



EDIBLE AQUIFERS

GRADES 3-8

MATERIALS

Clear plastic cups (e.g. party/punch cups)
Spoons
Chocolate chips
Clear soda (Sprite, 7-Up, ginger ale, etc.)
Vanilla ice cream
Sprinkles
Blue or red food coloring
Drinking straws



WATCH HIDDEN WATER

BACKGROUND INFORMATION

The “Hidden Water” video teaches that an aquifer is a “place underground where water can easily move around.” This activity provides an interactive way for students to learn about the different parts of an aquifer, and how they are affected by pollution and water usage. Groundwater is water stored in spaces between rocks, sand, and soil particles. The underground formations that hold groundwater are called aquifers. When it rains, aquifers are recharged as the rainwater slowly permeates the soil and becomes groundwater. Confined aquifers are characterized by having an impermeable confining layer above them, which restricts recharge of the aquifer from rainwater. Unconfined aquifers do not have this layer, and are more easily recharged by rainfall.

Over half of the U.S. population uses groundwater for drinking water. However, the number one use of groundwater worldwide is for agriculture. To extract the groundwater from aquifers, wells are drilled and the water is pumped up out of the ground. If groundwater is removed more quickly than it is recharged, the water table, or the height of the water in the aquifer, will become lower.

Humans affect groundwater supplies in other ways besides drilling wells. For example, wastes that are improperly disposed of can contaminate aquifers. These pollutants include oil, paint, household hazardous products, fertilizer, pesticides, sewage from septic tanks and sewer lines, chemicals from storage tanks, and drainage from landfills. Contaminants enter groundwater when rainwater passes through contaminated soil on its way to an aquifer. Even in the absence of rainfall, hazardous substances left on the ground can soak through the soil into groundwater. The Edible Aquifers activity is a delicious way to demonstrate how aquifers function and how they are affected by groundwater pollution.

DEFINITIONS

Groundwater: Water stored under the ground in the spaces between rocks, sand, and soil particles

Aquifer: An underground formation of gravel and sand that holds groundwater

Recharge: The process in which water on the surface of the earth travels through the soil and becomes groundwater

Confined aquifer: An aquifer with a layer of impermeable rock or clay above it that helps to protect the aquifer from pollution and restricts recharge of the aquifer

Confining layer: A layer of clay or dense rock in an aquifer that “confining” the water below

Unconfined aquifer: An aquifer that lacks an overlying layer of impermeable rock or clay

Water table: The surface of the water in an unconfined aquifer

INSTRUCTIONS

Before beginning the activity, ask the students what they know about groundwater. For example, what is it used for? Does their drinking water come from groundwater? Is it used to water plants that grow the food they eat?

Then it's time for the students to make their own aquifers! Each food item used in this activity represents a component of a real aquifer. First, have the students fill the bottom one-third of their cups with chocolate chips. This layer represents the sand, gravel, and rocks in an aquifer. Then have them pour soda into the cup to fill in the spaces in the chocolate chips. The soda serves as the groundwater. Next, have them spread a layer of ice cream over the chocolate chips. This represents the confining layer of clay or dense rock. Finally, add another layer of “gravel” (chocolate chips), and a layer of sprinkles. The sprinkles represent the porous layer of soil above the aquifer.

Now the students will add some pollution to their aquifer. Have them think of pollutants that might affect aquifers. Then have them predict what will happen if they pour a pollutant on the ground above their aquifer. Add a few drops of food coloring to a small amount of soda. Pour some of the mixture over each student's aquifer.

Finally, have the students observe what happens when we construct wells in our aquifers. Have them “drill a well” in the center of their aquifer, using a straw. As they suck up the “groundwater,” have them observe how the water table drops. Does the well affect how the pollution spreads through the aquifer? Students can then observe how rainfall recharges aquifers. Have them pour more soda in and watch how the water table rises. Be sure to point out that in real life, rainfall takes a lot longer to reach aquifers! Allow the students to enjoy their edible aquifers as you review what they have learned.