

Don't Use It All Up!



LEVEL: Grades PreK-12
SUBJECTS: Language Arts, Mathematics, Science, Social Studies

SKILLS: Describing, discussing, identifying, inferring, observing, sequencing, solving problems, taking responsibility, thinking creatively, understanding cause and effect, valuing

MATERIALS

Wall map of the world or globe; clear glass container with large mouth and capacity of 1 to 2 gallons with a lid; sponges cut into 1-1/2 inch square pieces or small sponge pieces cut in interesting shapes; medium or large mixing bowl; marker or masking tape; paper towels; 1/2 gallon of water for up to 30 students; measuring cup; drawing paper and materials; food coloring to tint the water. **Younger students:** photocopies of the attached **Sequence Chart** sheet. **Older students:** atlases, rulers, protractors or math compasses, photocopies of the **Pie Chart** sheet located in the Appendixes.

RELATED LESSONS

Go, Go H₂O
What Will the Land Support?

VOCABULARY

conserve, conservation **Add for older students:** consumption, demands, environment, increase, natural resources, nonrenewable, population, recycle, reduce, renewable, reuse.

SUPPORTING INFORMATION

This lesson is not meant to foster anxiety or a doomsday foreboding in students. Instead, it introduces the effect that growing populations have on the environment. One

intent of the lesson is to have students realize some steps that individuals and communities can take to reduce the strain on natural resources.

This lesson is effective as an introductory or culminating activity for the study of any natural resource, including water, air, plants, animals, and soil. To provide examples for this lesson, it is best if students have researched the natural resource and know how it is being used and how it can be conserved and/or replenished.

Earth's human population has now reached 6 billion persons. The strain placed on natural resources (both renewable and nonrenewable) will be greater than ever before and may become increasingly severe if the population continues to grow. Renewable resources are those dependent on sun, air, water, and soil to regenerate. Nonrenewable resources are those which are available only in finite amounts, such as oil, gas and metals.



The more individuals of one species living in a given area, the greater the impact on natural resources within that area. Conservation is an important tool to reduce this impact and protect the natural resources and local

BRIEF DESCRIPTION

Students participate in a sponge demonstration to discover that people are consumers of resources and explore methods of conserving those resources.

OBJECTIVES

(Note: All five objectives are appropriate for older students; younger students may accomplish only the first two objectives.)

The student will:

- state one demand he or she places on a natural resource;
- explain how a demonstration of sponges and water symbolizes human resource consumption;
- demonstrate the effects of growing populations on available natural resources through real-life examples;
- state at least one example of conserving a natural resource and justify the importance of doing so; and
- graph the percentages of distribution of water on Earth.

ESTIMATED TEACHING TIME

Two sessions: 30 to 45 minutes each for younger students.

Three sessions: 30 to 45 minutes each for older students.

ecosystem. An effective conservation practice is reducing the amount of natural resources consumed. Consumers can choose not to buy an item that they do not need. Recycling and reusing are two other ways to reduce the consumption. In addition, consumers can refuse to buy products that are not recyclable or biodegradable. They also can refuse to buy overpackaged products. By being aware of the supply of natural resources, consumers can substitute items made from plentiful raw materials for ones made from more scarce ones. Consumers also can find alternate energy sources that are renewable.

Consider water. People use water daily in many ways, often in unrealized amounts. While estimates vary, the Office of Water at the U.S. Environmental Protection Agency (EPA) estimates that a single family home that has no water conservation fixtures may use as much as 100 gallons of water per day (gpd). Some of the major home water uses include 24 gpd to flush the toilet, 20 gpd to bathe or shower, 8.5 gpd to wash clothing, 2 gpd to cook food and drink, 1 gpd to operate a garbage disposal, 4 gpd to wash dishes, 2.5 gpd to wash cars, 25 gpd to water the lawn and keep swimming pools operational, and 2 gpd to brush teeth. We also use water in many indirect ways, such as in the production of manufactured items and food, irrigation of ornamental and food crops, preparation of food, cooling, and heating.

