

Edible Aquifer

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Overview:

This yummy activity provides a fun opportunity for children of all ages to learn about the concept of aquifers, groundwater contamination and groundwater protection. It also includes some review of the water cycle, hazardous waste management and geology. This is a versatile activity that is appropriate for large or small groups of children in a classroom, lab, or outdoor/indoor educational festival environment.

Ingredients:

Clear plastic cups	lemon –lime soda
Vanilla ice cream cups	multi-color sugar crystals
Chocolate cake decorating sprinkles	Jelly Beans
Drinking straws	Napkins/paper towels
plastic spoons (optional)	

Learning Objectives:

Through this interactivity, children will learn that:

- aquifers contain groundwater that is pumped to the surface by wells to provide us with a clean water supply
- aquifers are located beneath our feet, below layers of permeable rock, sand and soil, and they lie on an impermeable layer of bedrock
- aquifers are fed by underground streams and surface water that slowly seeps down through permeable layers
- contaminants can also be carried down through the permeable layers
- motor oils, pesticides, paint, cleaning solutions and chemicals are examples of hazardous wastes that can contaminate water supplies
- groundwater that is pumped from aquifers is continually tested by water suppliers for possible contamination
- if unsafe levels of contaminants are detected, wells must be shut down
- contaminated portions of aquifers can no longer be used for drinking water
- treatment of contaminated or polluted water is very costly
- construction of new wells is also very costly
- pollution prevention is a better option, environmentally and economically
- drinking water is a limited resource and needs to be protected
- we can help protect groundwater by properly disposing of hazardous wastes at home and at work

Time Required:

15-30 minutes, depending on the size of the group and level of instruction

Instructions:

1. Prior to beginning your interactivity, place bottles of soda, chocolate sprinkles, multi-colored sugar crystals and straws on tables so that each group of children shares one set.
2. Begin the interactivity by asking the children if they know about aquifers. Explain that they will learn about aquifers first-hand by building one. Tell them that they will be able to eat their creations afterward, while they review what they have learned.
3. Using a diagram, review the concept of an aquifer, asking for input from the children. Show how it is situated beneath the earth's surface, pointing out permeable and impermeable layers. Ask the children to help define "permeable" and "impermeable." Briefly discuss the water cycle by asking them how water gets to an aquifer. Discuss wells by asking how water would come to us from an aquifer.

4. Distribute plastic cups that are about one-quarter full of jelly beans. Explain to the children that the cups represent bedrock. Remind them that bedrock is impermeable. The jelly beans represent the gravel layer which is permeable.
5. Ask them to carefully open the bottles of soda and pour enough soda in their cups to cover the “gravel” and form an aquifer. Emphasize that the soda represents water in an aquifer. While they are pouring soda, remind them how aquifers are replenished.
6. Review the two existing layers – bedrock and aquifer. Explain that you are now going to add something that represents the soil layer. Place the ice cream in the “aquifer” cup, asking the children what substances are in the different layers represented by the ice cream, i.e., sand, gravel, soil.
7. Ask the children to add the last layer by shaking chocolate sprinkles on to the ice cream. Ask them what it represents (topsoil and soil).
8. Tell the children that, unfortunately, their aquifers about to become contaminated. Ask them to sprinkle the colored sugar crystals onto the soil. As they do this, ask for ideas about what contaminants the different color crystals might represent, i.e., blue crystals are antifreeze, orange crystals are motor oil, green crystals are pesticides.
9. Now, tell the children it’s going to rain on their aquifer. Ask them what they think will happen to the pollutants. What will happen to their clean water in the aquifer? Now go around to each child and pour just enough soda on their soil for some of the pollutants and soil to sink down. Ask them to observe and discuss with each other how the contaminants react with the water, i.e., some sink, some dissolve, some float. Point out how the aquifer gradually becomes discolored.
10. Tell them to add a straw, but not to drink from it until they are told to do so. Ask for ideas about what the straw might represent (well or pump). Discuss how the straw will work like a pump by bringing the water from the aquifer to the surface. Remind them not to drink from it until everyone is ready.
11. Tell them that after counting to three out loud as a group, they should start sucking on their straws, paying close attention to what comes up through the straw. Count with the group and say, “Start your wells!” Ask if they are feeling the crystals or contaminants in their mouths. Explain that this is how actual wells bring contaminated water to the surface.
12. Apply what is happening to a real-life situation. Ask the children if a contaminated aquifer can continue to be used. Discuss how the well would have to be shut down if the contaminant level were unsafe. Explain the high costs of water treatment and new well construction. Discuss the better option – protecting aquifers through proper disposal of potential contaminants.
13. Congratulate the children on what a great job they have done and tell them to begin eating their aquifers. Use this time to go to each group and informally quiz them on the primary learning objectives. Examples of questions you might ask are: What do the layers in your cup represent? How do contaminants reach the aquifer? What things cause contamination? Whose job is it to detect contaminants? What happens when aquifers become contaminated? What can you do to help protect our groundwater? What should you do with your used motor oil from your car? Where should you wash your car, in the grass or on the driveway?

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