Every Drop Counts!

OVERVIEW

A series of water-related lessons beginning with a water trivia game and a short demonstration of how much of the Earth's water is available for human and other species' needs. The series includes a "water walk" and a personal water-use audit.

INQUIRY/CRITICAL THINKING QUESTIONS

- How much available fresh water exists worldwide?
- What are the causes and consequences of unequal water use around the world?
- How is water availability and use connected to other global issues?
- What can be done to conserve water resources and increase water availability?

OBJECTIVES

Students will:

- Understand that the world's fresh water supply is finite
- Understand what it might be like if they had to haul their own water daily
- Consider the global implications of fresh water use and discuss solutions to water scarcity

TIME REQUIRED: 1-2 hours

(depending on if you do all or part of the lessons)

KEY ISSUES/CONCEPTS

- **Water scarcity**
- **Water distribution and use**
- **Water conservation and productivity**

SUBJECT AREAS

- **Social Studies** (Geography, Global Studies, Contemporary World Problems)
- **Science** (Environmental, Earth)
- **Math**

NATIONAL STANDARDS CONSISTENCY

- **NCSS: 3, 7, 9**
- **NSES: A, C, D, F**

GRADE LEVEL: 5–12

FTF Related Reading

- Intermediate: Chapter 5 from *Global Issues and Sustainable Solutions*
- Advanced: Unit 3, Chapters 1, 2, and 3 from *It's All Connected*

Materials/Preparation

- Teacher Master, *Water Trivia*
- 1 gallon of water
- Clear, wide mouth container about the size of 1 pint (Optional: Add a drop of blue food coloring to the cup so that when you add the water it will be more visible from the back of the class)
- 1-cup measuring cup, tablespoon, and teaspoon
- Overhead: *Water Facts*
- Bucket of water or several gallon containers of water
- Handout: *Personal Water Use Audit*

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Activity

Introduction

1. Do a trivia game using the *Water Trivia* teacher master sheet. Ask students all or part of the trivia questions. If you want to set it up as a competition, see the directions for the *Global Issues Trivia* in the beginning of this book (page 26).
2. Have students brainstorm all the things they do or use that require water. Create a list on the board or overhead under the headings: Domestic, Agricultural, and Industrial.
3. Ask students if they know how much fresh water there is on the planet.
4. Tell them you are going to demonstrate how much fresh and available water there is on the planet.

Steps - Part 1

1. Show the class a gallon of water.
2. Take out 2.5 percent (3 tablespoons plus 1 teaspoon) and place it in a clear container to represent the amount of fresh water on Earth.
3. Of this amount, remove 70 percent (2 tablespoons) to represent the amount of water trapped in glaciers or too deep in the ground to realistically be recovered. The remainder – less than 1 percent of the Earth's total water supply – is left to support human needs for agriculture, drinking, and washing as well as for lakes, rivers, and fresh water ecosystems.
4. Conclude with the following reflection questions.

Assessment Reflection Questions - Part 1

For Intermediate and Advanced Students

- Given that there is a fixed amount of fresh water on the planet, what will happen to the distribution of water resources as global population grows?
- What happens when people do not have enough water to meet their basic needs?
- What happens when a fresh water resource is polluted? Why is it important to protect fresh water resources from pollution?
- What are some other purposes/uses of fresh water aside from human consumption?
- How can we reduce our personal water use?

For Advanced Students

- Does the greater use of water resources in developed countries (U.S., Canada, and Europe) affect the availability of water resources in water-scarce countries?
- How can water productivity (more crop per drop) be increased so that more water is available in areas that need it?

Activity

Steps - Part 2

1. Show and discuss the *Water Facts* overhead.
2. Create a scenario of a water-scarce country by having students walk around the classroom several times carrying a bucket (or gallon) of water (or have them go outside and carry the bucket around the track or playfield). You can do this activity with either 1 bucket and have 1 student at a time carry it, or use several gallon containers and have a number of students do the activity simultaneously.
3. Pass out and go over the *Personal Water Use Audit* worksheet with students so they can measure how much water they and their family uses.
4. Conclude with the following reflection questions.

