Common Water

What do you, your parents, your neighbors, a plant in your home, a squirrel in the park and your classmates have in common?

Grade Level
Pre-K through 2, Middle School

Subject Areas
Environmental Science, History

Duration
Preparation time: 50 minutes
Activity time: 50 minutes

Setting
Outdoors or an area with non-slippery floors, such as cement. (This activity may involve large quantities of spilled water.)

Skills
Analyzing information; Applying learned information (problem solving)

Charting the Course
Students can be introduced to various water users in "Water Footprint" before participating in "Common Water." In "Pass the Jug," students are made aware of water rights policies for sharing water resources. In "Sum of the Parts," students recognize water quality issues related to water users sharing a single resource. In "8-4-1, One for All," students appreciate the skills needed by water users sharing a river.

Vocabulary
conservation, water quality, finite resource, reusable resource, wastewater treatment plant, water quality control laws, ground water, runoff, watershed

Summary

Students analyze the results of a simulation to understand that water is a shared resource and is managed.

Objectives

Students will:

- illustrate how multiple users of water resources can affect water quality and quantity.
- examine the complexities of providing water for all water users.

Materials

Warm Up

- *The Yellow Pages of a local phone book or the Internet.*

The Activity

- *A large bucket* (The bucket should hold several gallons of water. The amount of water in the bucket should be visibly reduced when five full sponges of water are removed.)
- *Containers* (Bowls or milk cartons with the tops cut off, one for each student.)
- *17 large household sponges* (Cut three of the sponges into fourths; five into thirds; five into halves; and leave the last four whole. Increase or decrease the number of sponges to fit the number of students. Pieces of absorbent terry cloth can be substituted.)
- *Various colors of food coloring or washable paints* (Put several drops of food coloring of any color on all the sponges and sponge pieces.)
- *Markers*
- *Poster board*

Pre-K through 2

- *Water User Finger Puppets*
- *3 sponges*
- *2 large basins*

Making Connections

Students should be aware that every living thing on Earth uses water and that water is a finite though renewable resource. They know how their family members use water and they may have learned how industries and farms use water. In the news, they read about problems with water quality and quantity. This activity helps students recognize that it is vital for water users to consider each other's needs and to share this finite resource.

Background

Many of us have experienced standing up in a large crowd to watch a performer or speaker on stage. Often, to get a better view, someone will sit on the shoulders of a friend. How does this make people standing behind the couple feel? Sometimes what works for the individual may not work for the group.

Water is used by all members of a community. Because water is important to all water users, as demands for this finite resource grow, the need to conserve and manage supplies also grows.

Fortunately, water is a reusable resource. Given time, biological (e.g., filtering through soil and vegetation) and physical (e.g., rain, settling out of sediments) processes in healthy ecosystems improve water quality and quantity. Wastewater treatment plants facilitate these processes as well.

Since the enactment of water quality control laws, especially the 1972 Clean Water Act, many rivers and lakes are cleaner than they were in the 1960s. There is good news regarding water quantity, as well. Farmers throughout the country have reduced ground water consumption through efficient water use practices (e.g., planting crops that require less water, adopting irrigation methods that use less water, capturing and reusing runoff).

Conservation and practical use of water can be employed by water users (e.g., homeowners, businesses, industry) to prevent water shortages and ensure long-term supplies. If sharers of a water source consider the needs of all water users, and plan for and manage those needs, then water of sufficient quality and quantity should be available. We can all make a difference!

Procedure

Warm Up

- Have students list major water user groups in their community and how they use water. The Yellow Pages or Internet can be a source of ideas.
- Ask students to arrange the water users, from those who they think use the most water to those who use the least.

Round Scenarios

Following are four suggested rounds to symbolize use of a common source of water over time. The relationship of the rounds and the allotment of sponges are shown in the chart *Suggested Distribution of Sponges for the Rounds*. Depending on time considerations or extent of investigation, rounds can be added or deleted.

Round 1.

It is 200 years ago. The watershed is inhabited by a few homesteaders operating small farms. Have three students represent the homesteaders. Give each of them one-fourth of a sponge and a container.

Round 2.

One hundred years have passed. A large farm and a small town are now located in the watershed. Distribute sponges, cut in fourths, to six students (town dwellers) and a half sponge to a student representing the farm. Provide each student with a container. Complete another round.

Round 3.

It is now just after World War II. The size of the town has increased. Many of the town residents are employed in an industry that makes typewriters. The factory is represented by half a sponge. Two farming areas supply milk and some food (meat, grains, vegetables) for the town; they get one sponge each. Give one sponge to a student who represents a power company. Several community services, such as hospitals, schools and stores, are now part of the town; each student representing such a service agency gets half a sponge. Provide each family (about 10 students) with a third of a sponge. Provide each student with a container. Complete a round.