Even though there is an abundance of water on Earth, much of it is unusable for consumption by people or animals in its present form. More than 97 percent of Earth's water is salt water. Salt water is not easily treated for our consumption, nor is it economically feasible to convert it to freshwater. Of the freshwater supply (less than 3 percent of the total amount of water on Earth), most is inconsumable. Glaciers and icecaps hold more than 2 percent of Earth's water. Less than 0.5 percent of Earth's water is freshwater available in lakes, groundwater and streams. People face serious challenges when a limited resource such as freshwater has many demands for its use.

There is a limited amount of water actually available for use. It is unevenly distributed and every day more and more people need that water for a variety of uses. Most of us are so accustomed to having an unlimited supply of water any time we need it that we rarely think about running out of water. Like any natural resource, our water resources need to be protected to have good water quality for present and future generations.



Water is naturally recycled through the hydrologic (water) cycle. The water we use in our homes, schools, businesses, and industries is cleaned and treated (recycled) so it can be returned to the environment and reused. Agriculture, businesses and industries reuse water. Some agricultural fields and golf courses have systems for collecting and reusing runoff from precipitation, sprinklers and irrigation.

Most steel companies use water over and over in a circulating cooling system.

Water can be conserved by reducing our demands on it. Some communities and home owners conserve water through xeriscaping (landscaping for water conservation). Farmers may use drip irrigation to conserve water. For most of us, water conservation means being aware of some of our habits when we use water. When you brush your teeth, do you leave the water running? Do you take a long shower? Is the dishwasher fully loaded when it is used? Do you fix leaky faucets? (Leaky faucets can waste 6.6 gallons [25 liters] a day.) When you wash your car do you use a hose or a bucket of water? When you water outdoor plants, do you water the entire garden or do you water the area immediately around each plant?

Whether we live in an urban, suburban or rural area, we can all be more aware of how we use water within our homes, schools and community. No one needs to stop taking showers or watering their lawns, but we can all help stretch our water resources by conserving water and using it more wisely.

GETTING STARTED

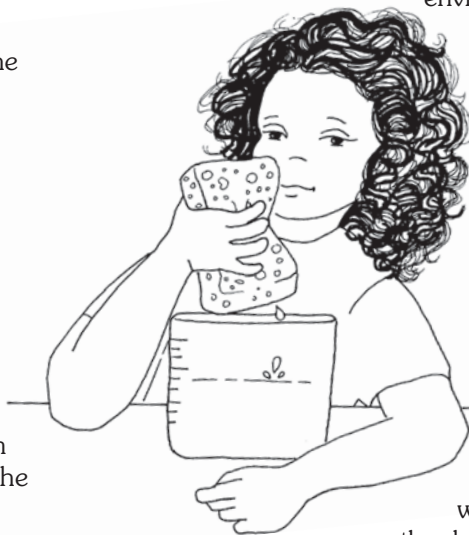
Obtain a world map or globe, measuring cup, large, clear glass container with lid, sponges (one piece per student), mixing bowl, towels, marker or masking tape, paper towels, tint (food coloring), and drawing paper. Cut sponges ahead of time. Add the tint to the water. Photocopy the **Sequence Chart** sheet for individual younger students. Photocopy the **Pie Chart** for older students. (Note: Water is used as the example of a natural resource. The water, however, could represent other natural resources such as soil, air, trees, and more. The Procedure is split for younger and older students. Decide which Procedure you want to use and see that section.)

