



Water Day: Lesson Plan

Compiled by Mary Mickel and Jeannie Voeks (Spring 2014)

Preparation:

1. Make sure you have all of your materials on hand (Materials List)
2. Water Taste Test:
 - a. Prepare two small recyclable cups (one labeled A and the other labeled B) for each student.
 - b. Prepare two pitchers in advance, labeled A and B, with bottled water in one and tap water in the other and insure both are at the same temperature, whether room temperature or chilled.
 - c. Set aside a plastic bag for kids to recycle their used plastic cups.
3. Usable Water on Planet Earth:
 - a. Prepare four identical quart jars for each team of students (number of students in “team” will be determined by teacher)
 - i. One jar will be full and representing total supply of water on earth
 - ii. Remaining three jars will be empty and labeled
 1. Salt water
 2. Glacial water
 3. Fresh water (lakes, rivers, streams, ground water)

Prepare one set (four quart jars) as Teacher’s set with the precise amounts of water representing the categories

1. Introduction

“Hi, my name is (leader 1) and this is (leader 2), and this is _____, _____, _____ etc. We are your Eco Team Leaders! Eco Teams is a fun investigation group that explores environmental issues facing everyone on the planet. We believe that kids have creative and helpful ideas for coming up with ways to live more sustainably and to help solve some of these issues; and that is why we are called an ECO TEAM. Together, we will be investigating issues and coming up with ways to be more earth-friendly. And, our mascot that helps get all this done is the earthworm, because earthworms are hard workers, turning the dirt under our feet into rich compost to grow plants in.”

Today, we need your help in investigating **water**.

- We want to find out whether water is a renewable or nonrenewable resource.
- We also want to figure out more ways that we can make sure all people can have clean water in the future by not wasting water today.

Let’s start with a taste test.



2. Water Taste Test

1. Pour into students' cups A and B from the two different pitchers (also labeled A and B) for the taste test.
2. Tell the students that one sample is bottled water and the other is tap water.
3. Ask them to take note of color, smell and taste and to keep the empty cup that they prefer, writing their answers onto the questionnaire sheet (Refer to Appendix A). They should recycle the cup that they liked least into a designated plastic bag.
4. Tell students that they will find out the answer shortly.

While the Support Staff is Pouring, and Students are Tasting have discussion:

- Ask general question whether there was a difference noticed in color, smell or taste in the water samples today
- Ask why they think some people want to drink water from a plastic bottle rather than use their tap water?
- Share environmental facts about negative effects of plastic bottles
 - It takes 1.85 gallons of water to make the plastic for one plastic bottle of water
 - Even though bottled water can come in handy for certain situations, tap water is safe and is better for the environment
 - Plastic goes into the landfills and takes a very long time to breakdown

Give Answer to Taste Test:

- Recap who liked sample A and who liked sample B
- Let them know which sample was bottled water and which sample was tap water
- Remind them how they are helping the environment by drinking tap water

Transition into Next Activity:

- Stress that all water on planet Earth has been here for billions of years and is the product of the same water cycle. Whether bottled or tap, all water comes to us through the same water cycle. Let's review that cycle...

3. Water Cycle Lesson (Water Cycle Boogie)

1. Support volunteers distribute beads and "Water Cycle Boogie" handout (Appendix B). One support volunteer should go around the room cutting a yarn length for each student.
2. Sing verse one of the song, "Water Cycle Boogie" (Appendix B) to the tune of *Skip to My Lou*, having student take out yarn for bracelet/necklace.
 - a. Have each student put a knot in the yarn.
 - b. Ask which color goes on first and what it stands for ("yellow" and "sun")
 - c. Instruct student to put the yellow bead on the yarn next to the knot
3. Sing verse two of the song, as above, asking student which color goes on next and what it stands for ("clear" and "evaporation")
 - a. Continue with each verse using same strategy until all beads are on strap
 - b. Instruct students to place a knot at the end of the bracelet after the last bead
 - c. Sing song together from beginning to end, touching each bead to reinforce the meaning of each bead



Transition into next activity:

While the water cycle shows us how water cycles from land and water to sky, clouds and precipitation, it does not show us how much of the water available on planet earth is actually usable for humans. Let's see how much that really is...