Round 4.

It is the present. The town has continued to grow. A new industry that makes household cleaning products has moved in (another sponge). Represent residential expansion by giving sponge pieces and a container to any remaining students. Complete a round.

The Activity

NOTE: This activity may involve spilled water and should be conducted outdoors or in an area that can get wet.

1. **Fill a large bucket to the brim with water. Tell students that the bucket represents water stored in a reservoir, pond or lake.** Some communities depend on ground water. If this is the case, the bucket represents water underground (and the sponges symbolize wells).
2. **Tell students they are going to simulate changes in a watershed over several time periods. Each 30-second round represents a time period (see *Round Scenarios*).** In each round, students represent different water users; they may want to make nametags to identify their roles.
3. **For each round, students should position themselves an equal distance from the water source. When the round starts, students fill their sponges with water from the reservoir (bucket). To represent water consumption, have them squeeze water out of the sponges into individual containers. Students can refill their sponges as often as they like during the round.**
4. **At the end of each round, note how much water remains in the bucket. Tell students to empty half of the water from their containers back into the bucket.** This represents used water that makes it back to the reservoir (i.e., when it percolates through soil, when it is discharged from a factory, after it runs off the surface). Students will notice that the water is colored. Inform them this represents sewage and runoff from urban and rural areas.
5. **Record students' comments about the amount of water used and the amount of waste materials generated; compare after each round. To represent the water source eventually cleaning and replenishing itself over time, fill the bucket to the brim with clean water before each round.**

Wrap Up

- Have students discuss the quantity and quality of water in the round. Discuss proportions of sponge pieces distributed to different community members. Are water users in their own community represented by the characters in the simulation? Do students think the sponge sizes were appropriate? Were there any groups who used too much water or did not get enough?
- Schools were a service agency in the demonstration. Have students identify the different ways their school uses water. Do students think the school uses water wisely?
- How could the activity be adjusted to ensure enough clean water for all users? Students may suggest making fewer trips to soak their sponges or reducing the size of their sponges. They may suggest adding another bucket of water to increase supply. Where would this water come from? Would another community experience water shortage as a result of these diversion projects?

Suggested Distribution of Sponges for the Rounds

	1/4 SPONGE	1/3 SPONGE	1/2 SPONGE	WHOLE SPONGE
Round 1 (200 years ago)	3 students (homesteaders)			
Round 2 (early 1900s)	6 students (residents of small town)		1 student (large farm)	
Round 3 (after WW II)		10 students (residents of town)	1 student (factory) 3 students	2 students (farms) 1 student (power company)
Round 4 (present)	3 students (town residents)	15 students (town residents)	1 student (factory) 4 students (service agencies)	2 students (farms) 1 student (power company) 1 student (industry)

Methods to reduce waste discharge can also be discussed (e.g., using organic fertilizers, reducing litter, upgrading sewage treatment plants).

- Have students interview local water managers to identify water distribution policies and conservation programs. Students may want to run another round to test their adjustments.
- Discuss the statement: "Water for all water users." Do students think this is possible? What can communities do to ensure everyone gets enough clean water?
- Students can create a display or mural, titled *Water for all Water Users*, depicting ways a community shares its water supply. If water quality or quantity is an issue in the community, students can research what the community is doing or should do to maintain clean water supplies. These actions should be included in the display as well.

Project WET Reading Corner

Books

Calhoun, Yael. 2007. *Water in the News*. New York, NY: Chelsea House.

This book goes beyond current events and water to the science of the global problems we face when dealing with water issues.

Coombs, Karen Mueller. 1995. *Flush!: Treating Wastewater*. Minneapolis, MN: Carolrhoda.

After flushing, follow the wastewater as it travels to a facility where it is cleaned and returned to the environment.

Fix, Alexandra. 2007. *Water*. Chicago, IL: Heinemann Library.+

Learn how to conserve water with easy and fun ways to use less.

Geisel, Theodore (Dr. Seuss). 1971. *The Lorax*. New York, NY: Random House Publishing Company.

For all ages, this fable speaks to environmental change caused by irresponsible industrialization.

Hollyer, Beatrice. 2009. *Our World of Water*. New York, NY: Henry Holt and Company.

Meet six families on four continents and learn the ways these families and their communities use and share water.

Olien, Rebecca. 2005. *Making Water Clean*. Makato, MN: Capstone Press.+

Learn how water is drawn from a source and made clean enough for drinking.

Olien, Rebecca. 2005. *Sources of Water*. Makato, MN: Capstone Press.+

Learn the interesting and strange places that water can be found on Earth.

