

Water Conservation 5E Lesson Plan

2. Subject area / course / grade level: Science / 4th Grade

3. Materials List:

- Pitcher- to fill 9 oz cups Per Group of 3-4
- 1 9 oz clear plastic cup
- 1 9 oz clear plastic cup (different as explore – to hold water)
- Water – 4 oz
- Sand – 2 oz (fill a portion cup)
- Clay – 1/2 stick
- Gravel – approximately 3 ounces
- Dixie Cup- to hold gravel
- Pipette Supplements
- Aquifer Water Cycle Image Preparation
- Fill portion cups with approximately 2 ounces of sand. Take one portion cup per group.
- Fill gallon size Ziploc bag with approximately 3 ounces of gravel for each group. Use a Dixie Cup to pass out gravel once you are at the club.
- Fill up the water pitcher with water 5 or so minutes before the class begins. Then fill a 9 oz cup halfway full for each group to use during Explore.

4. Overarching TEKS, [ELPS](#), [CCRS](#), and Global Graduate/other district standards (chart or list).

<i>TEK</i>	<i>CCRS</i>	<i>ELPS</i>	<i>Other</i>
<i>Science: 4.8 (B) describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this</i>	<i>Integrate and organize material effectively</i>	<i>Listening</i>	<i>Critical Thinking</i>
<i>ELAR: Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.</i>	<i>Participate actively, effectively, and respectfully in one-on-one oral</i>	<i>Speaking</i>	<i>Skilled communicators</i>

	<i>communication as well as in group discussions.</i>		

5. Lesson Objective/Summary: Students will build their own aquifer. After analyzing how the water cycle and human use impact the aquifer, they will discuss they best ways to conserve water.

6. Differentiation Opportunities:

TSW takes a look at the maps. Consider looking over these maps from [Bayou Preservation Association](#) of the 22 bayou systems and waterways in the greater Houston region. Most of these watersheds are located within Harris County and extend to Spring Creek, Clear Creek, and Cedar Bayou, plus Lake Houston.

7. Community-Based Resources:

Find a speaker from [NEPRIS](#).

8. Engage:

How much water do you think you use on a daily basis?

a. Every day, the average American uses about 50 gallons of water for drinking, bathing, cooking, and maintenance. Where do you think your water comes from?

o Most people are unaware of the source of their water. In the United States, about 88 percent of the population is supplied by community water supply systems. The other 12 percent is supplied by non-community means, such as campgrounds, resorts, and private wells. o Sixty-four percent of public water systems use surface water as their source, the other 36

percent use groundwater from wells. o Groundwater, or water that is found between soil particle, is also one of our most important

sources of water for irrigation. Unfortunately, groundwater is susceptible to pollutants. Groundwater contamination occurs when man-made products such as gasoline, oil, road salts and chemicals get into the groundwater and cause it to become unsafe and unfit for human use. Does anyone know what an Aquifer is?

o An aquifer is an underground geological formation able to store and yield (give) water.

o (CTX) Edwards Aquifer is where water is stored for use by almost 2 million people in south central Texas.

o (NTX) The Trinity Aquifer, a major aquifer, extends across much of the central and northeastern part of Texa

o (HTX) The Gulf Coast Aquifer is a major aquifer paralleling the Gulf of Mexico coastline from the

Louisiana border to the border of Mexico. o (Closest major aquifer to to Boston) The Pennsylvanian aquifer is present only in the central

part of the Lower Peninsula of Michigan, where it is called the Grand River-Saginaw aquifer and forms a major source of water for municipal, industrial, and domestic supply.

o (California) The California Coastal Basin aquifers occupy a number of basins in coastal areas of California.

9. Explore:

Give each group a plastic cup, the 9 oz cup of water, and portion cup of sand. Explain each layer as you go through the steps so students understand the function of the aquifer.

1. Pour your portion cup of sand in the bottom of the cup a. This is often a layer of an aquifer water can flow through it.

2. Use the portion cup the sand came in to pour water onto the sand. It should saturate the sand, but not leave any standing water on top.

a. Notice that the water is stored around the sand particles. This is one way water can be stored in an aquifer. This is called the saturation zone in an aquifer, since the sand is completely saturated.

