Clean Water Machine

UConn 4-H STEM Lab

Every living thing on earth needs water to survive. Did you know that the human body is 50-60% water? We would only be able to live up to 5 days without water to drink. Clean water is critical to the survival of people, plants and animals. In today's activity we are going to learn how an **aquifer** works by making our own clean water filters. Natural aquifers under the ground help purify the water we use every day to keep all living things safe and healthy.

Supplies and Tools

Plastic two liter soda bottle
Sand, gravel and dirty soil
Coffee filters, charcoal pad & cotton balls
Spoon, cup, water, & cutting blade

Activity Steps

Notes	Visuals
1.Take a 2 liter, plastic soda bottle. Remove the label and wash it out to ensure it's clean. Have an adult help with the next part. Cut the bottle about ⅓ of the way down so the bottle will now be in two parts. The top of the bottle will now serve as the funnel for your filter.	
2. Next, place a coffee filter into the funnel of the bottle. Using the materials in your kit, create a natural filter for the dirty water to strain through. You can use whichever combination of materials you wish. You will have several attempts to test what works best.	
3. Fill your cup with water and add a spoon full of the dirt in your kit. Stir until the dirt is mixed in and the water becomes a dirty brown. Pour over the filter you created in the funnel. How clean is the water as it comes through the filter into the bottom of the bottle? Use the same amount of water on each try.	
4. Clean out the funnel and try again putting your filter materials in a different order. What happens if you run your cleaned water through the filter a second time? Does it get cleaner? What materials work best to remove debris? Experiment with different combinations.	
5. Using paper and pencil, create an experiment journal to keep track of each step of the experiment. Log which materials you used and in which order on each try. Record how clean the water was on each attempt. Time how long it takes the water to run through the filter.	

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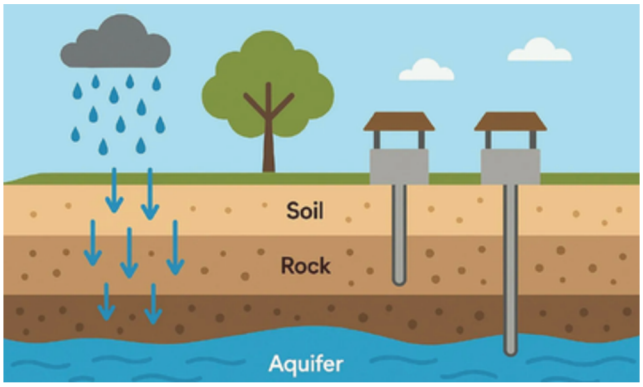
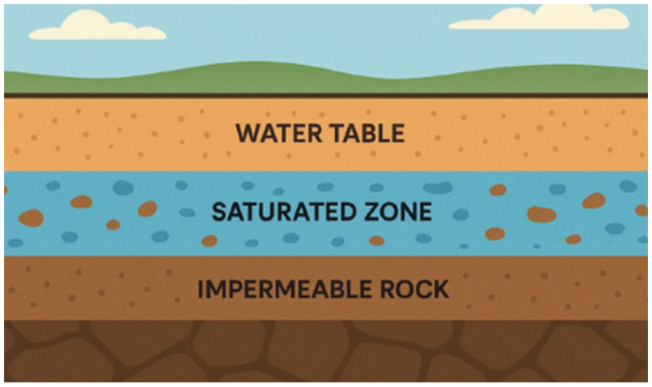
Understanding the Science

The slower the better. The longer it takes the water to go through the filter, the cleaner the water will be once it comes out the bottom. This gives each layer of the filter more time to do its job, removing impurities. The water easily makes it way through the filter but larger particles get trapped in the filter.

Natural aquifers work in much the same way. These underground systems use layers of rock, sand and soil to filter impurities out of the water we use. The layers must be **permeable**, which means able to be passed through. The water molecules are small enough that they pass through the layers but larger debris gets stuck as they are too large to go through the permeable layers. The finer the material, the less permeable it is. For example, more liquid can pass through the gravel than the sand because there is more space between the individual rocks than through the grains of sand. Eventually, the water will reach in impermeable layer where it stops and sits. This is where we are able to get the water through a well pump or underground spring.





Activity adapted from National Geographic Kids *"How things Work"* by T.J. Resler

We want to know what you thought of this activity. Please take a few minutes to complete the short survey. You can access it by the QR code on the left or going to **s.uconn.edu/4hstem2026**.

If you enjoyed this project, visit **s.uconn.edu/4-h** to learn more about **UConn 4-H.** Check out the **UConn Extension YouTube** page to view the video associated with this activity.

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