Project WET Foundation. 2001. *Healthy Water, Healthy People*. Bozeman, MT: Project WET Foundation.+

Learn about the connection between good water and good health through this illustrated activity booklet.

Spilsbury, Richard. 2009. *Managing Water*. Chicago, IL: Heinemann Library.

Examine water from the molecular level through its importance in biological processes and why this resource is finite.

DVDs

When the Water Tap Runs Dry. DVD. Directed by Ron Meyer. New York, NY: Ambrose Video Publishing, Inc. 2009.

A 40-minute video on how climate change will impact water availability and not just global temperatures.

+Reading materials for Pre-K through 2 Option.

Assessment

Have students:

- demonstrate scenarios in which water quality and quantity are threatened when water users use the resource without considering the needs of others (steps 3-5).
- propose and illustrate ways a community could supply its members with clean and ample water supplies (***Wrap Up***).

Extensions

Have students list groups of water users in the community. Explain that a water shortage exists. Working in groups, tell students they must determine who has rights to use water first and how much water each group can use. Are students able to determine which group most deserves water? Remind students that communities, like ecosystems, are interconnected and interdependent. For example, if students believe an industry uses too much water and should limit consumption, determine if production may need to be reduced. This would entail laying off workers, which will affect families. Some farms use large quantities of water, yet they supply people with large quantities of inexpensive food. Solutions to limited water supplies involve individual and group cooperative efforts, with everyone conserving water and using water efficiently.

Pre-K through 2 Activity Objectives

Students will:

- learn that all living things need water.
- understand that water users must cooperate to ensure that everyone has enough water.

Warm Up

- Have students discuss who uses water and for what (e.g., drinking, irrigation, energy, home use). Emphasize that every living creature requires water to live.
- Ask students how they use water in their everyday lives.

The Activity

1. **Using a simple story based on the rounds described in the activity (sample story below) and the finger puppets provided on the student copy page, tell a story and allow students to illustrate portions with the puppets.** You will need three sponges (large, medium, small) and two large basins (one filled with water). In the sample story, the words in italics are spoken and the words in parentheses are directions.
2. **Discuss how a water shortage might affect the people in the story. What changes could be made to keep more water in the lake?** Help students understand the needs and interdependencies of the different water users in the story (e.g., the farmer needs large quantities of water to produce food for the people; water is used by factories to manufacture products, such as cars and dishwashers).
3. **Place several basins and sponges at a learning center or a water table. Allow students time to create their own stories.**

Wrap Up

- Have students share their water stories with a partner or group.
- Discuss the stories and how they relate to the idea of "water for all water users."

Teacher Resources

Books

The Watercourse and Project WET Foundation. 2003. *Healthy Water Healthy People, Water Quality Educators Guide.* Bozeman, MT: The Watercourse.

Journals

Araya, Yoseph Negusse and Edward H. Moyer. 2006. "Global Public Water Education: The World Water Monitoring Day Experience." *Applied Environmental Education and Communication*, 5 (4), 263-267.

Church, Ellen Booth. 2006. "Keep the Ideas Flowing at Your Water Table! Ideas to Help Children Get to Know H-2-O." *Early Childhood Today*, 20 (4), 4.

Hall, Randy. 2008. "Science Sampler: Water-use Awareness." *Science Scope*, 31 (7), 62-66.

Heinhorst, Sabine and Gordon Cannon. 2004. Nature: "Water, Water, Everywhere, nor Any Drop to Drink." *Journal of Chemical Education*, 81 (2), 170-171.

Jahrling, Peter. 2007. "Water Ways." *American School & University*, 79 (11), 32-36.

Marcello, Jody Smothers. 2007. "When the Rivers Run Dry." *Geography Teacher*, 4 (1), 18-19.

Solis, Patricia. 2005. "Water as Rural Heritage: Reworking Modernity through Resource Conflict in Edwards County, Kansas." *Journal of Rural Studies*, 21 (1), 55-66.

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Once there was a lake. (Show basin of water.) *Some animals lived near the lake and drank from it everyday.* (Use the small sponge and collect a few sponges full of water, transferring the water to a different basin that is out of sight. Discuss how animal use of the lake barely affects the level of water.) *Some years later, people began to move into the area*. (Ask students how they use water; use the medium-sized sponge and remove one sponge full of water as you name each water use in the next sentence—include student suggestions.) *Like you, these people drank water, washed, watered their plants, etc. Everyone used as much water as he or she wanted, without thinking about other people's needs. The people thought there would be plenty of water because even though they took water away from the lake, the rain would eventually bring the level of the water back up.* (Pour some water back into the basin.) *People kept moving into the area; large farms and factories were built.* (Use the largest sponge and take out water until the basin is almost empty.) *After several years, people noticed that, despite the rain, the level of the lake was going down.* (Show students the water level.)