

Title:	Waste Not, Want Not
Source:	The Water Sourcebook Series, U.S. Environmental Protection Agency
Subject(s):	Math, Science, Social Studies
Grade(s):	3-5
Objectives:	In the activity, students will simulate the uses and conservation of water, list 3 to 5 ways to conserve water, and recognize wasteful uses of water in their own environments.
Summary:	The activity begins with a class brainstorming activity of ways that water is used. Students will then be divided into two groups with different water needs. Groups are given “water use cards” that describe various water-using activities. Both groups will start out with the same amount of water and will then measure the amount of water left after the activity. Students will compare the different water use behaviors in each group. The students will then discuss ways to conserve water in their own lives and complete the “Water Conservation Quiz.” As an extension activity, students can act as Water Use Detectives by trying to find as many ways as possible that the school could improve water conservation. Students should then categorize the water uses and write a letter to the local newspaper explaining their concerns.
Modification:	Use a large beaker with volume marks or mark the gallon jugs with volumes prior to beginning the activity in order to incorporate volume measurements into the activity. Have students visit the Water House at conserveh2o.org and learn about ways to conserve water at home.
Standards:	M3N2. Students will further develop their skills of addition and subtraction and apply them in problem solving. M3P4. M4P4. M5P4. Students will make connections among mathematical ideas and to other disciplines. S3CS2. S4CS2. S5CS2. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations. S3L2. Students will recognize the effects of pollution and humans on the environment. SS3E1. The student will describe the four types of productive resources. S4E3. Students will differentiate between the states of water and how they relate to the water cycle and weather. M5M3. Students will measure capacity with appropriately chosen units and tools.

WASTE NOT, WANT NOT

OBJECTIVES

The student will do the following::

1. Simulate the uses and conservation of water.
2. List 3 to 5 ways to conserve water.
3. Recognize wasteful uses of water in their own environments.

BACKGROUND INFORMATION

At this very second, somewhere on the earth, water is falling as snow, rain or sleet. Nature provides us with so much water that if all the mountains and hills were leveled, water would completely cover the earth to a depth of nearly 2 miles (3.2 km). Despite this abundance, water does not fall evenly over the earth's surface. Where precipitation supplies too little water, the result can be desolation. Organisms in a dry environment must be specially adapted to minimize their need for water. Liquid water is the most important single substance for life on earth. Some bacteria live without oxygen, but all known life forms require water.

Water makes up more than 70 percent of all living things. It is found in almost everything we see and touch. The use of water is required by almost every kind of economic activity. It is indispensable to our lives. Water is a natural resource that must be used wisely.

Term

conservation: the act of keeping, protecting, or preserving our natural resources.

ADVANCE PREPARATION

- A. Prepare ahead of time by bringing two 2-gallon buckets (or similar containers). Label one "Water Supply" and one "Water Used." Fill the bucket labeled "Water Supply" with water.
- B. Duplicate and cut out the water use number and letter cards (teacher sheets).
- C. Make photocopies of the water conservation quiz (one per student).

SUBJECTS:

Math, Ecology, Science, Language Arts, Conservation

TIME:

45-90 minutes

MATERIALS:

two 2-gallon (8 L) buckets
2 measuring cups
"Water Use" cards (included)
student sheets (included)
teacher sheet (included)
ruler
scissors
glue
crayons or markers
heavy construction paper
brass paper fasteners

PROCEDURE

I. Setting the stage

- A. Have the students discuss all the various ways they use water in a single day.
 - 1. List them on the board and encourage them to include ways that water is used indirectly (e.g., farming, manufacturing, food processing).
 - 2. Categorize the list by having the students decide if the usage is play, work, or home.
- B. Assign two students to special positions: one will be a recorder and the other will measure the amount of water used (this person will be the "Quantity Control Officer").
- C. Show the students the bucket labeled "Water Supply." Measure the depth of water in the bucket with a ruler and have the "recorder" write the results on the board. Tell the students that the bucket labeled "Water Supply" represents the amount of fresh water allowed per day for the group.
- D. Explain that in this simulation, there will be a Group 1 and a Group 2. (NOTE: This simulation is designed for 24 students. The number of participants can be varied as needed. Make sure there is an equal number of conserver and nonconserver cards.)

