Water Conservation Teacher Guide

Lesson Overview:

This activity was developed to get students thinking about the many ways that people use freshwater, and how we can conserve this precious and fundamental natural resource. In this one-hour-long activity, students will watch a short documentary describing issues related to clean water availability, analyze water-use data and start to think about how they consume and can conserve water. This background knowledge will lead to students collecting data about their own water use and finding areas in their lives to conserve water.

Learning Objectives:

- Analyze freshwater usage data to describe ways humans use water
- Explain why it is important to conserve freshwater
- List ways we can conserve freshwater resources

National Standards:

- *Core Idea ESS2.C: The Roles of Water in Earth's Surface Processes*
  Water continuously cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, and crystallization, and precipitation, as well as downhill flows on land.
  - MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [*Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.*]
- *Core Idea ESS3.A: Natural Resources*
  Humans depend on Earth's land, ocean, atmosphere and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.
  - MS- ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

Background Information:

Water is fundamental to life on Earth. Knowing where and how much rain or snow falls globally is vital to understanding how weather and climate impact both our environment and Earth's water and energy cycles, including effects on agriculture, fresh water availability and responses to natural disasters. The Global Precipitation Measurement (GPM) mission, launching in 2014, will help scientist to better understand how much rain and snow falls around the world.

Most of the freshwater we use is from surface sources (such as rivers and lakes), and those bodies of water are replenished by rain. Although the Earth's surface has more than 70 percent water, only about 3 percent is fresh water and less than 1 percent is available for consumption. Therefore, freshwater is a scarce and valuable resource. Humans use it for almost everything – agriculture, power generation, and personal needs. In the United States, we often take it for granted that we can turn on the faucet and have easy access to safe, clean water. However, many people in the world are not so lucky. Conserving our freshwater resources and monitoring our freshwater distribution are becoming very important issues.

Materials:

Copies of "Water Conservation" Student capture sheets
Copies of the water diary http://www.thirteen.org/h2o/print/p_educators_lesson4_h2.html
Internet access for showing documentary
Copies of graphs cut for each group

Engage:

Ask students to list ways they use water. Share answers aloud and/or make a list on the board. (See PowerPoint) (Slide 2) Remind students that we use only freshwater. Most of the water on Earth is salt water. Discuss the difference between fresh and salt water, as well as the availability of each. (See background above and Earth's Water lesson for more details.)

Explore/Explain:

Part 1: Safe Water Documentary: Show the students the short documentary "Overview" from the safe drinking water website. Ask them to record answers to the questions as they watch. Review the answers as a class. http://www.drinking-water.org (Slide 3)

Part 2: Analyze the Data: Divide students into groups of 4. Give each group a graph of water-use data. Ask them to discuss the data with their group and record three facts they learned. Give each group a turn to share answers with the class. Ask the students what surprised them about the data (graphs are found at the end of the student capture sheet). (Slide 4)

Evaluate:

Ask the students to list ways they use water again. Has their list expanded or become more thoughtful? Then, ask them to list ways they can conserve water. This will lead into the extension activity which can be done as homework for a few weeks. (Slide 5)

Elaborate/Extend:
Give students the Water Diary from Planet H20 and ask them to complete it for one week. (http://www.thirteen.org/h2o/print/p_educators_lesson4_h2.html) After they have collected data for the week, have them share their results. Students can even make graphs to represent their data. (Slide 6)

After they have examined their own use, ask them to choose one or two things they will do to conserve water. Give them another copy of the water diary to complete for a week after pledging to reduce. Share results after that week. Were they successful? Will they continue it or hopefully add more ways to conserve water? How will they encourage their families to conserve water?

If you have more time, or want to give students something fun to do at home, www.discoverwater.org is an interactive website for students to learn more about water issues and ways they can conserve.

Watch the Sources and Distribution Documentaries on http://www.drinking-water.org

Teacher Notes:

This lesson should provide students with an overview of current freshwater issues on Earth. It is meant to make them aware of these issues and think about ways they can help. Then data collection on personal water use can go on as long as you would like and students can hopefully communicate the lesson to other friends and family members. Consider making it a challenge, pledge, or competition for your class to encourage as much participation as possible. A great prize would be a reusable water bottle!

Additional Resources:

- Helpful information, background, and resources about the GPM mission and Precipitation Education http://pmm.nasa.gov/education/
- GPM freshwater availability classroom lesson http://pmm.nasa.gov/education/lesson-plans/freshwater-availability-classroom-activity
- Penn State Water Lessons http://ecosystmes.psu.edu/youth/sftrc/lesson-plans/water/6-8
- Project WET http://www.projectwet.org/
- USGS information about water use in the United States http://water.usgs.gov/watuse/
- USGS Water Science School http://ga.water.usgs.gov/edu/
- EPA Water Sense Program http://www.epa.gov/watersense/