

## UNIT 6 | PEOPLE AND RESOURCE USE

# EVERY DROP COUNTS

### METHOD

Students investigate how much water they use in their lives, both directly and indirectly.

### MATERIALS

#### Part 1:

- Gallon jug
- Sink
- Watch with second hand
- Calculators
- Student Worksheet

#### Part 2:

- None

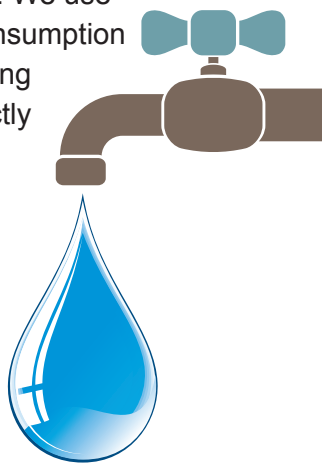
#### Measuring Learning

- Video camera (optional)

## INTRODUCTION

Water is absolutely necessary to our survival. We use water in some very obvious ways – direct consumption such as drinking, washing dishes, and brushing our teeth. But we also consume water indirectly and in ways that aren't so obvious, such as water for livestock or for growing crops.

Population growth over the past 30 years has caused the demand for water to double in about half the countries in the world. Residents of states with rapidly growing populations, such as Florida, Arizona, and California, as well as citizens of other countries, deal with this dilemma on a daily basis and often experience water shortages. In the following activity, students will gain an appreciation for the ways we use water and the need to conserve it.



### CONCEPT

Water is a finite resource that is necessary to all living creatures. For the survival of every species, including our own, preservation of water is crucial.

### GRADE LEVEL

Upper elementary

### SUBJECTS

Science, Math, Social Studies, Art

### OBJECTIVES

Students will be able to:

- Measure the amount of water they use on a daily basis.
- Analyze their water use, both directly and indirectly.
- Identify ways they can save water in their daily lives.

### SKILLS

Estimating, collecting and analyzing data, public speaking/reporting

# PART 1: DIRECT WATER USE

## PROCEDURE

1. Pose the question, “What are some of the different ways we use water on a daily or regular basis?” Write students’ answers on the board as they are offered. (*Possible answers: bathing, drinking, cooking (especially boiling things like eggs or pasta), washing dishes, washing clothes, watering the lawn, filling swimming pools, etc.*)
2. Ask, “How long do you think it takes to fill a gallon jug from the faucet at full power?” Record these answers on the board.
3. Select two volunteers from the class. Assign the first student the task of filling the gallon jug with water from the faucet. Assign the second student the task of timing how long it takes to fill the jug. Write this time on the board.
4. Distribute small pieces of paper and ask, “How many gallons of water do you think you and your family use in day? Write your name and estimate on this paper and then give it back to me.”
5. Distribute the Student Worksheet and have students fill in #1 based on what they witnessed in class.
6. Assign homework: “At home tonight and tomorrow morning while getting ready for school, whenever you or anyone else in your family is using water, time how long the water runs and write it down on your worksheet.”
7. When students return to class the next day, write the population totals for your city, state, and country on the board. (This information can be found at the U.S. Census Bureau website, [www.census.gov](http://www.census.gov) – a U.S. population clock is in the lower left on the main page; under Quick Facts you can search for your state and then city.) Instruct students to complete the “in class” portion of their worksheet.
8. Return to students their estimates from the day before and ask that they calculate the difference between their estimates and the actual amount of water they used.

## DISCUSSION QUESTIONS

1. Did you use more water or less water than you thought you would? What are some of the ways you and your family used water? If you used more or less than you thought you would, why might that be?

*Answers will vary.*

2. Do you think everyone on the planet uses water in a way similar to you and your family? Do you think everyone uses water for the same things?

