

Who, Me?

Lesson Focus: Earth, its water, how we affect it and need it.

Learning objectives:

- ❖ Students will identify how humans impact aquatic ecosystems.
- ❖ Students will be able to show how limited freshwater is to all organisms, including them through a graphing exercise. They will also be able to summarize, in their own words, how each one of them can help clean up water, conserve water, and prevent water pollution.
- ❖ Students will be able to explain how rivers are connected to the ocean.

Enduring Understandings for the lesson:

- ❖ The amount of fresh water available to all organisms is limited; most fresh water is found in glaciers and polar ice caps.
- ❖ Water composes a large percentage of the Earth's surface and is a vital resource.
- ❖ Humans play an important role in the conservation of water. We all are connected to the ocean and have an impact on it, regardless of our location to it.

Georgia Performance Standards Addressed:

- ❖ **S6E3. Students will recognize the significant role of water in earth processes.**
 - a. Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.
 - b. Relate various atmospheric conditions to stages of the water cycle.
- ❖ **S6E5. Students will investigate the scientific view of how the earth's surface is formed.**
 - i. Explain the effects of human activity on the erosion of the earth's surface.
- ❖ **S6E6. Students will describe various sources of energy and with their uses and conservation.**

Grade level: 6th Grade, Earth Science

Materials:

- ❖ **The following items need to be one per a student:**
 - Journals
 - Writing utensil (pen/pencil)
 - Color Pencils
 - Markers
 - Rulers
 - Computer

- PowerPoint Presentation (included with this lesson)
- Water Cycle Lab sheet entitled "What do you know?"
- T-Shirt Handout

❖ The following items need to be one per a group of 4 students:

- Container A filled with 1,940 mL of water (2 liter coke bottle works nicely)
- Container B filled with 60 mL of water
- Container C filled with 40 mL of water
- Container D filled with 18 mL of water
- Container E filled with 2 mL of water
- "Seepy Sandwich" Group Lab Sheet
- One Slice of Bread
- A spray bottle filled with water
- Bottle of Food Coloring
- Stack of paper towels

Time needed: 3, possibly 4 class periods; 55 minutes per class period

Background information:

"Among all the planets of the solar system, only Earth is largely covered by water. Vast oceans separate Earth's continents. Millions of rivers, streams, and brooks flow down from its highlands to the sea. Countless lakes and ponds dot its surface. Reservoirs of water lie hidden underground. Ice more than 3,000 meters thick in some places presses down on the continent of Antarctica. Far to the north, slabs of ice larger than a small state float on the Arctic Ocean. Some people call Earth a "blue marble" because so much of it is colored blue. The blue is liquid water. This liquid water, along with solid water, or ice, covers about 71% of Earth's surface." -(Georgia CRCT GPS Edition Coach Book, 6th grade)

Ninety seven percent of the Earth's water is salt water. Oceans contain salt water. The salinity, or salt concentration, of the oceans averages about 3.5 percent. This can be calculated as 35 grams of salts per kilogram of water. The other three percent of Earth's water is fresh water, most of which is locked in polar ice caps. In general, fresh water on Earth's surface holds amounts of dissolved salts that are so small they cannot be tasted. "Lakes, rivers, streams, and glaciers hold the rest of Earth's surface fresh water. A glacier is a very slowly moving river of ice. A small portion of the rest of Earth's fresh water is trapped between underground layers of rock. The trapped water is called groundwater. Pools of groundwater build up when water from the surface seeps into the earth. This water sinks lower and lower until it reaches a waterproof layer of rock. Many people dig wells into pools of groundwater." -(Georgia CRCT GPS Edition Coach Book, 6th grade) The wells deliver fresh water to the surface for people to use.