II. Activity

- A. Divide the class into 2 groups.
- B. Pass out the "Water Use Number Cards" to Group 1 and the "Water Use Letter Cards" to Group 2. Explain that these cards represent how much water each person will use in a day.
 - 1. Begin with Group 1.
 - 2. As each student reads his demand on the water supply aloud, the "Quantity Control Officer" should remove that amount of water from the water supply bucket and place it in the bucket labeled "Water Used."
 - 3. Ask the student who has card number 1 to read his/her demand and the amount of water needed. Continue with subsequent numbers.
 - 4. This process should continue until all the number cards are used.
- C. Measure the depth of water left in the "Water Supply" bucket. Have the recorder write the results on the board.
- D. Subtract the amount of water left from the starting amount. Record the difference for Group 1.
- E. Repeat the process for Group 2, beginning with the same amount of water as before. (NOTE: If none of the water has been spilled, dumping the used water back into the first bucket should be equal to the same amount.)
 - 1. Ask the student who has card A to read his/her demand and the amount of water needed. Continue with subsequent letters.

2. This process should continue until all the letter cards in the group are used.
- F. Measure the amount of water left in the "Water Supply" bucket and record as before.
- G. Subtract the amount of water left from the starting amount. Record the difference for Group 2.
- H. Discuss the noticeable difference between the amounts left and have the students formulate explanations.
- I. Interject the "Water Trivia" teacher sheet; share selected facts with the students.

III. Follow-Up

- A. Have the students state the difference in the groups; they should notice how one group carefully used its water supply and the other used it without concern for the amount available.
- B. Help the students explain the differences in behaviors in the water use by each group.
- C. Ask the students how group 1 could have conserved more.
- D. What things do the students do that could conserve water in their daily uses?
- E. Have the students list 3 to 5 ways to conserve water.
- F. Have the students complete the student sheet, "Water Conservation Quiz." (Answers: 1.W, 2.W, 3.W, 4.S, 5.S, 6.S, 7.S, 8.S, 9.W, 10.W)

IV. Extensions

- A. Give the students copies of the "Water Use Detective Badge and Citation" student sheet. Have them color and cut out the badge; they can pin or tape it to their shirts. Have the students become "Water Use Detectives" by finding as many ways as possible the school wastes water. Make a list of their findings and suggested solutions on the citation. Post these lists or send them to the principal.
- B. Have the students complete a checklist of conservation improvements and practices in their individual homes as a homework assignment.
- C. Have the students categorize the teacher sheet information (trivia) and student water use suggestions as to whether they are home, work, or play uses. Design circle, bar, or line graphs to show the results.
- D. Have the students write a letter to the local newspaper explaining their concerns to the public.

RESOURCES

"The ABC's of Water Conservation," Channing L. Bete Company, New York, 1981.

Burch, Sandra K., "Be Water-Wise," Virginia Water Resource Center, Blacksburg, Virginia, 1983.

Leopold, L. and W. Langhein, A Primer On Water, U.S. Government Printing Office, Washington, DC, 1960.

"The Story of Drinking Water: Teacher's Guide Primary Level," American Water Works Association, Denver, Colorado, 1984.

WATER USE NUMBER CARDS

Group 1

#1 I have been working in the sun and am very thirsty. I would like some cold water to drink. 1 CUP (250 mL)	#2 I have been playing basketball and need to take a bath. 3 CUPS (750 mL)
#3 Mom asked me to wash the breakfast dishes, so I put them in the dishwasher and turned it on. 2 CUPS (500 mL)	#4 Mom said my tennis shoes need cleaning, so I ran them through the washing machine. 2 CUPS (500 mL)
#5 Since it's so hot outside, I want to fill up the wading pool. 2 CUPS (500 mL)	#6 It is time for lunch and I need to wash my hands with the faucet running. 1 CUP (250 mL)
#7 Mom wants me to wash her car tonight. 2 CUPS (500 mL)	#8 Flush the toilet, please. 1 CUP (250 mL)
#9 Dad and I are growing a garden. Since plants need water, turn the sprinkler on, please. 2 CUPS (500 mL)	#10 I just ate an ice cream cone. I need to brush my teeth with the faucet running. 1 CUP (250 mL)
#11 Our grass needs water to grow every day. 1 CUP (250 mL)	#12 I noticed the faucet leaking but it's nothing more than a drip. 1 CUP (250 mL)

