

Usable Water

Lesson Focus: Water as a limited resource

Learning objectives:

- Students will be able to identify where different water sources are found.
- Student will understand how much water is usable.
- Students will learn why it is important to take care of our usable water.

Enduring Understandings for the lesson:

- Water composes a large percentage of the Earth's surface and is a vital resource.
- Although water is plentiful on the surface, usable water is limited.
- Humans play an important role in its conservation.

Georgia Performance Standards Addressed:

S3L2. Students will recognize the effects of pollution and humans on the environment.

- a. Explain the effects of pollution (such as littering) on the habitats of plants and animals.

S5E1. Students will identify surface features of the Earth caused by constructive and destructive processes.

- a. Identify surface features caused by constructive processes.
- b. Identify and find examples of surface features caused by destructive processes.
- c. Relate the role of technology and human intervention in the control of constructive and destructive processes.

S3-5CS4. Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

- a. Observe and describe how parts influence one another in things with many parts.

S6E3. Students will recognize the significant role of water in earth processes.

- a. Explain that large portions of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.

S6S5. Students will use the ideas of systems, model, change, and scale in exploring scientific and technological matters.

- a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts

Grade level: 3rd-6th

Materials:

Were You Aware? Prediction Sheet (One per student)
Measuring cups
4 clear plastic cups per group
Salt

Masking tape
Food Coloring (blue, green, yellow)
Measuring Spoons
Crayons: blue, green, yellow (Students will share crayons so have at least one set of colors per 3 students)
Globe (one that can be tossed around)
Tap water

Time needed: 30 minutes

Background information:

Did you know that nearly 75% of the earth's surface is covered with water? It is probably the most important liquid in the world. Water in the form of precipitation (rain, snow, sleet, hail, etc.) collects in many places: springs, wells, streams, rivers, ponds, and lakes. It fills the ocean beds. Water is also present in the air as water vapor.

There are two types of water: fresh water and salt water. Fresh water can be broken into two categories: usable and non-usable. Non-usable fresh water is water that is locked in the polar ice caps or glaciers. Usable water is water that we find in streams, lakes, ponds, rivers, creeks, and underground in aquifers.

Water is very different from most liquids:

- Water is lighter as a solid than as a liquid. If ice were heavier than water, frozen water in a lake would sink to the bottom and kill all the marine life!
- Water can store much heat. Because it can store a lot of heat, water helps living things survive when temperatures change.

Without water there would be no life. Think about where people settle and start farms. Did you know one corn plant uses more than a gallon of water a day? It takes about 800, 000 gallons of water to grow an acre of cotton!

Water makes up about 60% of your weight. The water in our bodies is used in many ways. For example, water helps us regulate our body temperature. It cools us off when we are hot. The amount of heat produced by a man during one day's activity would be enough to raise his body temperature to 300 degrees F, if he did not have water in his body to cool him down. We need at least 2 ½ quarts of water a day.

One person can use more than 50 gallons of water a day for things such as drinking, washing, cooking, and removing waste. Most of an animal's blood is water; most of the plant sap that nourishes living tissue is water.

Learning Procedure:

1. Have students stand in a circle and take turns tossing the globe to one another. When a student catches the globe have the students identify how many fingers are

- touching water and how many are touching land. Tally answers on board. Once students have had a few minutes to toss and catch, stop the tossing and have students focus on the board.
2. Ask students to look at the comparison between the number of their fingers touching land and those touching water. Ask, does anyone know how much of the Earth's surface is covered with water (approximately 75%)? That sounds like a great deal of water.
 3. Explain that there are three types of water on earth:
 - a. salt water-water that is unusable to drink
 - b. fresh water in glaciers and polar ice caps-usable to drink but locked in
 - c. surface and ground water-drinkable and usable for living things
 4. Pass out *Were You Aware?* sheets. In groups of 3-4, have students discuss their prediction. Write on the board that they are to use the color green for salt water, yellow for freshwater locked in glaciers and polar ice caps, and blue for fresh surface and ground water.
 5. Students should have 4 clear cups per group. Using masking tape the students label cup 1 as water on earth, cup 2 as non-usable fresh water, cup 3 as usable fresh water and cup 4 saltwater.
 6. Have students drop one drop of food coloring in each cup. Cup 1 gets no food coloring and 1 cup of water from the sink; Cup 2 gets a yellow drop; cup 3 gets a blue drop and cup 4 gets a green drop.
 7. Using Cup 1, fill one teaspoon with water and pour it into cup 2. Using cup 1, fill a ½ tsp measure with water and pour it into cup 3 and finally pour the remaining water in cup 1 into cup 4.
 8. Have the students observe the water in each cup. Ask if they think their predictions were correct. Students should take *Were you Aware?* sheet out and discuss the comparison.
 9. Finally ask students did they realize how little usable freshwater is available. Using the *Were You Aware* sheet complete the activity by labeling 97% of earth's water is saltwater. Ask where that is found? (-ocean). Have students observe how much water is in cup 4. Next have a student pick up cup 2 and ask why this water is non-usable even though it is fresh water (-it is locked within the ice of polar caps and glaciers) Explain that this is 2% of the earth's water. Students should start at the 97% line and color yellow up to the 99% mark. Finally have students look at the blue water. Explain that this is only 1% of the earth's water. It represents our rivers, streams, and tributaries. That is why we need to protect our rivers. It is the past, present and future of water.
 10. Have students think of ways we can protect our rivers. Record them on the board.

Evaluation:

1. Evaluate the student's prediction and actual results on their *Were You Aware?* sheets.
2. Have student's journal at least three ways they can help protect our water resource.

3. Observe and evaluate students as they work in their groups.
4. Assess the list of ways to protect our rivers for accuracy.

Extensions

1. Have students create a scale map of usable water. Using the information from the lesson the students can label rivers, oceans, and glacier regions. They can color the areas according to a key.
2. Students can choose one particular river, ocean, or glacier region and report to class what activities take place in these areas that could potentially damage the water source.
3. Working from their selected water source in #2 have students identify animals in that area and problems they may encounter if their water sources are polluted.
4. Have students determine how their selected water source in #2 contributes to the water (hydrologic) cycle.
5. Ask students to identify potential effects of climate change on their selected water source.
6. Ask students to track the path a drop of water from their water source will take to the ocean identifying all the obstructions along the way. (dams, uptake by factories, uptake by farms for irrigation, uptake by cities, etc.)
7. Ask students to keep a journal of how much water and for what purposes they use it in their households for a week.
8. Ask students to determine how much water is wasted by a dripping faucet over an hour's time and then extrapolate how much would be wasted in a day, a week, a month and a year.
9. Ask students to determine how much electricity is used/wasted by a faucet that is allowed to drip freely for a day, a week, a month and a year.
10. Take students to the local water treatment plant to learn how the water they drink is processed.

Resources:

- *Are You Aware? Water Precious Water*, Book A 1988 AIMS Education Foundation
http://www.aimsedu.org/aims_store/Were-You-Aware-p-1495.html
- Life Is A River Unit-Cobb County Gifted Specialists

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Were You Aware?

Use this sheet to first estimate how much water is usable and then after your experiment what you actually found. Don't forget to use your colors to demonstrate salt water (green), glacier/ice caps (yellow), and fresh usable water (blue)!