Learning Procedure:

1. As students enter the room, divide them into groups of four. One idea is to have students, on the way into the room, draw from a bag filled with pictures of animals (4 of each kind). When the students draw an animal card, they walk into the room to find the desks arranged in table form with one animal picture in the center of each table. They find their animal picture and sit down. This gives students the opportunity to work with a variety of classmates.
2. When students get to their group's location, have them, individually, begin the bell ringer activity (activator). (I have students do this activity in their science journals.) The bell-ringer can be projected from PowerPoint presentation, slide #3. In this bell-ringer, students are asked to copy and answer the following question: What one thing do all the following items have in common? (I have 13 items sitting on my lab bench at the front of the room. The list of items can be found on slide 3 of the PowerPoint presentation.) The answer to the question is WATER (slide 4).
3. Then introduce students to the essential questions, learning objectives, enduring understandings, and the Georgia performance standards for this lesson. They are listed on slides 5, 6, 7, & 8.
4. (Activity #1, 1st assessment is described here.) Then have students open their journals to the next clean available sheet of paper and draw a moderate sized circle, leaving a few lines to write sentences underneath. Tell students to complete this circle by illustrating how they see the earth. Provide students with color pencils at this time. Underneath their earth pictures, have students describe the earth such as how much water, land, etc. Have them pretend they are preparing this piece of journal for an alien who has never heard of earth. (This activity is described in detail on slide 9 of ppt.)
5. Once students have finished drawing and describing, guide them in a class discussion about the earth. Project ppt. slide #10 which shows a globe of the earth with a water spigot nozzle attached to it. Ask students to explain what they think this picture is trying to say. Guide students in realizing how much of our earth is water verses land.
6. Then begin Activity #2, shown on slide 11(2nd assessment). Provide each group with 5 containers of water; labeled container a, b, c, d, or e. (These containers will need to be prepared prior to class. The amounts of water are listed under materials and on slide 11.) Ask students to write down the container names in journals, letters a thru e, leaving space for names of bodies of water described below. These containers represent the 71% of earth that is water. Ask students to hypothesize, based on prior knowledge and what you have discussed so far in class, which container represents salt water, which container represents freshwater as a whole, which container represents groundwater, which container represents lakes, streams, & wetlands, and which container represents glaciers & polar ice caps. Give students about 7 or 8 minutes to discuss within

their groups and write down their answers in their journals. Then use slide 12 and 13 to go over the answers.

7. Make sure before you move on any further that students understand that our earth is 71% water. Earth's water is broken down into 97% saltwater and 3 % freshwater. Two of that three percent of our freshwater is frozen in glaciers and icecaps. The rest is found in groundwater (.9%) and the rest is found in rivers, lakes, and swamps (.1%). Discuss why it is important to conserve the freshwater that we have available to us.
8. Have students hypothesize why pollution is such a bad thing for our water and them. Discuss how water gets polluted and how it can be cleaned and prevented. Have students make a list in their journals of things they can do on their own or with their environment to clean up and/or prevent water pollution. Examples might include setting a time up each month where he/she and family picks up trash near their home and/or using environmentally friendly household cleaning products as well as for washing cars, pets, etc. Guide students to begin thinking about where our water comes from and how it is continually cycled. Ask students if they play a role in this cycle. Use slides 14, 15, and 16 during this portion of your lesson. Provide each student with a "What do you know?" handout sheet so they can fill out the water cycle and make any extra notes as you discuss it/elaborate on the board. Sum up the day's lesson and release the class for the day.
9. (**Day two**) Prior to students entering the room, provide each group's table with one piece of bread, a spray bottle filled with water, a bottle of food coloring, a "Seepy Sandwich" group lab sheet, and lots of paper towels. Once students get settled, review the lesson from yesterday and start activity #3 entitled "Seepy Sandwiches." Using the PowerPoint presentation slides 1-16 will be helpful during that review. It will take students back through the discussions and activities you did with them the day before.
10. Begin Seepy Sandwich activity. During this activity students will be asked to hold the slice of bread (soil and rock) vertically, add a drop of food coloring (pollutant) to the top crust edge of bread, spray water (rain) on the food coloring, allowing drainage to seep through the crust into the bread. Students will then answer 7 questions that follow these steps on their activity sheet. (Step by step instructions and discussion notes are listed on slides 17, 18, and 19.) This activity takes about 15 or 20 minutes to do.
11. Explain to students how the polluted water seeps down into the bread as it begins to spread out, making it difficult to locate where the pollution originated. The water and food coloring will remain together as the water moves. This illustrates visually how pollutants are not filtered out by the ground; and human activities can affect groundwater quality. You can extend this lesson by discussing non-point source and point source pollution. You can also have students connect this lesson to the water cycle. Have them discuss among their groups what happens to the water going through the cycle due to pollution.