WATER USE LETTER CARDS

Group 2

<p>A. I have been working in the sun and am very thirsty. There is a cold bottle of water in the refrigerator. 1/2 CUP (125 mL)</p>	<p>B. I have been playing basketball and I need to take a short 5-minute shower. 1/2 CUP (125 mL)</p>
<p>C. Mom asked me to wash the breakfast dishes. I will wait until our dishwasher is full. 1/2 CUP (125 mL)</p>	<p>D. Mom said my tennis shoes need cleaning. I'll run them in the washing machine when it is full of old towels or cleaning rags. 1 CUP (250 mL)</p>
<p>E. Since it is so hot outside, I want to fill the wading pool, but I don't need to fill it to the top. 1 CUP (250 mL)</p>	<p>F. It is time for lunch and I need to wash my hands. I'll just fill the sink halfway and not run the faucet. 1 / 2 C U P (1 2 5 m L)</p>
<p>G. Mom wants me to wash her car, so I'll use the water I saved from the kitchen and bathroom sinks instead of letting the water run down the drain. 0 CUPS (0 mL)</p>	<p>H. Please flush the toilet. There is a plastic bottle filled with stones in the tank. 1 CUP (250 mL)</p>
<p>I. Dad and I are growing a garden. We use a soaker hose and mulch the plants. I'll also use rainwater we have saved. 1/2 CUP (125 mL)</p>	<p>J. I just ate an ice cream cone. I need to brush my teeth. I never leave the water running. 1/2 CUP (125 mL)</p>
<p>K. Our grass needs water to grow, but not every day. We use a soaker hose. 1/2 CUP (125 mL)</p>	<p>L. I noticed the faucet leaking so I told my dad and he fixed it. 0 CUPS (0 mL)</p>

WATER TRIVIA

1. It takes 100,000 gallons (379,000 L) of water to manufacture one automobile.
2. 122 gallons (462 L) of water are needed to produce one loaf of bread.
3. It takes 50 glasses of water to grow 1 glass of orange juice.
4. 97 percent of all earth's water is salty; only 3 percent is fresh water.
5. $\frac{3}{4}$ of the earth's surface is covered with water.
6. A 20-minute shower uses 16-20 gallons (60-75 L) of water.
A 10-minute shower uses 8-10 gallons (30-38 L) of water.
A 5-minute shower uses 4-5 gallons (15-19 L) of water.
7. It takes 3 gallons (11 L) of water to flush a toilet.
8. It takes 30-40 gallons (115-150 L) of water for a tub bath.
9. 10 gallons (38 L) of water is required to hand wash dishes.
10. It takes 20-30 gallons (75-115 L) of water to run a washing machine.
11. The average American home uses an average of 293 gallons (1,110 L) of water a day.
12. It takes 2,500 gallons (9,500 L) of water to produce one pound (2.2 kg) of beef.

WATER CONSERVATION QUIZ

Saving or Wasting

Print an "S" on the line before an action that saves water. Print a "W" on the line before an action that wastes water.

- ___ 1. Take long showers.
- ___ 2. Fill the bathtub full.
- ___ 3. Delay fixing a leaky faucet.
- ___ 4. Fix a leaky toilet.
- ___ 5. Wash only full loads in the washing machine or dishwasher.
- ___ 6. Fill the bathtub 1/4 full.
- ___ 7. Turn off water while brushing teeth.
- ___ 8. Fix leaky faucet.
- ___ 9. Wash a few clothes every day.
- ___ 10. Let water run while brushing teeth.