3. Pass out modeling clay to each group. Flatten half a stick of modeling clay and push it down onto the sand so it is covering only half of the sand. Push the clay against the edges also so water cannot get through. There is often some surface in an aquifer such as clay or bedrock that water can not get through. This is called the confining layer of an aquifer, since it confines the water in its location.

4. Pass out a pipette to each group. Put a pipette full of water on top of the clay and observe the water sitting on top of the clay instead of going through it.

5. Pass out Dixie cups of gravel to each group. Create a valley and a hill by carefully pouring gravel and rocks into the cup so that there is a small layer of rocks on top of the sand and the gradually gets higher on top of the clay. It should go all the way to the top of the cup on the side with the clay.

a. Rocks are used as a way for water to enter the aquifer. The best types are sandstone and limestone, since water can get through its pores easily. Granite and basalt can also be used if there are cracks in them that allow water to seep through. There are often rocks that are present at the surface and then continue into the aquifer underground. 6. Pour a portion cup amount of water into the cup so a puddle forms in the "valley", but the cup is not filled completely.

a. Notice that water is stored between the rocks. There is also some surface water in the valley so we can see how it affects the aquifer as well. This is the water table of an aquifer. 7. Draw your aquifer in your journals.

10. Explain:

- Where do you see the water in our aquifer? The groundwater runs off, or drains away, the hill down into the gravel in sand. Once the sand and gravel are too full of water, the water starts to collect in the "valley" area of the aquifer, this is the water table.*

- Is the water clean? Yes. How does it get clean? The rocks and sand filter the water as it passes through. Aquifers act as natural filters.*

- Would you drink this water? Shower with it? Yes.*

- What would happen if chemicals or trash were to get into the water? It would not be as clean. Would you still want to drink and shower with the water? No!*

- What happens if more water more enters than the aquifer than is being used? If the aquifer is full, areas around it can flood.*

- *There is a water table that sits on top of the aquifer that allows us to see how high the water level is, like the “valley” of our design. If it gets too low, what can happen? The aquifer can go dry and may take a while to refill—sometimes hundreds or thousands of years. Many people depend on water from the aquifer for their lifestyles and well-being, such as agriculture, showering, etc.*
- *As we talked about earlier, people use a lot of water. What are some ways that we can conserve, or use less, the amount of water we use? Turn off the water while brushing your teeth. Turn off the water when rubbing soap into your hands. Take shorter showers. Only run the dishwasher or laundry machine when it's full.*
- *Have students write 3 ways they plan to conserve water in their lives at the bottom of their journals.*

10. Explanation:

Biologists from USFWS will come to the classroom/ or video chat with the students and answer the questions they have about the video that was just shown to them.

11. Elaboration:

- Now we are going to demonstrate how water goes in and out of an aquifer by learning about the Water Cycle (use supplement). Groups will continue to need a pipette and cup of water.
- Where does the water come from? Precipitation and runoff enter the recharge zone where it waits to enter the aquifer.
- What does precipitation look like? Rain, hail, snow, any form of water falling from the atmosphere. Have students use their pipette to “rain” on their aquifer. What changes do you see in the aquifer? It gets fuller!
- How do you get water out of an aquifer? Through evaporation, the process that water turns into vapor (gas). First have students “evaporate” their water by taking water from the surface of the water table using the pipette. Place the dirty water back in the 9 oz cup that was holding water. What changes do you see in the aquifer? There is less water. What happens to the water that is evaporated? It goes into the atmosphere, goes through condensation, or the process of vapor (gas) turning into a liquid, and then is precipitation again. Have students draw the aquifer and the cycle by which water circulates between the earth, atmosphere, and land (water cycle) in their journal.
- How do people get water out of aquifers for drinking and showers? Wells drilled into the aquifer. Have students “drill” their pipette into the gravel to gather water. What changes do you see in the aquifer? There is less water. The rocks shifted. The rocks moved or fell, so drilling affected the environment.
- Are there any other ways water can leave an aquifer? It can also leave through springs, or areas where ground water emerges at the surface, such as Barton Springs.
- In your journals, add the steps of the Water Cycle to your aquifer.

12. Evaluation:

What is an aquifer? A landform that collects water. Exit ticket