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Assessment Reflection Questions - Part 2

For Intermediate and Advanced Students

- How hard was it to carry the bucket of water?
- How would your life be different if you had to walk 3 hours every day for your water?
- What would life be like if you didn't have a safe, adequate water supply?

For Advanced Students

- Have you ever known anyone who had a water-related illness? Why aren't water-related illnesses very common in the developed world?
- Can water rich countries help provide water resources to water poor countries? How?
- Why do people in the developing world spend such a large percentage of their income on water?
- How is water availability and use connected to other global issues? (food production, health, environment, global warming, poverty, etc.)

Lesson Extensions

- Have the class determine and diagram the source of their community's fresh water. Graph the available limits of the community's water resources over the period of an average year. Predict events or circumstances that could negatively affect the availability of the community's drinking water. What would the impact be if the community water source ran dry? Brainstorm ways in which the community could reduce its fresh water consumption.
- Have students brainstorm a sustainable management plan for a watershed containing farmland, forest resources, salmon spawning streams, and other wildlife habitat. They should attempt to preserve each of the elements listed, while providing for economic and recreational opportunities for the area's human population.

Writing Connection

- Have students write a story as if they were a drop of water moving through the hydrologic cycle. They should describe what they see, hear, smell, taste, etc.

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Technology Connection

- Have students research water use issues in a specific country including use, quality, conservation, and productivity measures and then prepare a PowerPoint presentation for the class based on the research and findings.

Action Projects

- Do a service learning project that helps WaterPartners International bring safe, accessible drinking water to those who do not have it. To learn more go to **www.facingthefuture.org**, click on **Take Action,** then click on **Service Learning Projects.**
- Collect and share data on your local rivers, lakes, and estuaries by contacting a local water quality monitoring agency or becoming part of a global initiative called "World Water Monitoring Day": **www.worldwatermonitoringday.org**.
- Let your neighbors know how natural waterways and marine species can be harmed by storm water runoff. You can help by labeling storm drains in the neighborhood around your school or home. By painting a warning next to a street's storm drain, you will educate others about where street waste flows – into local natural waterways. Stencils and information on labeling are usually available through local utility companies or other local entities.
- Organize a river or beach clean-up in your neighborhood.
- Visit **www.facingthefuture.org** and click on **Take Action**, then **Fast Facts Quick Actions** for more information and action opportunities related to water issues.

Additional Resources

Films

- *Environmental Ethics: Examining Your Connection to the Environment and Your Community,* The Video Project, 2005, 62 minutes, **www.videoproject.com**. This documentary profiles a diverse group of courageous Goldman Environmental Prize winners who have made it their duty to protect their local environments. Download an accompanying study guide at **www.envethics.org**.

Books

- *Water: The Fate of Our Most Precious Resource*, Marq de Villiers, Mariner Books, 2001. An eye-opening account of how global population growth, unchecked development, and cross-border struggles are stressing and depleting the world's fresh water supply.

Websites

- **www.water.org** – Water Partners International is committed to providing clean drinking water to communities in developing countries. Working in partnership with donors and those in need of safe water, they have helped thousands of people develop accessible, sustainable, community-level water supplies.
- **www.unep.org** – The Food and Agriculture Organization of the United Nations leads international efforts to defeat hunger, serving both developed and developing countries.

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Water Trivia

1. What percent of the Earth's water is available for people to use?

   a. less than 1%; b. 5%; c. 10%; d. 20%

2. What percentage of people in the world lack access to safe drinking water? [1]

   a.15%; b. 25%; c. 35%; d. 45% (or 1.5 billion people)

3. What is the total amount of water (in gallons) consumed per day by the average person in the U.S.? [2]

   a. 55; b.150; c.750; d.1,300

4. About how many gallons/day are needed to sustain life (including the minimum water needed to produce the food we consume)? [3]

   a. 5; b. 13; c. 21; d. 33

5. What percentage of the adult human body is comprised of water? [4]

   a. 10%; b. 20%; c. 50-65%; d. 75-80%

6. What activity accounts for the highest water use worldwide - agriculture, industry, or domestic?[1]

   agriculture accounts for about 65-70% of water use; industry for about 20-25%; and domestic for about 13%

