



AQUIFER IN A CUP

What is an aquifer?

An aquifer is an underground area that holds groundwater. It is made up of rock, gravel, or sand that has enough spaces for water to move through. Aquifers are an important source of freshwater throughout the world.

THE GOAL:

Create an aquifer model and discover where groundwater comes from.

WHAT YOU NEED:

- Clear plastic cup or glass jar
- Gravel (sand works too)
- Water
- something to catch spills (e.g. tray or towel)
- Pump from a soap dispenser (optional)
- Food coloring (optional)

DID YOU KNOW?

One of the largest aquifers in the world runs through Oklahoma. The **Ogallala Aquifer** underlies portions of 8 states in the Great Plains region, including the Oklahoma panhandle. It makes up 174,000 square miles and supports about one fifth of the wheat, corn, cotton, and cattle grown in the U.S.



FORM THE AQUIFER

- Scoop some gravel into your cup so that it's filled to about 2 inches. Pretend this is the ground outside. The top layer of the gravel represents the surface. Everything underneath it is what's under the ground.
- Now, add some rain. Slowly pour some water into your cup and watch it trickle underground. Pour until your cup is filled with water to about 1.5 to 2 inches. The water should be lower than the gravel.
- Watch how the water moves into the spaces between the gravel pieces. This is called **groundwater**. Groundwater is freshwater that is stored under the ground.



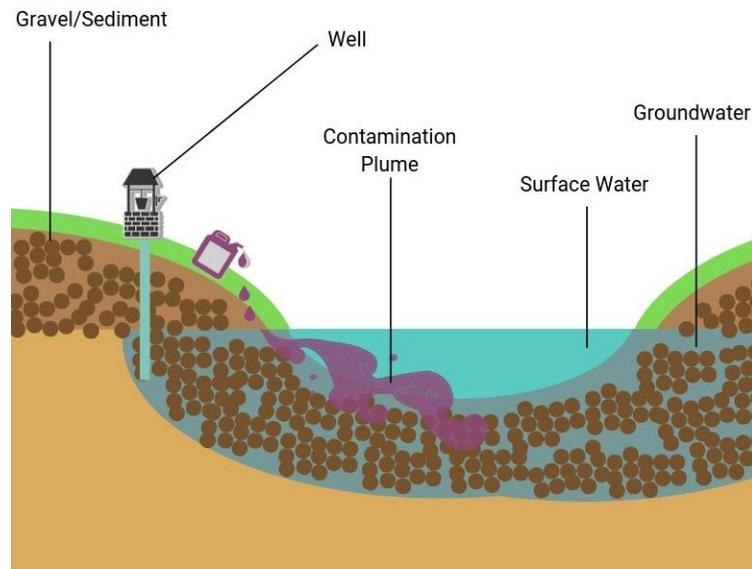
AQUIFER IN A CUP CONT.

- Wait for the water to trickle down to the bottom of the cup, then look at the line created by the water. This line is called the **water table**. Notice how the area under the water table is filled with water, while the area above the water table is not.
- Now a big storm comes. Add more water to the cup until the spaces underground become full and the water table line rises until it's above the ground. Water above the ground is called **surface water**. Lakes and ponds are types of surface water.

CHANGE THE AQUIFER

- Now take a pump from a soap dispenser and use it to pump groundwater out of the cup. This represents a **well**. What happens to the water table line when you start pumping water from your well? What will happen to the well when the water table gets too low?
- See what happens when you contaminate the groundwater. Add one or two drops of food coloring to the cup. Drop the food coloring down the side of the cup so you can see it. What happens to the food coloring when it gets into the groundwater? Notice that it spreads out and gets into the surrounding water. This is called a **contamination plume**.

Here's a model of
how a groundwater
system works:





AQUIFER IN A CUP CONT.

MORE TO EXPLORE

- Oklahoma gets freshwater from surface water sources like lakes, as well as groundwater sources. You can visit the Oklahoma Water Resources Board website (owrb.gov/maps) to see maps of the water sources across our state. Which water sources are located where you live?
- Water isn't just used for drinking. Water is also used to grow the food you eat, and to wash the dishes that your food is served on. As you go through your day, look for other things water is used for. Make a list of all the ways people use water in your home and community.

READ ALL ABOUT IT!

- **Water is Water** by Miranda Paul
- **A Drop Around the World** by Barbara McKinney
- **The Water Walker (Nini Emosaawdang)** by Joanne Robertson

STANDARDS

This activity aligns with the following Oklahoma Academic Standards:

- 4-ESS2-1 Earth's Systems: Earth Materials and Systems
- 4-ESS2-2 Earth's Systems: Plate Tectonics and Large-Scale System Interactions
- 4-ESS3-1 Earth and Human Activity: Natural Resources
- 5-ESS2-2 Earth's Systems: The Roles of Water in Earth's Processes

NOTE:

The instructions for this activity were adapted from a lesson created by the Groundwater Foundation. Find more of their resources at groundwater.org.



Tulsa Regional
STEM Alliance