

Edible Aquifers Lesson Plan

SOL Standards - Elementary

- 3.7: The student will investigate and understand that there is a water cycle and water is important to life on Earth.
- 3.8 The student will investigate and understand that natural events and humans influence ecosystems.
- 4.8 The student will investigate and understand that Virginia has important natural resources.
- 6.8 The student will investigate and understand that land and water have roles in watershed systems.

Overview

Students will use food to construct edible aquifer models to learn about how water is stored underground and can be removed and used. Students will identify aquifers' main components and why aquifers are important and need to be protected.

Essential Questions

- What are aquifers and why are they important to communities?
- What happens when you remove water from an aquifer?
- What is SWIFT?
- What is the connection between SWIFT and the Potomac Aquifer?

General Ingredients/Materials

- Clear plastic 9oz. cups
- Straws
- Utensils to serve ingredients
- Whipped topping (like Cool Whip) or ice cream (clay)
- Ice (rocks)
- Mini chocolate chips (gravel)
- Crushed chocolate chip cookies or graham crackers (sand)
- Clear soda or seltzer water (water)
- Crushed sandwich cookies (land)
- Sprinkles or gummy bears (living/nonliving things on land)

Procedures

1. Review the **water cycle**
 - a. Place an emphasis the difference between freshwater and saltwater
2. Introduce students to aquifers
 - a. Over 30% of Earth's freshwater is located underground!
 - b. This water is contained in **aquifers**. Aquifers are bodies of permeable rock (sand, gravel, silt) that can contain or transmit groundwater.
 - c. Aquifers are separated by **confining layers** made of clay or **non-porous** rock (**bedrock**).
3. Discuss [Sustainable Water Initiative for Tomorrow](#)

- a. Benefits of SWIFT
 - Helping the Chesapeake Bay by significantly reducing the amounts of nutrients HRSD discharges into local waterways (**TMDL**)
 - Provides a sustainable source of groundwater
 - Prevents **saltwater intrusion** into the Potomac Aquifer
 - Helps reduce the rate at which land is sinking in Hampton Roads (land subsidence)
4. Provide each student with one clear plastic cup and a **scoop of ice** (enough to cover the bottom of the cup). The ice represents rocks in the aquifer.
5. This porous rock allows water to move through the spaces. **Add a small amount of soda or seltzer water** to the cup. This represents how water moves through the rocks in the aquifer.
6. Provide each student with mini chocolate chips (gravel). Instruct them to **place the chocolate chips** as a thin layer on top of the ice. This represents gravel. Gravel is a mixture of rock fragments and is both permeable and porous. It has the highest permeability in the aquifer.
7. On top of the chocolate chip layer, **add the crushed chocolate chip cookies/graham crackers**. This represents sand in the aquifer. Sand helps to trap bacteria and naturally filter the water. Sand is also permeable and porous. The students have now created their **aquifer body**. This is the portion of the aquifer that will store and transmit groundwater.
8. Next, let's create the confining layer of the aquifer. This is the clay layer. **Add a layer of whipped topping** to the aquifer. Clay slows down the flow of water. It is porous, but not very permeable.
9. If you have time and space in the cup, students can create another layer, starting with ice.
10. Next, provide students with **crushed sandwich cookies**. This will represent dirt/land.
11. Add **sprinkles/gummy bears**. These represent the living and nonliving things (**abiotic and non-abiotic** factors) on land.
12. Provide each student with a **straw** portion. Instruct them to "drill" through their land to reach the groundwater in their aquifer body. This represents a groundwater **well**.
 - a. Wells can be drilled into the aquifers and water can be pumped out. Precipitation eventually adds water (recharge) into the porous rock of the aquifer. For deep aquifers, this may take many years!
 - b. If you remove water from an aquifer faster than it can recharge, you can:
 - Lower the water table
 - Create **cones of depression**
 - **The well can "go dry"**

Example:

Edible Aquifer



Abiotic and Biotic Factors

Land/Soil

Water

Clay

Sand

Gravel

Water

Rocks

