snow melt, etc can recharge an aquifer.

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More Info:

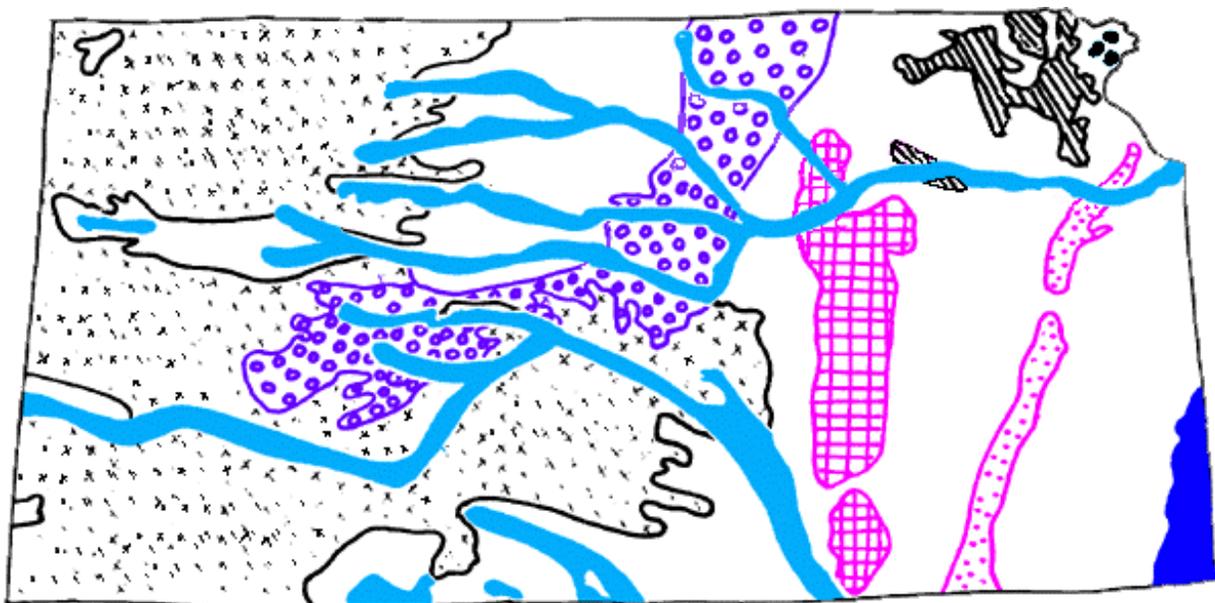
Go to the USGS site and print off the page for good background information.

<http://ga.water.usgs.gov/edu/earthgwakuifer.html>

Another place to look is on the EPA kids site. Here, you'll find a background paragraph and then another way to build an aquifer that involves rocks, sand, etc (not near as much fun as food!) but it has good info built into the procedure that you could use in your lesson.

<http://www.epa.gov/OGWDW/kids/aquifer.html>

KS Aquifer Map:



Aquifers

-  Alluvial aquifers
-  Chase and Council Grove aquifers
-  Douglas aquifer
-  Glacial drift aquifer
-  Great Plains aquifer
-  High Plains aquifer
-  Not a principal aquifer
-  Ozark aquifer