

LESSON: **Edible Aquifer**

GRADE: 1

OBJECTIVES:

Mathematics

Operations & Algebraic Thinking-

Represent and solve problems involving addition and subtraction.

- **1.OA.1.** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Science

K-2-ETS1 Engineering Design

- **K-2-ETS1-2** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Physical Education

- **P.E. Standard 4** - Exhibits responsible personal and social behavior that respects self and others.

MATERIALS & RESOURCES:

- Images of aquifer (two examples included in this lesson)
- Website: Iowa Public TV Water Quality
http://www.iptv.org/explore/more/water/uses/use_drinking_water.cfm
- Two clear cups -2 cups- and straws at each workstation
- Measuring cups
- Supplies for cleanup
- Food which represents an aquifer (the list below is merely suggested, food allergies should be considered before beginning)
 - Raisins, or other dried fruit-
1/4 cup per student
 - Nuts or carob chips-1/4 cup
per student
 - Granola-1/2 cup per student
 - Yogurt 1/3 cup per student
 - Brown sugar-about 1/4 cup
not packed, per student
 - Soda water or ginger ale-
about 1 cup per student
 - Food coloring (yellow may
not show up well)-1 bottle at
each workstation

PRESENTATION:

In Iowa, 80% of our drinking water comes from ground water, including aquifers. This fun and edible lesson gives students a visual idea of the layers of earth and aquifer and how pollution can occur.

DIRECTIONS:

1. Prepare for experiment by creating a number of workstations. Equip each station with enough materials (listed above) for each student to create an Edible Aquifer. Include supplies for cleanup.
2. As a class view the images of aquifers. If possible view the Iowa Public TV website as listed in resources above. Discussion points include:
 - How and where the water comes from to fill aquifers
 - What are aquifers made of and where are they located? Add up the number of different layers between where we stand and the aquifer. (Soil, gravel, clay, rock, bedrock, etc...You could even add the floor of the school as a layer. Look at illustrations of aquifers if helpful.)
 - Can you identify Iowa aquifers? How many are there?
 - From where does water pollution come? Add up all the sources. Now subtract the sources about which you can do something.
 - Other topics that are prompted by student's questions
3. Have students divide into small groups.
4. Pollute the water by pouring $\frac{1}{3}$ cup of soda water into one of the clear cups and adding 2-3 drops of food coloring into the $\frac{1}{3}$ cup of soda water. This colored water will represent the pollution.
5. Now create an aquifer: Have students measure $\frac{1}{4}$ cup of raisins and $\frac{1}{4}$ cup of nuts and pour each into the second clear cup (the one that does not contain soda water).
6. Then add $\frac{1}{4}$ cup of granola on top of the raisins and nuts. The nuts, raisins, and granola represent the gravel, rocks, and sand.
7. Now pour just enough clear soda water onto the raisins, nuts and granola to cover granola. Pour just until soda comes to the top of the granola. This represents the water in the aquifer.
8. Now add a layer of clay or dense rock on top of the aquifer: Measure $\frac{1}{3}$ cup of yogurt. Gently add and spread the yogurt to the top of the aquifer (granola).
9. Now add the topsoil: Students add $\frac{1}{4}$ cup of granola to represent subsoil then on top of the granola, add just enough brown sugar to represent topsoil.
10. Add pollution to the land by pouring the colored water on the soil.

11. Drill a well. Push the straw down to the bottom of the cup. Sometimes, just like in real life, the first attempt is not successful. It is sometimes helpful to *gently*, pull the straw out and re-drill a different well. (This helps the polluted water penetrate the confining layer of clay or rock.)
12. Pump water from the well. Turn on the faucet by *slowly* sucking on the straw, (leave the cup sitting on the table). Look to see what is happening as the water level goes down. Have small groups discuss what is happening- the aquifer level decreases and polluted water is pulled down into the aquifer.
13. Student's aquifers can be replenished by adding more clear soda water. Explain that real aquifers take much longer to replenish. This is important in relation to water conservation.

TIME:**45 min.****PROCESSING THROUGH THE SIX PILLARS****WHAT**

- What happened when we added pollutants (food coloring) to our land?
- Who is responsible for clean water?

NOW WHAT

- What are some things people do to harm our water quality when they wash their cars?
- What are some things people do to harm our water quality when they take care of their yards?
- What are some things people do to harm our water quality when they clean up after their pets?

SO WHAT

- What kinds of things should you do when cleaning up after your pet if you want to take responsibility for cleaner water?
- What kinds of things should you do to take care of the fall leaves if you want to take responsibility for cleaner water?

EdwardsAquifer.jpg



<http://www.rdn.bc.ca/cms.asp?wpID=2415>

