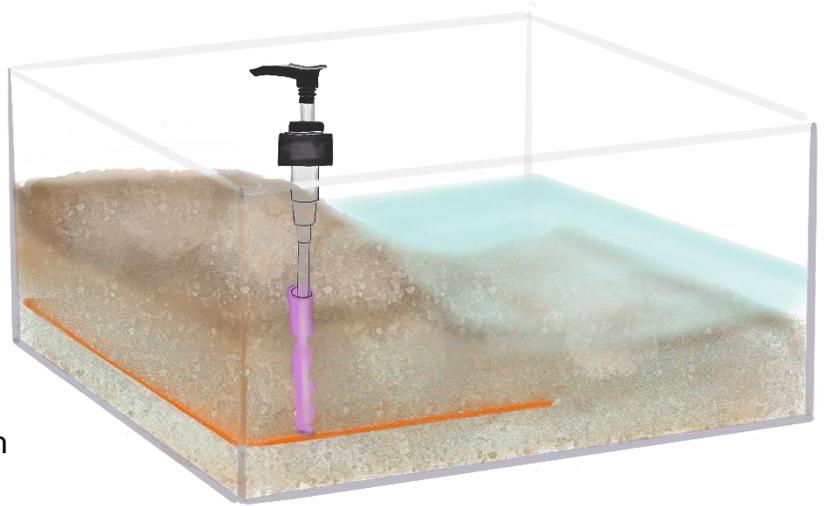


MODEL AQUIFER

In Oklahoma we have 22 major ground water basins, the largest is the Ogallala aquifer in the western part of the state. It is estimated to be more than two million years old and to hold about 650 trillion gallons. It underlies parts of eight states, stretching about 800 miles (from South Dakota to Texas).



Let's put together a model of one and explore how an aquifer works.

WHAT YOU'LL NEED:

- Clear plastic shoe box or similar container
- Gravel or coarse sand
- Craft foam or modeling clay
- Duct tape
- Cups
- Smoothie straw
- Piece of stretchy nylon hose
- small rubber band
- Lotion bottle pump assembly
- Water

WHAT TO DO:

- Start by completely covering the bottom of your container with a thin layer of sand between $\frac{1}{4}$ " – $\frac{1}{2}$ " thick.
- Next, cover about half the sand with a piece of craft foam. Use some duct tape to secure it to the sides of your container.

Within the underground layers of sediment are rock layers made of dense material, like granite or clay, that water has a hard time penetrating. The bottom of our box will represent one of these impermeable or confining layers and this foam another.

- Pour a small amount of water onto the craft foam and observe what happens.

An impermeable layer on the bottom of the box obviously prevents the water from passing through it. But, what about the foam layer? The layer does stop the water travelling down vertically, but does it stop the water completely? What do you notice about the sand below this layer?

The places where the water is able to move around past confining area like this one and into the sediment below are called recharge areas and they are necessary for healthy aquifers.

- Next, cover the sand and confining layer completely with more of the sand mixture to form the next layer of the earth.
- On one side of the container slope the sand up to form an elevated hill with a valley below it.
- Pour water into the container until the water covering the valley is at least halfway up your hill creating a small lake that will provide a “surface” supply of water for the area.

In Oklahoma a little more than half of the water we use is pumped from surface water sources like this, but not everyone has a lake nearby. The rest of the water we use, including nearly three quarters of our irrigation water, comes from groundwater.

Getting to it requires a bit of work. You’re going to need to build a well.

Since you are using sand as our substrate, any hole you dig will have weak walls. Since you don’t want a cave in, you will need to line our well with casing.

- Grab a wide straw to serve as the casing, choose a position on the surface and decide how deep you want your well to be. How deep will you make it? Remember the water table level varies from season to season and year to year.
- Cut the corresponding length of straw and secure a piece of nylon hose on one end with a rubber band. This will act as your well screen. It will prevent sediment and rock particles from clogging the well, but allow the water to pass through.

Once your screen is in place, install your well.

Now all you need is a way to get lift the water out. A bucket at a time is a lot of work, so let's try a little mechanical advantage.

- Grab your lotion bottle pump and slide it into your well casing. Try pushing the mechanism up and down as see if you can pull water up and into a cup or container.

Watch what happens to the water in your aquifer as you do.

The pump pulls the water up from inside the well first, but as the water level drops, so does the surrounding pressure and that causes the water from the surrounding aquifer, which is under more pressure to move toward the lower pressure inside the well.

What happens to the level of the lake as you continue to pump water from the well? What happens to the aquifer?