4. Usable Water on Planet Earth

1. Tell students you would like them to take a moment to think about the following question: "Of all the water on the planet, what percent is available for human consumption?"
2. Show them a map of the world in order to visualize the amount of water and land.
3. Ask them to consider what they know about oceans and about the type of water that is considered usable by humans and animals
4. Have students pour their estimates from the jar representing all of the earth's water supply into the jars labeled "salt water", "ice caps and glaciers", and "fresh water".

After everyone has completed their pouring, show the Teacher's set and provide the facts (from www.globalchange.umich.edu)

- Over 70% of our Earth's surface is covered by water (we should really call our planet "Ocean" instead of "Earth"). Although water is seemingly abundant, the real issue is the amount of fresh water available.
- 97.5% of all water on Earth is salt water, leaving only 2.5% as fresh water
- Nearly 70% **of that fresh water** is frozen in the icecaps of Antarctica and Greenland; most of the remainder is present as soil moisture, or lies in deep underground aquifers as groundwater not accessible to human use.
- < 1% of the world's fresh water (~0.007% of all water on earth) is accessible for direct human uses. This is the water found in lakes, rivers, reservoirs and those underground sources that are shallow enough to be tapped at an affordable cost. Only this amount is regularly renewed by rain and snowfall, and is therefore available on a sustainable basis.

TRANSITION TO NEXT ACTIVITY:

Remind students that while the little amount of freshwater on the planet has remained fairly constant over time—continually recycled through the atmosphere and back into our cups—the world population has exploded. World population today is 7+ billion. In 1974 it was 4 billion. Estimations for world population in the future vary, but further population increases are expected.

This means that every year competition for a clean supply of water for drinking, cooking, bathing, and



sustaining life grows. This competition for water is for both direct and indirect use. Ask students what they think would be examples of indirect rather than direct water use. If time allows give students the direct/indirect water use sheets (available for reference at the end of this document). How do our many material possessions affect our water supply? With so little usable water available for humans, we need to use water wisely.

5. Using Less Water

DISCUSSION:

1. Ask students how they use water where they live. Compile a group list.
2. Are there ways they are already trying to use less water in these activities? What other ways can they think of to use less water? Share ideas on how to use less water.
3. Ask each student to choose one of the saving water activities they have suggested to try for the next week and report back to the group on how it went.

6. Conclusion

1. Thank students for their time today and that you learned new ways to save water from them.
2. End by reminding students that they can help save water at home by teaching their families about saving water and why it is important. They can show their family the water-use sheet, talk about how little water is available for humans to use so we need to save as much as we can, and also go online to check out the website that is listed on their sheet! It is a really cool website that can help families come up with ways to reduce water use.

~Optional activity if there is time~

THINGS TO PONDER:

While the little amount of freshwater on the planet has remained fairly constant over time—continually recycled through the atmosphere and back into our cups—the world population has exploded. This means that every year competition for a clean supply of water for drinking, cooking, bathing, and sustaining life grows.

How are humans using water faster than it can get replenished in the water cycle?

- 70% Consumable water is used for Agriculture.
 - How many ways can you name that water used in agriculture? (irrigation/watering crops, animals need it to drink, cleaning, fish farms)
- 22% Consumable water is used for Industry.
 - How many ways can you name that water is used to make things? (It can be used as a coolant, to transport things, as an energy source, to make paper, to make plastic, to make glass, to make fabric, and to make many things)
- We also use a lot of water at home. There are many ways that we can cut back on this water use.



Reflection:

1. How can we use less water at home? Are there ways we can help other members in our families use less water? (Refer to the direct water use sheet)
2. Introduce the Indirect Water Use sheet. Spend a few minutes talking about ways we use water without ever getting wet. Ask team members how we can cut back on our indirect water use.
 1. Clue: to make things it takes a lot of water. See the hand-out
 2. Encourage participants:
 - i. Even though bottled water can come in handy, tap water is clean and better for the environment.
 - ii. Share this fact: It takes 1.85 gallons of water to manufacture the plastic for the bottle in the average commercial bottle of water.