PROCEDURE

For younger students

SESSION ONE

1. Show students a map of the world. Discuss the amount of water covering Earth. Ask:
 - How much of Earth's surface is covered by water? (*About 3/4.*)
 - Is all of this water usable for consumption by people or animals in its present form? (*No. See Supporting Information.*)
2. Distribute the **Sequence Chart** sheet to individual students. Explain that they will be drawing pictures of the four steps of the water-sponge activity.
3. Measure about eight cups of the tinted water into the container. Ask students to pretend that the container represents Earth and the water represents all the available freshwater. With a marker or masking tape, mark the water level on the outside of the container.
4. In Sequence Box 1, have them draw a picture of the container filled with the eight cups of water.
5. Have students brainstorm ways in which we use water (*drinking, irrigation, recreation, cleaning, processing, cooking, bathing, transportation, and more*). Write the responses in a visible place.
6. Drop a piece of sponge into the container as you state one demand you made on water today. Remove (don't squeeze) the wet sponge from the container.
7. Have students examine the water level. (It probably shows very little change.)
8. Ask students to think of another demand they made on water today. (If they have a difficult time thinking of a demand, direct their attention to the list from Step 5.) Have them draw a picture of their demand in Box A on the bottom of the **Sequence Chart**.



9. Have them drop their piece of sponge into the container. At the same time, tell them to state their demand on water. Leave the sponges in the container. The students may begin to notice a change in the water level.
10. After all the sponges have been dropped in the container, have students draw a picture of the container and the water level in Sequence Box 2. Put the lid on the glass container to avoid evaporation.

SESSION TWO

1. Remove all the sponges. (Don't squeeze them out!) Set them aside in the bowl. Draw attention to the dramatic change in the water level.
2. Have students draw a picture of the container and the water level in Sequence Box 3. Be sure they include in their picture the sponges in a bowl next to the container.
3. Discuss with students how the demands on natural resources of a large population have more effect than the demands of a smaller one. (Use the Supporting Information to expand on these ideas.) Ask:
 - What happens to the water level as we remove all the sponges?
 - What will happen if we keep using water at this rate?
 - What can we do about this situation?
 - How can we conserve or give water back to the environment?

4. Once students have mentioned the concepts of reducing, reusing or recycling, take one wet sponge and name a way you can reduce the amount of water you use. Squeeze the water out of the sponge back into the container. Point out the slight change in the water level.
5. Explain that one person reducing the amount of water he or she uses does make a difference. The effect, however, will be greater when many individuals reduce and reuse. Ask, "In what ways can you reduce or be more careful about the demands you make on water (or reduce, reuse, and/or recycle other natural resources)?"

6. When students have an idea how they can make more careful demands on water, have them illustrate their action in Box B on the bottom of the **Sequence Chart**.

7. Have them squeeze the water out of a wet sponge into the container. Have them tell the class their idea. The water level will go up. It will not go back to the original mark, however.

8. When everyone's sponge is squeezed out, have them draw a picture of the container in Sequence Box 4. Be sure they indicate the water level. Summarize by asking:

- Why doesn't the water level return to the original mark even after all the sponges are squeezed out? (*Some water remains in the sponge.*)
- What happens to the water left in the sponge? (*It evaporates to return later in condensation. Water is endlessly recycled.*)
- Why is it important to make only careful demands (reduce) on water (or other natural resources)?
- How can the water in this demonstration represent other resources people use?
- What is one thing you have learned from this demonstration: (*Answers will vary, but should reflect an appreciation for the finiteness of many natural resources, the renewability of some natural resources, and the desirability of using natural resources wisely.*)

For older students

SESSION ONE

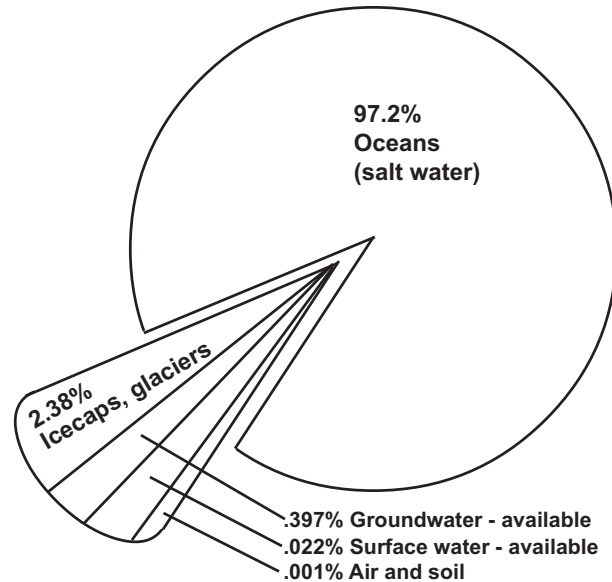
1. Show students a map of the world and discuss the amount of water covering Earth. Ask:
 - How much of Earth's surface is covered by water? (*About 3/4.*)
 - Is all of this water usable for consumption by people or animals in its present form? (*No. See Supporting Information.*)
2. Have students make several pie charts or bar graphs that show how the world's water is distributed as salt, fresh, and available water by using the following table of information.

