

## ABCWUA Water Resource Education Activity

<b>Activity Title:</b>	<b>Aquifer in a Cup</b>
<b>Description</b>	Students will create their very own model of an aquifer.
<b>Objectives</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• create and identify the layers beneath ground level.</li> <li>• understand the role each layer plays.</li> <li>• learn how rain water travels through those layers.</li> <li>• learn that our aquifer water does not exist in a gigantic under ground lake but rather exists in the spaces between rocks.</li> <li>• learn the importance of the aquifer as a source of drinking water for many communities, including the Albuquerque area.</li> <li>• learn how groundwater gets polluted.</li> </ul>
<b>Grade Level</b>	3 <sup>rd</sup> -8 <sup>th</sup>
<b>Materials Needed</b>	<p><u>Enough for two people:</u></p> <ul style="list-style-type: none"> <li>• cups – clear, 6-8 oz., one per person</li> <li>• straws – one per person</li> <li>• modeling clay</li> <li>• sand (or rice) – 1 cup</li> <li>• gravel (1/4"-1/2" size), or 1/2 cup each of pinto beans + kidney beans</li> <li>• water – 2 cups</li> <li>• red food coloring</li> <li>• pipettes, optional</li> </ul>
<b>Background Info</b>	<p>About 30% of Earth's fresh water occurs as groundwater, but much of this is too saline to drink or is difficult and/or expensive to extract. People all over the world depend on groundwater as their primary or only source of drinking water. The Albuquerque area is no exception. Up to now, 100% of our drinking water has come from an aquifer that is deep underground, and the water is brought to the surface through a system of over 90 groundwater wells. The problem is that we have been pumping it out faster than it's being replenished naturally. In our area, it takes a long time for rain and river water to seep down and replenish the aquifer. To make matters more difficult, we live in a high desert ecosystem where droughts are common, everyone wants and needs water, and the population keeps growing.</p> <p>By Fall 2008, the Albuquerque area will begin to use surface</p>

	<p>water (the Rio Grande) to reduce our aquifer pumping so the aquifer can begin to recover on its own. The aquifer will remain an important reserve to draw on during drought. Most students do not realize where their drinking water comes from or what an aquifer is. This activity helps students visually understand what it looks like and how it functions.</p> <p>For more great information about groundwater, visit the U.S. Geological Survey’s website: <a href="http://ga.water.usgs.gov/edu/watercyclegwstorage.html">http://ga.water.usgs.gov/edu/watercyclegwstorage.html</a></p>
<b>Procedure</b>	<p>Ask students where their drinking water comes from. Discuss the difference between surface water and groundwater. Ask students how groundwater gets extracted so we can use it.</p> <p>To start, each person needs one cup and one straw.</p> <ol style="list-style-type: none"><li>1. Place a layer of gravel (or kidney beans, then pinto beans), about 2”, in the cup.</li><li>2. Pour water into the cup to just cover the gravel or beans.</li></ol> <p>This represents the deep aquifer that holds the purest water. The aquifer is underground below us and was formed millions of years ago when erosion and precipitation filled the Rio Grande Rift with gravels, sands and water. Some of the water contained in our aquifer is very old and some is newer. The water percolated or infiltrated from the surface down to deeper levels, filtering through many layers of rock.</p> <ol style="list-style-type: none"><li>3. Make a disk from clay large enough to cover about half the water/gravel.</li></ol> <p>This represents the confining layer that separates the deep aquifer from the shallow groundwater. This layer formed when clay soils washed into the Rio Grande Rift long ago. Not all areas are covered in a confining layer.</p> <ol style="list-style-type: none"><li>4. Pour a layer of sand (or rice), an inch or so, over the entire clay layer. Make one side much higher than the other.</li><li>5. Pour water in the valley area so it is even with the top of the hill.</li></ol> <p>Notice how water goes in between the tiny “rocks” of sand/rice. This represents shallow groundwater. This groundwater is recharged by percolation of rain and melted</p>

	<p>snow as well as seepage of the Rio Grande. Over many years, the shallow groundwater also continues to seep down and can recharge the deep aquifer. Notice the surface water created on one side of the cup.</p> <p>6. Insert a straw carefully into rock hill side of the cup.</p> <p>This represents a well that pumps water to the surface. Some people have a well on their property. Others get their water from a series of city wells.</p> <p>7. Add one or two drops of food coloring on the rock hill area, close to the cup wall.</p> <p>Students will see how the food coloring spreads through the rocks, into the surface water and into the bottom of the cup. This is how pollution spreads and can get into our wells.</p> <p>What kinds of things could pollute our aquifer? What can we do to protect our aquifer?</p>
<b>Evaluation/Extension</b>	<p>To demonstrate the effect of drought and aquifer depletion, student should use pipettes to remove water from the cups in the rock hill area. Have students remove one pipette of water every 10 seconds for 1 minute, representing removal of groundwater through wells. Add one pipette of water back into the cup, representing precipitation. Again, remove one pipette of water every 10 seconds for 1 minute, then add one pipette of water back as precipitation. Continue until students can clearly see the effect groundwater pumping has on the surface water.</p> <p>For grades 6 through adult, here is more elaborate way to construct a groundwater model: <a href="http://www.groundwater.org/kc/activity8.html">http://www.groundwater.org/kc/activity8.html</a></p>