Water Facts & Trivia: (from www.thewaterinitiative.com)

- 1) 2 billion people lack access to safe potable drinking water.
- 2) 31 countries face chronic drinking water shortages today.
- 3) By 2025, 48 countries will face potable water shortages affecting nearly 3 billion people.
- 4) Less than 1% of the world's fresh water (or about 0.007% of all water on earth) is readily accessible for direct human use.
- 5) Oceans store most of earth's water – approximately 97%.
- 6) Only 2.5% of earth's water is fresh water.
- 7) Over 61% of the world's fresh water is located in Antarctica
- 8) The overall amount of water on our planet has remained the same for two billion years.
- 9) The earth's total amount of water has a volume of about 344 million cubic miles.
 - 315 million cubic miles is seawater.
 - 9 million cubic miles is groundwater in aquifers.
 - 7 million cubic miles is frozen in polar ice caps.
 - 53,000 cubic miles of water pass through the planet's lakes and streams.
 - 4,000 cubic miles of water is atmospheric moisture.
 - 3,400 cubic miles of water are locked within the bodies of living things.
- 10) A quarter of the world's population is without safe drinking water.
- 11) Most of the world's people must walk at least 3 hours to fetch water.
- 12) The single largest freshwater resource suitable for drinking is Lake Baikal in Siberia, which has a very low salt and calcium content and is very clean.
- 13) The World Water Assessment Program indicates that, in the next 20 years, the quantity of water available to everyone is predicted to decrease by 30%.
- 14) Only about 3% of the water on our planet is freshwater. Groundwater accounts for about 14% of that 3%, while ice sheets and glaciers account for about 85%. The rest is in lakes, streams, reservoirs, the air and soil, and rivers. In the United States, groundwater supplies about 50% of our drinking water, 40% of the water used for irrigation, and about 25% of the water used by various industries.
- 15) The Great Lakes have 80 percent of the United States fresh water supply.
- 16) By 2025 2.4 billion will be living without fresh water
- 17) About 1/3 of the water that falls to Earth runs off the surface in streams rather than soaking into the Earth's soil. A drop of water finding its way to a stream will spend two weeks there on average before rejoining the ocean..
- 18) There may be as much water locked in the Earth's minerals as there is in the Earth's oceans.



- 19) Brazil has the worlds largest fresh water supply. The US has the worlds 4th largest fresh water supply.
- 20) Where the worlds Fresh water supply is used:
 8%- Domestic and municipal
 22%- Industrial
 70%- Agriculture
- 21) The leaves in one acre of broad leafed forest may release as much as 8,000 gallons of water a day into the air as water vapor through the tiny pores in their leaves.
- 22) The Aral Sea has lost 75% of its volume and more than half its surface area between 1973 and 2004 as a result of cotton farmers.
- 23) In 27 developing countries, most of them in Asia and Africa, clean relatively convenient water is unavailable to over 900 million people.
- 24) The average American individual uses 100 to 176 gallons of water at home each day – the average African family uses about 5 gallons of water each day.
- 25) 2 in 3 people lacking access to clean water live on \$2 a day.
- 26) Poor people living in the slums often pay 5-10 times more per liter of water than wealthy people living in the same city.
- 27) The only way to ensure pure, contaminant-free drinking water is through the use of a point-of-use filtration system.
- 28) It takes 25 gallons of groundwater to irrigate each 2 square foot area of wheat field.
- 29) It takes 1,851 gallons of water to refine one barrel of crude oil.
- 30) It takes 25 gallons of water to make one pound of plastic.
- 31) More than 60% of the worlds rivers have been dammed or diverted.
- 32) Today, Dams generate 20% of the worlds electric power and provide needed water for irrigation to cities.
- 33) It takes 700 gallons of water to make a Cheeseburger.

Appendix A: Water Taste Test Questionnaire

Circle	Please Answer This Question	Comments
Yes / No	Do you see a difference between the two kinds of water? If so, what difference do you see?	
Yes / No	Do you smell a difference between the two kinds of water? If so, what difference do you smell?	
Yes / No	Do you taste a difference between the two kinds of water? If so, can you describe the taste difference?	
A / B	Did you have a preference? If so, which one did you prefer, A or B?	