*Probably not. Especially in places where water is scarce, people only use water for tasks that are absolutely necessary (like drinking and washing) and most likely skip unnecessary tasks (like washing the car or watering the lawn).*

### 3. Could we use less water? How?

*Answers will vary but may include: turn off the water when brushing teeth or between dishes being washed, take shorter showers, only pour yourself as much water as you'll drink, etc.*

## PART 2: INDIRECT WATER USE

### PROCEDURE

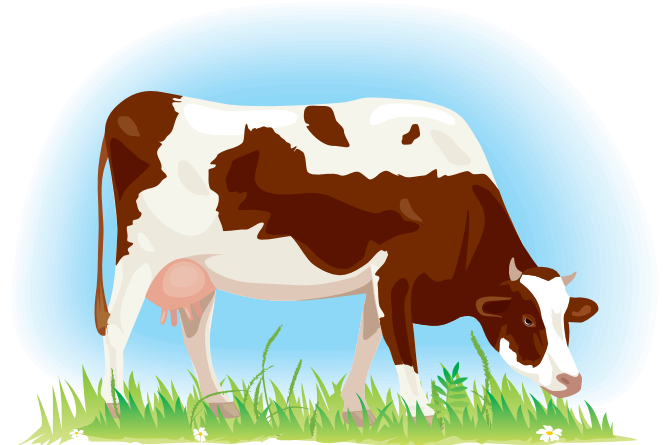
It's easy to track how much water we use directly from faucets, showers, sprinklers, dishwashers, toilets, and so forth. That's when we actually see the water running and we control it by turning it on and off. But a lot of water is used to produce things that aren't at all wet by the time they get to us. For example, hamburger and roast beef aren't watery on your plate. But beef comes from cows, and in its lifetime, a single cow consumes a huge amount of water. (Cows not only drink water, but water is used to grow the feed that cows eat. And they eat a lot!) Many of the products we buy, use, and eat every day use up a lot of water while they are being made. So, when we add up the water we use, we have to look at our indirect use of it, too.

1. Have students brainstorm some items that are produced using water. These might include: paper, bacon, electricity, fruit, bread, etc. You may need to provide a few prompts and/or examples, such as that of the hamburger above.
2. Now take a closer look at beef, specifically. Explain to the students how much water is used during the life of a cow. In addition to water for drinking, water is used to grow the feed a cow eats. It takes about 43 pounds of feed to produce one pound of meat and each pound of feed requires about 42 gallons of water. Now consider that an average beef cow weighs 1,350 pounds. Go over the following equation:

$$\begin{array}{r} 42 \text{ gallons of water to grow one pound of feed} \\ \times 43 \text{ pounds of feed to produce one pound of beef} \\ \hline 1,806 \text{ gallons of water per pound of beef} \end{array}$$

$$\begin{array}{r} 1,350 \text{ pounds – weight of an average beef cow} \\ \times 1,806 \text{ gallons of water per pound of beef} \\ \hline 2,438,100 \text{ gallons of water to feed one beef cow} \end{array}$$

Three and a half Olympic swimming pools would hold 2.3 million gallons – not even as much as is needed to feed a single cow!



3. Ask, "Does the fact that it takes over two million gallons of water to feed one cow surprise anyone?"

4. Copy the “Item” side of the chart below onto the board. Write the heading “Gallons of Water Used” as well but do not fill in the numbers or descriptions. Lead the class in a brainstorming session about how water is used in the production of these items:

Item	Gallons of Water Used	Notes
1 egg	53	For the mother hen to drink; to water the grain in the field that will feed the mother hen.
1 pound refined sugar	198	To water the sugar cane as it grows and clean it before production.
1 loaf of bread (20 slices)	220	To water the grain in the field that is then ground into flour; to raise the mother hen that provides the eggs; to grow the sugar.
1 apple	16	To water the tree.
100 sheets of paper	264	To mix with the tree pulp to process; to mix with the pigment to make ink.

### DISCUSSION QUESTIONS

1. Do you think there are ways we could reduce our indirect use of water? What are they?

*Answers will vary but may include: recycle paper (each ton of recycled paper saves 7,000 gallons of water); eat lower on the food chain (more grain/vegetable products); use direct sweeteners, like honey, rather than white sugar.*

## MEASURING LEARNING

In small groups, have students create news broadcasts that detail the process and result of their water audit as well as what they discovered in regards to direct versus indirect use of water. They should provide a few examples and should also be sure to include what they will do in the future to continue conserving water in their daily lives. Students can either perform their broadcasts live or record them on film.