7. What is a proven technology or practice that can decrease agricultural water use?

   drip irrigation, planting low water use crops

8. What are other uses and benefits of fresh water aside from human consumption?

   stream flow, provides animal and plant nutrients and habitat, wetland filtration, recreation

9. What percent of his/her income does the average U.S. citizen spend on drinking water? [2]

   a. 0.5%; b. 2%; c. 10%; d. 25%

10. What percent of his/her income does the average Honduran living in the slums of that country's capital city spend on drinking water?[2]

    a. 0.5%; b. 2%; c. 10%; d. 25%

11. Approximately how many people in developing countries die each year from water-related disease?[2]

    a. 100; b. 1,000; c. 10,000; d. 10,000,000 (over 25,000 people every day!)

12. How many gallons of water does it take to produce 1 pound of corn?

    a. 68; b. 168; c. 568; d. 1268

13. How much water does it take to produce 1 pound a beef?[4]

    a. 40; b. 400; c. 4,000; d. 40,000

14. What are 2 things you can do personally to reduce your water use?

    turn off the water when brushing teeth, plant drought tolerant landscaping, reduce meat consumption

15. What is one benefit of a dam?

    produce hydroelectricity, prevent flooding, control water storage; make navigation easier

16. What is one negative impact of a dam?[6]

    impede the flow of soil nutrients, impede fish migration, flood rivers upstream

17. Name 3 sources of fresh water.[6]

    melting snow, aquifers, groundwater, rainwater, icebergs, desalinization of salt water

1 United Nations Environment Program www.unep.org
2 Water Partners International www.water.org
3 World Meteorological Organization
4 Mad Sci Network www.madsci.org
5 Environmental Protection Agency http://www.epa.gov/OGWDW/kids/games.html
6 American Forum for Global Education www.globaled.org

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Lesson 16 Overhead:

Water Facts

- Every day more than 1 billion people make a 3-hour journey on foot just to collect water.

- More than 1.2 billion people (25% of the world's total population) do not have access to a safe and adequate water supply.

- 14,000 people die every day from water-related illnesses. This includes diseases transmitted via water such as giardia and dysentery, from lack of water (dehydration), and from parasites that breed in water (e.g. malaria).

- An average U.S. citizen will spend 0.5% of his/her annual income on water; while a citizen of Honduras will spend 25% of his/her annual income on water.

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Personal Water Use Audit

Keep track of how many times you do each activity in 1 day. Keep a running tally throughout the day and then calculate your total times and gallons used at the end of the day.

Activity	Tally times doing activity	Total number	Estimated Water Use (multiply total number by the amount listed to get total gallons)
Washed hands			0.1 gallons =_____gallons
Showered (regular showerhead)			30 gallons =_____gallons
Showered (low-flow showerhead)			15 gallons =_____gallons
Tub bath			20 gallons =_____gallons
Brushed teeth			0.2 gallons =_____gallons
Drank a glass of water			0.008 gallons =_____gallons
Boiled pot of water for cooking			0.25 gallons =_____gallons
Flushed toilet (conventional toilet)			5 gallons =_____gallons
Flushed toilet (ultra-low flush toilet)			1.6 gallons =_____gallons
Washed a load of dishes in dishwasher			15 gallons =_____gallons
Washed a load of dishes in sink (not running the tap)			10 gallons =_____gallons
Washed load of laundry in conventional machine			40 gallons =_____gallons
Washed load of laundry in high efficiency washer			25 gallons =_____gallons
Washed a car			15 gallons =_____gallons
Other activity:			
Other activity:			
Other activity:			
Total daily gallons			

Adapted from WaterPartners International "Tap Tally Sheet" (http://water.org/assets/PDF/ODsplishsplash.pdf)