

## EXPLORE

## 3 | Water, Water Everywhere

GRADE LEVEL

4-8

45 minutes

*Developmental Modifications: For younger students (grades 4 and 5), do the demonstration so they can see the limited amount of freshwater on Earth. Because the Annex article in this activity may be too advanced, teachers can incorporate some of the information into the discussion by using the article as background information.*

**summary**

Students participate in a demonstration of the types of water on Earth and reflect on their own water use through reading, discussion and graphing.

**objectives**

- Explain how much freshwater on the Earth is available for human consumption.
- Describe how much water Americans use, and for what purposes.
- List ways to conserve water.

**prerequisite**

Timelines, Looking at Landscape

**vocabulary**

*Great Lakes basin:* The land where water from the ground, rivers and streams flow into the Great Lakes, also known as Great Lakes watershed

**setting****subjects**

Geology, Hydrology, Social Studies

**standards**

This Great Lakes in My World activity is aligned to the Common Core State Standards and to state learning standards in:

Illinois  
Indiana  
Michigan  
Minnesota  
New York  
Ohio  
Pennsylvania  
Wisconsin

This alignment is available on your Great Lakes in My World CD in the "Standards" folder and on-line at <http://www.greatlakes.org/GLiMWstandards>.

**materials**

- 1 liter container with milliliters marked
- 1 liter of water in a bucket
- Map of the world
- Annex 2001 article (in activity)
- Copies of Personal Water Log (several per student)

## background

About three-quarters of the Earth is covered with water. Of this, 97% is saltwater, which humans cannot drink. 2% of the water on Earth is frozen in glaciers. This leaves only one percent of the water on Earth available for human use. On average, Americans have a use of over 100 gallons of water daily for household use. Examples of household use are drinking and washing. Examples of indirect water uses of water include water used to grow the food we eat and manufacture products we buy. The biggest use of water is cooling water for power plants and agriculture, but each has instituted conservation measures in recent years. For example, power plants reuse cooling water several times and some are turning to air cooling, while irrigation methods have become much more efficient in recent years. The United States uses 25 trillion gallons of freshwater each year.

According to the U.S. Environmental Protection Agency, we are using our freshwater faster than we can recharge the groundwater. In the United States, 50% of the wetlands, which recharge and filter freshwater, have been destroyed. The Great Lakes provide 20% of the world's fresh surface water and 95% of the United States' fresh surface water. They contain six quadrillion gallons of freshwater; only the polar ice caps and Lake Baikal in Siberia contain more. Spread evenly across the continental U.S., the Great Lakes would submerge the country under about 9.5 feet of water. If spread it across the North American continent, the Great Lakes would cover the entire land mass with about two feet of water. While this is certainly a lot of water, freshwater is a precious resource that must be conserved. The Great Lakes are not bottomless, nor is any freshwater resource.

## procedure

1. Show students the map of the world. Ask them how much of the Earth they think is covered by water. *About three-quarters. This is a lot of water!* Ask students what makes water in the ocean different from water in the Great Lakes. *The oceans are made of saltwater, the lakes of freshwater, different species live in each place.* Ask students if they think the ocean water is okay for humans to drink. Why not? *Humans cannot drink salt water because the salt dehydrates us. As of now, the process of desalination (taking the salt out of the water) is very expensive and uses high amounts of energy.* Given that we cannot drink from the oceans, ask students how much of the water on Earth they think is available for humans to drink. *Only 1%.* Ask students if they can think of any other water on Earth (besides the oceans) that is not available for drinking. *The water that is frozen in the ice caps, about 2%.*

### Demonstrate

2. Show students the liter container. It is made up of 1000 ml, which are marked on the side.
3. Have a student fill the container with water. This represents all of the water on Earth. Of this water, 97% is in the oceans. Have a student carefully pour out 970 ml of the water.
4. Two percent of the total water on Earth is frozen in the ice caps. This is 20 ml. Ask a student to pour out this water.

5. One percent, or 10 ml, of the total water on Earth is left in the container. This is all of the water that is available for humans to drink and use for watering crops. The Great Lakes contain 20% of that water.

### Discuss

6. What are the implications of such a small percentage of the water on Earth being available for human use? What if this water is polluted? *Currently, the world population has an annual growth rate of 1.4%, or 80 million new people each year. Unlike population, the water supply is not growing—water is not gained or lost from the Earth's hydrological cycle. At the current rate in the U.S., we are using water faster than it can be cleaned and replenished.* How should this knowledge impact our water use? Should we be more careful with the amount of water we use and how it is treated?
7. Of the available freshwater on Earth, 20% is found in the Great Lakes. How much of the one liter of water is this? (two ml) What does this mean? *This gives the people of the Great Lakes watershed a large responsibility for managing and caring for this water.*
8. Complete and discuss the journal pages. This includes reading the Annex 2001 article provided in this activity.

## wrap-up

1. Ask students how much water they use in 24 hours. Ask students to design a method to monitor their water use and use the accompanying journal pages to do so.
2. What conclusions can students draw from their own water use charts? From other students' water use charts? Are there ways in which the students could reduce the number of liters they each consume each day?
3. Students complete the last column in the chart by including conservation options they could use, then recalculate their total liters per day. Which options do they really think they will use? To make this exercise worthwhile, students

will have to follow through at home by conserving water in the ways they suggested. Even by adjusting one habit and getting their family to do the same can make a big difference over time.

4. Have students graph the amounts of water they use in one week without water conservation methods and with water conservation methods. Have students compare the amounts. Now that students have this information, what can they do with it? Discuss ways to educate others or implement the water conservation methods suggested.

