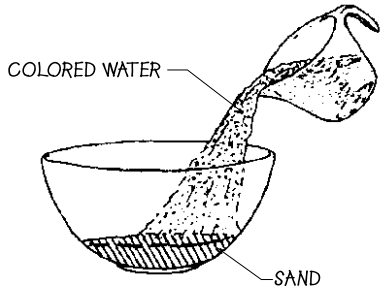
Sandwiched Between

Some places, like deserts, get less than an inch of water a year; others, like tropical rain forests, may get more than 400 inches of rainfall a year.

Equipment/Materials

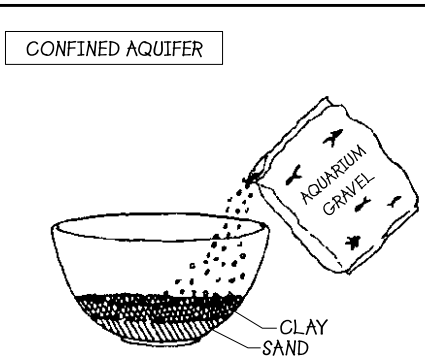
large, clear glass bowl	clean washed sand*
modeling clay	aquarium gravel*
pump from spray bottle	blue food coloring
measuring cup	water
plastic cup	clear plastic straw

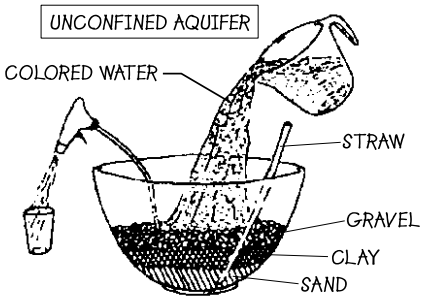
* light colors, like white or pale brown, make the water easier to see



Procedure

1. Put about 2 inches of sand in the bottom of the glass bowl. Explain that the bottom of the bowl represents an impermeable layer (one that water cannot pass through) in this aquifer model. The sand represents an aquifer because water can fill the spaces between the sand grains.
2. Fill the measuring cup with water and add 2 to 3 drops of blue food coloring. Pour enough water into the sand to saturate it. This represents groundwater in an aquifer.
3. Put a layer of modeling clay or play-clay over the top of the sand. Since the clay is impermeable to water, the aquifer is trapped between two impermeable layers. This represents a confined aquifer.
4. Pour 2 or more inches of aquarium gravel on top of the clay, and pour some of the tinted water into the gravel layer, partially filling the gravel layer with water. Point out that the water table is the top level of the water in the aquifer. This model represents an unconfined aquifer because water is not trapped between two impermeable layers.





5. Put the spray bottle pump into the unconfined aquifer and pump the water into a small plastic cup. Explain that this is how a well works when it pumps water from an aquifer. Ask participants to observe what happens to the water table as water is pumped from the aquifer. Discuss how the aquifer could be replenished.
6. Insert a clear straw into the confined aquifer along the edge of the bowl so it can be seen. Note that the pressure in the model is not great enough to cause the water to flow from the straw, but that deep, confined aquifers may be under extreme pressure. Explain the concept of an artesian well, where water under pressure in a confined aquifer can rise to the surface without the need for pumping.