12. Then flip to slide 20 that asks this question; "Do we, YOU, have an effect on all water (fresh and salt)? Have students answer this question in their journals. Summarize everything they have learned in this lesson. Introduce the culminating activity they will begin the following class period entitled "Water T-Shirt Challenge." The summarizing will take about 15 minutes at the end of class. The T-Shirt Challenge activity takes one class period to do (50 minutes).
13. (Day Three) Review all aspects of this lesson. Flip through the PowerPoint presentation to give students an overview of everything they have learned. Stop at slide # 21. This is the "Water T-shirt Challenge" slide. Tell students to pretend they have been hired by an advertising agency to design a t-shirt logo that does one of the following: promotes cleaning up our water, conserving our water, or showing how essential water is to all organisms or to a specific organism. Give each student a T-Shirt handout. Provide markers, color pencils, and rulers for them to make their t-shirts everything they want them to be. Give them the remainder of the class time to design their shirts. As students complete their shirts, have them copy and answer the essential questions of the entire lesson. These questions can be projected from slide 22 of the PowerPoint presentation.
14. Have students present their shirts the following day to the class and then display them for all to see.

Evaluation:

1. Evaluate activity #1, earth drawing and description.
2. Evaluate students' journal entry from activity #2 on the average water amounts of earth. Make sure students know their percentages correctly.
3. Assess group lab sheets for activity #3, "Seepy Sandwiches."
4. Have students pretend they were hired by an advertising agency to design a t-shirt logo that does one of the following:
 - *Promotes cleaning up our water.
 - *Conserving our water.
 - *Showing how essential water is to all organisms. Students should be able to take what they have learned from their previous lessons and create a shirt that depicts one of their thoughts. For example, a student could draw a mother duck in a polluted pond getting her ducklings out of the water, telling her babies that they must move their home. (You as the evaluator are looking to see that they grasp how important water is to organisms and its impact if destroyed, not conserved, etc. on the environment, its inhabitants and more importantly on them as humans.)
5. Have students turn in their journals for you to grade their essential questions. Review any material with which students seem to be having difficulty.

Extensions:

- 1) Lead students through the Sum of the Parts activity from Project WET's Curriculum Guide K-12 on non point source and point source pollution.
- 2) Have students write a letter for the local paper, expressing how the community can clean up their water. In their letter, students will incorporate facts they learned in class, research about their local water, and ways the community could help.
- 3) Have students survey their own homes and neighborhood for sources of non point source pollution and point source pollution. Then create a list of ways to better conserve water and to reduce or better yet eliminate pollution.

Resources:

- ❖ Georgia CRCT GPS Edition Coach Book /6th grade earth science -for descriptions of Georgia standards taught in 6th grade earth science, extender ideas, CRCT style questions, and how to link the standards.
- ❖ Georgia CRCT GPS Edition Coach Book/7th grade life science -for descriptions of Georgia standards taught in 7th grade life science, extender ideas, CRCT style questions, and how to link the standards.
- ❖ Ozark National Scenic Riverways -
<http://www.nps.gov/archive/ozar/seepy.htm> -for the seepy sandwich activity and other links to find curriculum on groundwater protection.
- ❖ EPA website at www.epa.gov/OWOW/watershed/ -for more information about watersheds and additional lessons and resources.

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This activity is a product of the Rivers to Reef Educator Workshop sponsored by the Georgia Aquarium and Gray's Reef National Marine Sanctuary which the author participated in. For more information about this workshop, Georgia Aquarium, or NOAA Gray's Reef National Marine Sanctuary, please visit our websites at www.georgiaaquarium.org or <http://graysreef.noaa.gov/>



Use the following word bank to complete the Water Cycle diagram:
Condensation (use twice) Evaporation Transpiration Precipitation Surface
Runoff Subsurface Runoff Accumulation of Water

