Earth Science Lesson Plan

Our Groundwater in Baton Rouge

Essential Question: What is the current status of the water supply for Baton Rouge?

Objectives:

1. Students will define an aquifer and identify diagrams representing the various sands which supplies Baton Rouge with water.
2. Students will review the hydrologic cycle and describe groundwater flow patterns in the Southern Hills Aquifer System.
3. Students will give examples of potential sources of groundwater contamination.
4. Students will explain what causes a cone of depression and its effect on saltwater encroachment.
5. Students will interpret static water flow maps and compare with topographic maps.
6. Students will examine recent measurements of saltwater encroachment in the Southern Hills Aquifer System and probe possible causes and solutions.

Earth and Space Sciences GLEs:

13. Describe the processes responsible for earthquakes and volcanoes and identify the effects of these processes (e.g., faulting, folding) (ESS-M-A3)
20. Describe how humans' actions and natural processes have modified coastal regions in Louisiana and other locations (ESS-M-A8)
21. Read and interpret topographic maps (ESS-M-A9)
24. Investigate and explain how given factors affect the rate of water movement in the water cycle (e.g., climate, type of rock, ground cover) (ESS-M-A10)
34. Apply geological principles to determine the relative ages of rock layers (e.g., original horizontality, superposition, cross-cutting relationships) (ESS-M-B3)

Scientific Inquiry GLEs:

11. Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)
12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
13. Identify patterns in data to explain natural events (SI-M-A4)
15. Identify and explain the limitations of models used to represent the natural world (SI-M-A5)
19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
39. Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)

Vocabulary:
aquifer, hydrologic cycle, groundwater, recharge area, cone of depression, saltwater encroachment or intrusion, fault

Anticipatory Set:
Pour a glass of tap water and take a sip. Ask the students how many people in this world have this luxury.
Only 20% of the world population enjoys access to running water!

Additional information for discussion:

- At least 11% of the world's population—783 million people—are still without access to safe drinking water.
- 1.4 billion people live without clean drinking water.
- At least 1 billion people must walk 3 hours or more to obtain drinking water.
- More than one-third of Africa, population lacks access to safe drinking water
- More than 130 million people in Latin America and the Caribbean lack access to safe drinking water
- Dirty water kills more children than war, malaria, HIV/AIDS and traffic accidents combined.
- Despite being the most common substance on earth, 97% is seawater and unfit for human use. Two thirds of the fresh water is locked up in glaciers leaving only 1% of the earth's water for human consumption.

Sources of information:

http://www.foodandwaterwatch.org/water/interesting-water-facts/

http://www.theworldwater.org/water_facts.php

Teacher Instruction:
Power point: Our Groundwater in Baton Rouge 1) the value of water 2) aquifers and the hydrologic cycle 3) Baton Rouge Water Co. pumps 4) water withdrawals 5) freshwater threat – saltwater intrusion

Student Engagement Activities:

How fast is groundwater - .00002 km per hour? – Students create a visual representation of the movement of groundwater by calculating how many days it would take groundwater to travel 10 meters across the classroom. (Materials: meter stick, student calculators, student question/answer blackline master)

Drawing a static water map from a model of a cone of depression: Students construct a simple 3-D cone from which they cut out the contour lines in order to produce a map. This activity not only facilitates the understanding of a cone of depression, but also demonstrates the relationship of contour lines to 3-dimensions. Students will make comparisons with topographic maps. (Materials: cone

template, clear tape, scissors, copies of topographic map and static water map, student question/answer blackline master)

Groundwater by the numbers – Students match cards with groundwater statistics. The activity develops students' number sense of size and scale while reviewing groundwater information. (materials: recommended card stock for card cut-outs)

Closure:

Pour another glass of tap water. Ask the students how their perceptions of the value of our water have changed. Generate discussion about how they might become involved in community or global action to sustain water resources.