

# EDIBLE AQUIFER

## **Objective:**

To understand how pollution can get into groundwater and how pumping can cause a decline in the water table and increased subsidence (sinking) of the land.

## **Materials Needed:**

Clear drinking cups (12 oz or bigger)

Crushed ice

Vanilla ice cream

Clear soda pop

Mini chocolate chips/crushed cookies/graham crackers

Drinking straws

Food coloring

## **Background: What Is An Aquifer?**

An aquifer is any rock or sediment with spaces that hold water, and through which significant quantities of water move. The water contained in these underground spaces is called ground water. Ground water is withdrawn from wells to provide water for everything from drinking water for the home and business, to water to irrigate crops, to industrial processing water. Examples of aquifers include: sand and gravel layers; fracture systems in brittle rocks; and fracture systems or solution cavities in easily dissolved rocks, such as limestone. Aquifers have connected pores or open fractures through which fluid may flow. As an analogy, consider a glass filled with crushed ice and soda pop, with a straw in it. The ice is equivalent to the sand and gravel aquifer, the soda pop is like the ground water that flows around and between the "grains," and the straw is like a well. It can be used to "pump" water out of the aquifer.

## **Activity:**

1. Construct your aquifer by filling a clear plastic cup  $\frac{1}{2}$  full with crushed ice. This represents the gravels that hold groundwater.
2. Add enough soda to just cover the ice. The soda represents groundwater.

3. Add a layer of ice cream (pack it pretty tight) to serve as a "confining layer" over the aquifer. In nature, the confining layer is made of impermeable materials such as clay or caliche that impede the movement of water into and out of the aquifer.
4. Add a layer of mini chips or crushed cookies on top of the ice cream. This represents the soil horizon.
5. Add a couple of drops of food coloring to the top of the soil. This represents contamination. Discuss the possible sources of the contamination.
6. Using a drinking straw, drill a "well" into the center of your aquifer.
7. Slowly begin to pump the well by sucking on the straw. Watch the decline in the water table.
8. Watch as food coloring gets sucked into the well area and eventually enters the groundwater. Also watch how the area around the well starts to sink, representing subsidence.
9. Recharge your aquifer by slowly adding more soda which represents a rain shower. In some places, artificial recharge is used to replenish aquifers. This is accomplished through the pumping, or injection, of water into wells where it replenishes the aquifer directly or through the spreading of water over the land surface where it can seep into the ground. Artificial recharge is done to replenish the ground water supply when rains are heavy in order to preserve water for later use or, in the case of injection wells, to dilute or control the flow of contaminated ground water
10. Review what you have learned as you enjoy eating your edible aquifer.