

5th Grade Science

Groundwater and the Hydrologic Cycle

Essential Question: How is Baton Rouge groundwater linked to the hydrologic cycle?

Objectives:

1. Students will describe the molecular structure of water.
2. Students will define the Earth's hydrosphere and explain why liquid water is unique within our solar system.
3. Students will distinguish the relative proportions of distribution of water in the hydrosphere.
4. Students will create a model of an aquifer and compare it to diagrams of groundwater below Baton Rouge.
5. Students will identify sources of drinking water and how saltwater has intruded on the groundwater supplying Baton Rouge.
6. Students will compare the approximate salt content of seawater with freshwater and explain that seawater cannot be used for drinking or irrigation.
7. Students will examine the hydrologic cycle and describe factors that influence movements of water.

SI GLEs:

7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
14. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
33. Evaluate models, identify problems in design, and make recommendations for improvement (SI-M-B4)

GLEs

3. Describe the structure of atoms and the electrical charge of protons, neutrons, and electrons (PS-M-A1)
5. Describe the properties and behavior of water in its solid, liquid, and gaseous phases (states) (PS-M-A5)
12. Identify the Sun as Earth's primary energy source and give examples (e.g. photosynthesis, water cycle) to support that conclusion (PS-M-C3)
34. Identify the components of the hydrosphere (ESS-M-A7)
38. Estimate the range of time over which natural events occur (e.g. lightning in seconds, mountain formation over millions of years) (ESS-M-B3)
45. Identify Earth's position in the solar system (ESS-M-C-5)
46. Identify and explain the interaction of the processes of the water cycle (ESS-M-C6) (ESS-M-A10)
50. Describe the consequences of several types of human activities on local ecosystems (e.g. polluting streams, regulating hunting, introducing nonnative species) (SE-M-A4)
51. Describe naturally occurring cycles and identify where they are found (e.g. carbon, nitrogen, water, oxygen)(SE-M-A7)

Vocabulary:

aquifer, hydrologic cycle, groundwater, recharge area, saltwater encroachment or intrusion,

Anticipatory Set:

Show the students a globe and ask them if they can estimate how much of the surface is land and how much of the surface is water? (Answer- 70% water or $\frac{3}{4}$ water). Have 1 liter of water (may color it for added effect) and tell the students that this container represents all the water on earth. Show the class 6 clear plastic cups labeled with the different sources of water (ocean, icebergs, groundwater, lakes, swamps, and rivers). Ask the students what water source they would choose to serve all of their needs. Using a graduated cylinder and a dropper place the following amounts in each of the cups:

Icebergs – 20.6 mls

Groundwater – 9 mls

Lakes - 0.08 mls

Swamps – 0.01 mls (roughly 5 drops)

Rivers – 0.002 mls (roughly 1 drop)

Take the water left in the liter container (should be 970 mls), and dump a generous amount of salt in it (2-3 tablespoons). Refer back to the globe and point out the large surface area covered by water, but that most of the water is not suitable for humans to drink. Drinking water is a valuable resource and they will be learning about where their water supply comes from.

Teacher Instruction:

Power point: 1) Earth's Hydrosphere 2) Groundwater and the Hydrologic Cycle 3) Saltwater Intrusion

Student Engagement Activities:

Edible Aquifers: Students create models of aquifers in a clear plastic cup with a “confining layer” of ice cream. The porosity of aquifer materials are compared by using a variety of materials such as gummy bears, chocolate chips, or candy sprinkles. A “well” is dug with a straw to observe changes in the level of the “water table”.

How Salty is Seawater: Teacher demonstrates how salty seawater is with gallon or a liter of water and tablespoons of salt. Students use place value charts to determine the numerical value of salt in parts per million and parts per thousand and compare salt content of different bodies of water.

Louisiana Water Cycle Journey: Students take the role of a water molecule as they learn how these drops move around Baton Rouge, South Louisiana, and the Gulf of Mexico.

Closure: Ask students to summarize how groundwater is linked to the hydrologic cycle and explain why it is important to protect groundwater.