**extension**

Students can creatively display their water use data conservation options and ideas and use it to educate others in the school or community.

**sources**

U.S. Department of Agriculture, Natural Resources Conservation Service, <http://www.nrcs.usda.gov/>

Great Lakes basin brochure, 1990, Michigan Sea Grant

EPA: Kid’s Stuff, <http://www.epa.gov/ow/kids.html>

**resources**

Environment Canada, [http://www.ec.gc.ca/water/en/e\\_quickfacts.htm](http://www.ec.gc.ca/water/en/e_quickfacts.htm)

Alliance for the Great Lakes, Visit <http://www.greatlakes.org/healthybeachesactionguide/>

U.S. Department of Agriculture, Natural Resources Conservation Service, <http://www.nrcs.usda.gov/>

U.S. Geological Survey, <http://ga.water.usgs.gov/edu>

The Thirsty Lizard Project

H2ouse: Water Saver Home, <http://www.h2ouse.net>

**assessment**

Rubric on page 462



We value your thoughts and feedback on Great Lakes in My World. Please let us know about any oversights, errors or omissions you find, or if there are things you or your students particularly like.

Send your comments to: [education@greatlakes.org](mailto:education@greatlakes.org)

**Our lakes, our future, our responsibility**

The Great Lakes are a unique and precious resource. They are a natural wonder of the world. The Great Lakes provide freshwater for the 44 million people who live within the Basin. They support the region’s ecosystem and economy. The Great Lakes watershed contains nearly 20 percent of the Earth’s fresh surface water. It is the only freshwater system of its kind in size and ecological diversity and is essential to humans and wildlife alike; providing homes, food, recreation, and economic sustainability.

The Great Lakes are vulnerable to depletion and degradation. The Great Lakes are a vast resource, but each year rainfall and snowmelt replenish only about one percent of the water in the basin. The other 99 percent is finite and nonrenewable. That fact coupled with a growing demand for water by domestic users - including utilities, agriculture, manufacturers, and housing- and proposals to export water to other parts of the U.S. and to foreign countries, is cause for concerns regarding keeping the region’s freshwater resources safe for future generations.

In 2005, after nearly five years of negotiations, the Great Lakes Governors and Premiers endorsed a precedent-setting agreement to protect and conserve the Great Lakes. In 2008, a companion compact became effective in the eight Great Lake states, following approval by the Great Lake legislatures, the U.S. Congress and President. The Great Lakes - St. Lawrence River Basin Water Resources Compact and Agreement implement the Great Lakes Charter Annex signed by the parties in 2001. The Compact and Agreement provide for comprehensive water use protections throughout the Great Lakes Basin. The agreements protect the Great Lakes from harm by implementing strong and effective water management and conservation programs. These agreements close the door on diversions to places like the Middle East, and arid Southwest U.S., but they also put our own house in order by protecting us from unwise water use in the face of growing demand from across the nation and the world. The Compact and Agreement provide a foundation for the long-term protection and sound management of Great Lakes water, ensuring that they are protected today and for generations to come.

*Excerpted from a National Wildlife Federation fact sheet.*

# 3 | Water, Water Everywhere

FIRST NAME																				
LAST NAME																				

[1] Personal Water Log: 24 hours

Date \_\_\_\_\_

USE	AMOUNT (Liters)	CONSERVATION USE (Liters)
Total Amount Used		

Here are some amounts for typical personal water use, according to the U.S. Environmental Protection Agency.

What methods could you use to reduce your water use? Use this information to fill the last column in the water use table (above).

Calculate how much water you would use and save by using these new methods.

Use	Liters / Gallons	Conservation Options
Flushing	19-26 / 5-7	Displace water in tank: 15 liters / 4 gallons
Showering	94.5 / 25	Reduce shower time: 57 liters / 15 gallons
Bathing	151 / 40	Reduce water level: 38 liters / 10 gallons
Brushing Teeth	19 / 5	Turn off tap: 2 liters / ½ gallon
Washing Hands or Face	7.5 / 2	Plug and fill basin: 4 liters / 1 gallon
Dishwasher	60.5 / 16	Use the dishwasher when it's full
Dish Washing by Hand	113 / 30	Plug and fill basin: 19 liters / 5 gallons
Washing Clothes	227 / 60	Use the washing machine when it's full

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# 3 | Water, Water Everywhere

FIRST NAME

LAST NAME

[2] What is the importance of clean freshwater?

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[3] What do you think is the responsibility of the people who live near the Great Lakes, with regard to taking care of the water?

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[4] Read the article "Annex 2001". What do the governors and premiers think their responsibility should be with regard to caring for the Great Lakes basin or watershed?

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[5] Examine your personal water consumption log. What trends and/or patterns do you notice? Did anything surprise you?

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[6] What do you think you could do to help preserve the Great Lakes?

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# 3 | Water, Water Everywhere

FIRST NAME

LAST NAME

[7] What ways do you use water at home?

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[8] Graph your water use BEFORE using water conservation strategies.



[9] This is for one day. Multiply to find the results for one week. One month?

[10] BONUS: Can you figure out the water use for the whole class for one day or one week?

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# 3 | Water, Water Everywhere

FIRST NAME																				
LAST NAME																				

[11] What ways can you conserve water at home?

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[12] Graph your water use AFTER using water conservation strategies.



[13] Describe how much water you saved for one day. Describe the methods you used.

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[14] This is for one day. Do the math to find the water saved for one day, one week and one month.

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