## FOLLOW-UP ACTIVITY

Show the class the YouTube video ‘Water Saving Hero’ – [www.youtube.com/watch?v=RyYKMjmjD0](http://www.youtube.com/watch?v=RyYKMjmjD0). Ask each student to think of a way they can reduce the amount of water they use and make a pledge to do so. On a piece of blank paper, have the students draw a picture of themselves taking that action. (Ex. A picture of a child standing at the bathroom counter and brushing his/her teeth with the water off.) At the top of the page, they should write the title ‘Water Saving Hero’ and at the bottom, write what action they will take by starting with “I pledge...”

Data Sources: American Cattlemen, Beef Cows, How Big is Too Big? <http://www.americancattlemen.com/articles/beef-cows-how-big-too-big>; National Geographic, The Hidden Water We Use, <http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>.

# EVERY DROP COUNTS

## STUDENT WORKSHEET

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Amount of time it takes to fill a gallon at full faucet power: \_\_\_\_\_ minutes \_\_\_\_\_ seconds.

### AT HOME

2. Amount of time water was running in your home from the time you came home from school to the time you left in the morning:

a. Getting a drink _____ min _____ sec	Washing face _____ min _____ sec
Filling bathtub _____ min _____ sec	Showering _____ min _____ sec
Washing hands _____ min _____ sec	Brushing teeth _____ min _____ sec
Washing dishes (by hand) _____ min _____ sec	
Other _____	_____ minutes _____ seconds
Other _____	_____ minutes _____ seconds
Other _____	_____ minutes _____ seconds
Other _____	_____ minutes _____ seconds
Other _____	_____ minutes _____ seconds

b. Number of toilet flushes \_\_\_\_\_ (x 5 gallons per flush)

Number of loads of laundry \_\_\_\_\_ (x 40 gallons per load)

Did the dishwasher run? \_\_\_\_\_ (x 14 gallons per load)

3. Total time water was running at home \_\_\_\_\_ minutes \_\_\_\_\_ seconds

4. Reading of water meter \_\_\_\_\_ or water bill \$ \_\_\_\_\_ (if available)



## IN CLASS

5. How many gallons were used at home? \_\_\_\_\_  
(Answer to question 3 divided by answer to question 1 plus answers to 2b.)
6. What is the average number of gallons used daily per person in your home? \_\_\_\_\_  
(Answer to question 5 divided by the number of people in your household.)
7. Assuming that everyone uses water at the same rate as each person in your family, calculate how much water is used daily by your:
  - a. City \_\_\_\_\_ (Answer to question 6 multiplied by the number of people in your city.)
  - b. State \_\_\_\_\_ (Answer to question 6 multiplied by the number of people in your state.)
  - c. Nation \_\_\_\_\_ (Answer to question 6 multiplied by the number of people in your nation.)

# **EVERY DROP COUNTS BROADCAST RUBRIC**

	<b>Beginning 1</b>	<b>Developing 2</b>	<b>Mastered 3</b>	<b>Score</b>
Content: Water Audit process and findings	The data collection process and findings are not explained.	The data collection process and findings mentioned but not fully explained.	The data collection process and findings are fully explained.	
Content: Direct vs Indirect uses of water	Direct and indirect uses of water are not correctly discussed.	Direct and indirect uses of water are discussed but are only partially correct.	Direct and indirect uses of water are correctly discussed and an example is included for each.	
Future conservation practices	Ideas for future conservation practices are not mentioned.	Ideas for future water conservation practices are mentioned, but are not clear or fully accurate.	At least two clear, accurate means of water conservation were included.	
Organization and presentation	The presentation seems to have no order and is difficult to follow and hear.	The presentation is somewhat organized but still a bit hard to follow.	The presentation is well organized and easy to understand. Voices are easy to hear.	