Water Waste *CITATION*



Location of water waste _____

Description _____

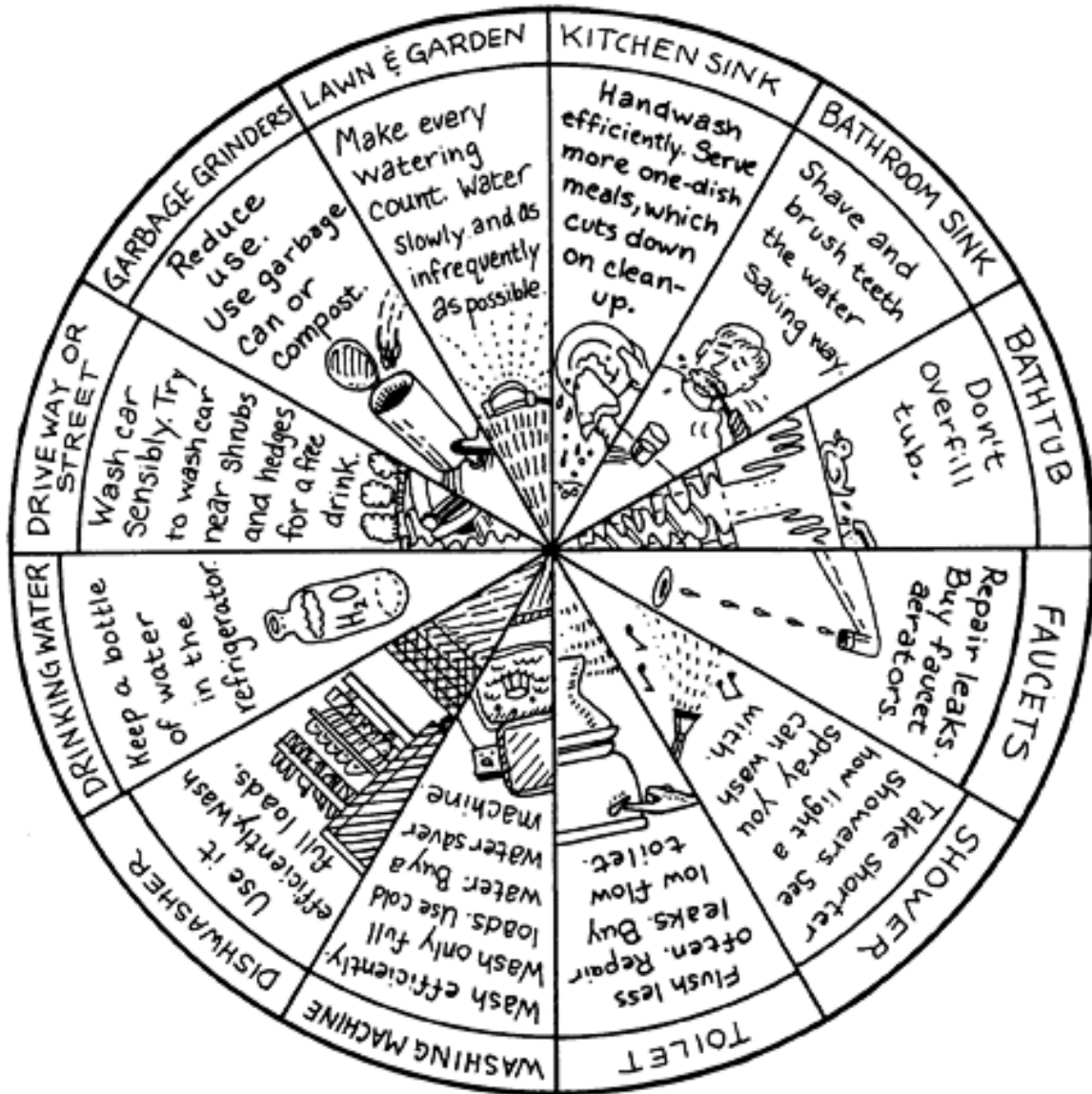
Suggested solution(s) _____

Issued by Officer _____ (name)

Date _____



MAKE A WATER CONSERVATION WHEEL!



MAKE A WATER CONSERVATION WHEEL!
(continued)

