

Lesson 2

Water Scarcity

INTRODUCTION

In this lesson, students will learn about water scarcity and how much of the earth's water is actually available for daily human use. They will learn the importance of water to humans and brainstorm ways that they can reduce their own water usage.

LESSON OVERVIEW

Grade Level and Subject: Grades K-4: Social Science

Length: 1 class period - 45 mins-1 hour

Objectives:

After completing this lesson students will be able to:

- Visualize how much water is available to humans
- Explain the importance of water
- Understand the problem of water scarcity
- Understand how they can conserve water

Next Generation Science Standards Addressed:

This lesson addresses the following Next Generation Science Standards:

- **K-LS1-1.** Use observations to describe patterns of what plants and animals (including humans) need to survive.
- **K-ESS3-1.** Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live
- **K-ESS3-3.** Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- **2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid.
- **4-ESS3-2.** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Materials Needed:

- 4 liters of water, or a liquid of your choice (Use juice or turn into Koolaid, etc. if you want to make it a snack when you're done!)
- Measuring cup
- Chalkboard or equivalent
- Crayons/colored pencils
- Globe or map
- Ice cube tray
- Worksheet #1- How Much Water Can We Use?

Assessment:

Students will be assessed through the following activities:

- Participation and attentiveness
- Completion of Worksheet #1- How Much Water Can We Use?

LESSON BACKGROUND**Relevant Vocabulary:**

- Conservation: Preservation and protection of materials and resources
- Scarcity: Deficient amount of something to meet the demands; not plentiful or abundant
- Salt Water: Water located in the ocean that contains salt.
- Fresh Water: Water without salt that makes up lakes, streams, rivers, and rainwater.
- Glaciers: A large body of ice, usually found in mountain areas and at the north and south pole

Information:

Water is one of earth's most valuable resources, and one of its most scarce. Out of the earth's total supply of water, 97% is salt water and only 3% is fresh water. Furthermore, the amount of fresh water trapped in glaciers and icecaps is 2.2%, leaving only .08% of the earth's total water available for everyday human use.

Water is a finite resource that continues to move through its natural cycle, meaning that we are drinking the same water that dinosaurs did millions of years ago! Everyone on the planet needs to share the small amount of fresh water available - that is why it is important to protect it and not waste it.

Resources:

- Information on why salt water is not a replacement for fresh water: U.S. Geological Survey (2008) Thirsty? How 'Bout a Cool, Refreshing Cup of Seawater? Retrieved January 27, 2009 from <http://ga.water.usgs.gov/edu/drinkseawater.html>
- U.S. Geological Survey (2008) Water Science For Schools. Retrieved January 27, 2009 from <http://ga.water.usgs.gov/edu>
- Information on Glaciers: National Snow and Ice Data Center (2009) All About Glaciers. Retrieved January 29, 2009 from <https://nsidc.org/cryosphere/glaciers>
- Tips On Water Conservation Mono Lake Committee (2009) Water Conservation. Retrieved January 28, 2009 from <http://www.monolake.org/about/waterconservation>

LESSON STEPS

Warm Up: Why Is Water Important?

1. Begin the lesson by discussing with students what water is used for and why it is so important. Ask questions such as:
 - a) Why do we need water? (*ex. We cannot survive without clean water to drink every day. We also depend on water for many other things in our daily lives, in addition to agriculture, industry, etc.*)
 - b) What types of activities is water used for?
 - c) Where and when do you use water the most?
 - d) Where do you think the water that you use comes from?
 - e) What is the difference between fresh and salt water?
 - f) Do you think it is possible to run out of water?
 - g) What would happen if your water supply was reduced?

Activity One: Measuring Available Water Supplies

1. Pass out crayons/colored pencils and Worksheet #1- How Much Water Can We Use? to each student. Show the 4 liters of liquid to the students and tell them that it represents all of the water on Earth. Ask students to estimate how much of the 4 liters they think is fresh water available for human use.
2. Show students a globe or map, and point out all the water on Earth. Explain that even though our "blue planet" is covered with mostly water, 97% of water on earth is salt water in the oceans and cannot be used for human consumption, agriculture, etc. Have them color in the largest portion of their measuring cup in Worksheet #1 labeled "Salt Water" with the color red to represent salt water that cannot be used.

3. Pour 120ml of the liquid into the measuring cup to represent the 3% of fresh water that exists on the earth. Ask students to notice how little the amount is in comparison to the rest of the liquid left in the liters.
4. Out of the cup of liquid you just poured explain to students that 2.2% of Earth's water is locked up in glaciers and unavailable for use, and less than 1% (only 0.8%) of it is actually available for everyday use from rivers and lakes. Pour 88ml from the cup into the ice cube tray to signify that it is frozen water. Have students color in the second largest portion of the measuring cup labeled "Fresh Water in Glaciers" with the color green.
5. Therefore, there should be about 32ml of the liquid left in the measuring cup. Explain to students that the small amount left in the measuring cup represents the only fresh water available to humans out of all of Earth's water, and we have to share this amount with people all over the world. To represent this amount on their worksheet, have students fill in the remaining small top section of the measuring cup labeled "Fresh Water that Humans Can Use" with the color blue.
6. To test students' understanding, have them draw a big X over the portion of water in their measuring cup that cannot be used by humans (i.e. over the red and green sections).

Activity Two: Discussion and Reaction

1. Tell students that the remaining water in the measuring cup is a representation of the amount of water available for human use out of earth's total water supply. Ask students to look at their worksheets and compare the amount of liquid left in the measuring cup to the amount in the liters of liquid. Lead a discussion on their reaction. Was the amount more than they thought? Less?
2. To get students thinking about how everyone on Earth shares the same small amount of fresh water, have them tell you other animals, plants, and people that use fresh water too and write it down on the chalkboard for them to see. Also ask students to consider what else water is used for besides personal use (agriculture, plumbing, industry, etc.)

Wrap Up: Conserving Water

1. Talk with students about how important it is not to waste water because, as they have seen, there is a limited amount available for everyone on the Earth to use. Ask if they have any ideas on how they could conserve water in their house (take shorter showers, turn off the sink while brushing your teeth, etc.), and encourage them to go home and teach their families how to conserve water in their house.

Extension: Finding Water on a Map

1. Use a map or globe to show students where salt water, fresh water, and frozen water are found on the Earth. Have students point out the oceans and major lakes and rivers in your area. Also have students talk about all the other places on Earth where people live and use water, and have them point out continents and countries on the map.

CONCLUSION

After completion of this lesson, students should have a better understanding of the scarcity of water, why water is so important, and how a small amount is shared with everyone around the globe. They will brainstorm ways in which they can conserve water in their own homes, and think of ways to share what they learned with their family.

How Much Water Can We Use?

Name _____

This measuring cup represents all of the water on Earth. Color the Salt Water **RED**. Color the Frozen Water **GREEN**. Color the Available Fresh Water **BLUE**. When you are done, put an **X** through the water that **cannot** be used by humans.