Appendix B: Water Cycle Boogie

Water Cycle Boogie (sung to the tune of Skip To My Lou)

<p><u>Sun a-shining</u>, from its birth, Dries the water, dries, the earth, A YELLOW bead shows its worth, Water Cycle Boogie</p>	
<p><u>Evaporation</u>, water's gone, To a vapor, won't take long. Choose a CLEAR bead, can't go wrong, Water Cycle Boogie</p>	(water vapor changing from a liquid to a gas)
<p><u>Clouds</u> are forming, drop by drop. Vapor moving, will not stop. WHITE beads show us, what's on top, Water Cycle Boogie</p>	
<p><u>Condensation</u>, water's here. No more vapor, give a cheer. A LIGHT BLUE bead, like a tear, Water Cycle Boogie</p>	(water vapor changing from a gas to a liquid; the opposite of evaporation)
<p><u>Precipitation</u>, rain and snow, Shows us water, on the go. A DARK BLUE BEAD, don't you know, Water Cycle Boogie</p>	(water falling to the earth in the form of rain, snow, sleet, or hail)
<p>See the water, moving fast, <u>Runoff</u> on the ground at last. BROWN beads also join the cast, Water Cycle Boogie</p>	(the portion of the precipitation on a drainage area that is discharged from the area into streams, including surface runoff, groundwater runoff, or seepage)
<p><u>Infiltration</u> in the ground, To aquifers the water's bound. A bright ORANGE bead now is found, Water Cycle Boogie.</p>	(the process by which water on the ground surface enter the soil)
<p><u>Transpiration</u> from a tree, Water vapor, you can't see, GREEN beads show it, all to me. Water Cycle Boogie</p>	(trees & plants dissipate water into the atmosphere from leaves and other surfaces)

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Direct Water Use

Let's take a look at how much water you use in a normal day. Use the following chart to figure out how many gallons of water you use to complete everyday tasks.



Action	Gallons of Water Used
Brushing your teeth (with water running)	3 gallons per minute
Flushing the toilet	5 gallons
Taking a shower	5 gallons a minute (50 gallons for a 10 minute shower)
Washing Dishes under running water	30 gallons
Washing clothes	37 gallons per load

Make sure you turn the water off! The water should not be running while you brush your teeth but only to wet the toothbrush before brushing and then rinsing after brushing.

Time those showers! Just a few minutes makes a big difference for saving water!

How much water do you use? If you brush your teeth, take a 10 minute shower and use the restroom three times in a day you've used almost 70 gallons of water—and that's without even helping with any chores! Are you surprised?

CHECK OUT these really cool websites at home!

For Kids:

<http://kids.nationalgeographic.com/kids/games/puzzlesquizzes/water-wiz/>

For Families:

<http://environment.nationalgeographic.com/environment/freshwater/water-footprint-calculator/>



Indirect Water Use

Reducing the amount of water we use directly is an important step toward conserving water. However, we also have to consider our indirect water use.



When you are using paper to do your schoolwork, eating a hamburger for lunch, or reading a webpage on a computer, it may not seem like there is any water involved. But in order to make the paper, the hamburger and the computer, the manufacturer used a LOT of water.

Take a look at how much water is needed to make some things we use every day:

Item	Gallons of Water Needed to Make
1 sheet of paper	2.5 gallons
1 pound of steel (used to make things like cans)	31 gallons
1 pound of plastic (used to make things like pop bottles)	70 gallons
1 gallon of gasoline	70 gallons
1 pair of jeans	1,800 gallons
1 pound of hamburger	2,464 gallons
1 desktop computer	7,300 gallons
1 car	65,000 gallons

Can you believe it? We can't control how much water is used to make these items, but we can make every effort to reduce our use of these products in order to conserve water. See the tips below for decreasing indirect water usage:

One of the best ways to conserve water is to buy recycled goods, and to recycle your stuff when you're done with it. Or, stick to buying only what you really need.

Recycling a pound of paper, less than the weight of your average newspaper, saves about 3.5 gallons of water. Buying recycled paper products saves water too, as it takes about six gallons of water to produce a dollar worth of paper.