Earth's Total Water Supply

97.2%	Salt water (oceans, seas, and salt lakes)
<u>2.8%</u>	Freshwater
100.0%	Total water on Earth

Earth's Total Freshwater Supply

2.38%	Icecaps, glaciers
0.397%	Groundwater - available
0.022%	Surface water - available
<u>0.001%</u>	Air and soil
2.8%	Total freshwater on Earth



SESSION TWO

1. Measure about eight cups of the tinted water into the container. Ask students to pretend that the container represents Earth and the water represents all the available freshwater.
2. Have students brainstorm ways in which we use water (*drinking, irrigation, recreation, cleaning, processing, cooking, bathing, transportation, and more*). Write the responses in a visible place.
3. With a marker or masking tape, mark the water level on the outside of the container. Drop a piece of sponge into the container as you state one demand you made on water today. Remove (do not squeeze) the wet sponge from the container.
4. Have students examine the water level. (It probably shows very little change.)
5. Ask students, one at a time, to state a demand they made on water today. Have them drop their sponge into the container. Leave the sponges in the container. The students may begin to notice a change in the water level.

After the students have dropped all the sponges in the container, remove them (do not squeeze). Set them aside in the bowl. Draw attention to the dramatic change in the water level. Mark this water level on the outside of the container. Help students understand that the demands on natural resources

of a large population have more effect than the demands of a small one. (Use the Supporting Information to expand on these ideas.) Ask:

- What happens to the water level as we remove all the sponges?

- What will happen if we keep using water at this rate?

- What can we do about this situation?

- How can we conserve or give water back to the environment?

Put the lid on the glass container and cover the bowl to avoid evaporation.

SESSION THREE

1. Review the previous session's discussion and note the water level. Remind the students of reducing the amount of water they use.

2. Take one wet sponge, name a way you can reduce the amount of water you use, and squeeze the water out of the sponge back into the container. Notice the slight change in the water level. Explain that one person reducing the amount of water he or she uses does make a difference. The effect, however, will be greater when many individuals reduce. Ask, "In what ways can you be more careful about the demands (reduce) you make on water (or reduce, reuse, and/or recycle other natural resources)?"

3. When students have an idea about how they can make more careful demands on water, have them squeeze the water out of a wet sponge into the container. Have them tell the class their idea. The water level will go up. It will not go back to the original mark, however. Summarize by asking:

- Why doesn't the water level return to the original mark even after all the sponges are squeezed out? (*Some water remains in the sponge.*)

- What happens to the water left in the sponge? (*It evaporates to return later in condensation. Water is endlessly recycled.*)

- Why is it important to make only careful demands (reduce) on water (or other natural resources)? Justify your reasons.

- How can the water in this activity represent other resources people use?

- What are some resources that cannot be recycled?

- How can they be conserved?

- What are some resources that are renewable? (*water, trees, fertile soil*)

- Describe one thing you have learned from this demonstration. (*Answers will vary, but should reflect an appreciation for the finiteness of all natural resources, the renewability of some, and the desirability of using natural resources wisely.*)



EVALUATION OPTIONS

1. Students draw two pictures. In the first picture, have them show themselves making one or more demands on a natural resource. In the second picture, show how the demand(s) can be made more carefully. (Look for recycling, reusing, and reducing the use of resources.)

2. Evaluate younger students' **Sequence Chart**. Look for understanding of concepts and completeness.

3. Students write a statement or paragraph about one or more ways in which they personally can recycle, reuse and/or reduce the use of any natural resource.

4. Students complete the following statements.

- I believe that using less water is important because...

- I believe that reusing water is important because...

- One morning I turned on the shower and there was no water. There was no water anywhere in the house. I am going to...

EXTENSIONS AND VARIATIONS

1. Use different color sponges, with each color representing a different natural resource (blue = water, green = plants, yellow = minerals, and so on). Have students identify ways in which they use water, plants, minerals, and other resources each time they drop a piece of colored sponge into the container of water.
2. By tipping the container “accidentally” and spilling some of the water out of the container, demonstrate how accidents and natural disasters can limit the availability of natural resources. Discuss accidents and natural disasters (floods, oil spills, groundwater contamination, and others) and their effect on natural resources.
3. Sing the following song with students to reinforce the lesson concepts. The song can be sung as one long song or each verse can be a song unto itself. The chorus also can be sung after each verse.

SONG OF SOIL, WATER, AIR, TREES, AND WILDLIFE

Song tune: “This Land Is Your Land”

Lyrics used with permission from
Beverly Bruns, Victoria, Texas

Our soil is your soil,
Our soil is my soil,
From a ti-ny flow'r pot,
To the plan-et Earth
From the dif-ferent re-gions
To the float-ing Sky-lab
Soil is a need for you and me.

The air is your air
The air is my air
From the a-rid de-sert
To the fro-zen tun-dra
From the tro-pi-cal for-est
To the e-ro-ding o-zone
This air is there for you and me.

Our wa-ter is your wa-ter
Our wa-ter is my wa-ter
From the bog-gy mar-shes
To the end-less o-ceans
From the an-cient gla-ciers
To the da-ily rain-fall
Wa-ter was made for you and me.

The trees and wild-life
Are all a-round us
They are a source of
Our food and fi-ber

We need them dai-ly
We must con-serve them
Wild-life and trees are what we need.

(Chorus)

Soil, Air and Wa-ter, Trees and the Wild-life
Are all a part of the scheme of Na-ture
We must pro-tect them, So let's be-gin now
Re-duce, Re-use, and Re-cy-cle.

4. Start a class recycling and reusing project. Recycle paper, cans and bottles from the classroom, the cafeteria or home. Have students set up a book, toy, clothing, game, or computer software exchange. Students also might collect materials for Salvation Army, St. Vincent de Paul, American Cancer Society, or Goodwill. Challenge another class to match or beat your efforts. (To learn more about reducing, reusing, and recycling natural resources, see the FLP lesson “Trash Bashing.”)
5. Have students role-play a demand they make on a natural resource. Let the student who correctly guesses what is being acted out drop the next sponge in the water. That student acts out another demand on natural resources.
6. Older students can take a different slant on the activity by examining how resources are unequally distributed and consumed around the world. From an atlas, students can use selected thematic maps, such as petroleum production and consumption, observing and analyzing relationships about the differences among the patterns shown on the maps.
7. Have students draw “Waste/No Waste” pictures showing people “wasting” and “not-wasting.” Have students fold pieces of white paper in half. On one side have them draw pictures showing how they might use a resource. On the other half, they can draw a picture of how they can conserve that resource.
8. Find out what is being done within your community to conserve water resources. (See the Supporting Information for possibilities.)

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EDUCATOR'S NOTES

SEQUENCE CHART

Name: _____

Directions: Draw a four-picture strip showing the sequence of steps in the water-sponge activity.

1.	2.	3.	4.
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1. Show yourself making a demand on water.

2. In that same activity show how you could use less water.

A.	B.
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*Soil, like faith, is the substance of things hoped for,
the evidence of things not seen.*

*It is the starting point for all living things
that inhabit the earth.*

Firman E. Bear