

**Purpose:**

The purpose of the lesson is to learn about the uses of water, the water cycle, and to discuss the importance of water as a nonrenewable resource. A further purpose is to discuss why being good stewards of this resource is acting for the common good.

**Duration:**

Two days - three forty-five minute class periods

**Objectives:**

*The learner will:*

- identify sources of water.
- list several uses of water.
- explain why water is important.
- explain why water is a nonrenewable resource.
- explain why it is important to be a good steward of water and how this relates to the Core Democratic Value – Common Good.

**Service Experience:**

*Although this lesson contains a service project example, decisions about service plans and implementation should be made by students, as age appropriate.*

Create a classroom newsletter detailing why water is important and why it is necessary to take care of it. The newsletter could include such aspects as an informational piece, a letter to the editor, a comic strip, and a game or puzzle using vocabulary from the lesson. Share the newspaper with others in the school, parents and the community.

**Materials:**

- Paper
- Pencil
- Glass of water
- Computer access if you are going to include student interaction with water cycle websites
- **Attachment One: *Water on Earth***
- **Attachment Two: *Find Someone Who...***

- Materials for the demonstration to model the distribution of water:
  1. One 100mL graduated cylinder
  2. A bucket to hold 9.5 liters (2.5 gallons)
  3. One eyedropper
  4. One permanent marker
  5. 8 clear plastic cups
  6. One 1000mL beaker
  7. One 100mL graduated cylinder
- Cup with water
- Beaker with ice
- Heat source (hot plate)
- Wet paper towel
- Creating the Terrarium (see **Day Two** instructions for details)
  1. Two Liter bottle
  2. 0.5 liter potting soil
  3. Small plant or seed (Note: if using seeds, plant a few weeks before this lesson.)  
water

Handout 1

[Water On Earth](#)

Handout 2

[Find Someone Who...](#)

**Instructional Procedure(s):**

**Teacher Note:** Much of the information and the demonstration itself are adapted from the lesson “How Wet is Our Planet?” from the Saginaw Bay Watershed Middle School Curriculum Guide, developed by Bay Area Community Foundation and others.

*Anticipatory Set:*

*Have the learners do a quick-write, considering each of the following questions, then have a few volunteers share their thoughts. How much of the Earth's surface is made of water? (about 70%- hence the Earth has been referred to as the "water planet"). How much of your body is made of water? (About 60 -70%) Why is clean water important? (All living things depend on it.)*

- Ask learners the following questions: If we were to consider all of the water on the Earth, how much do you think is readily available for human use? Why would we have more of a need for freshwater? Where is most of the Earth's freshwater located? Accept learners' guesses and then share the information located in **Attachment One: Water on Earth**.
- Fill a glass with water and place it on a desk. Ask learners: "How old do you think this water is?" (Accept a variety of answers).
- Explain that even if it fell during a rainstorm two weeks ago, it could be the same water that a Tyrannosaurus Rex Dinosaur drank millions of years ago.
- Explain that centuries ago water usage was done without money or cost and bodies of water were well taken care of by Naive People who considered water to be sacred.
- Continue the discussion by telling the learners that water is considered a **nonrenewable** resource. Some scientists believe that all water that is present on the Earth, in all forms – solid, liquid, and gas, has been here since the beginning of time. It is all that we will ever have. It continues to recycle. If we do not take care of our water resources, all life on Earth will suffer.
- Continue with the following demonstration to model the distribution of water on the Earth:

**Materials for demonstration model:**

1. One 100 ml graduated cylinder container (ex. bucket) that holds about 9.5 liters (2.5 gallons)
  2. One eyedropper, one permanent marker
  3. 8 clear plastic cups, one 1000 ml beaker
- Use the 1,000 ml beaker to fill the bucket with 10,000 ml of water.
  - Tell the learners that you are going to pretend that the 10,000 ml of water (about 2 ½ gallons) represents all of the water on Earth.
  - Using the permanent marker, label each cup with a different name from the following list:
    - Icecaps/ glaciers
    - Groundwater

- Freshwater lakes
- Great Lakes
- Saltwater Lakes/seas
- Atmosphere
- Rivers/Streams
- Unaccounted for

Using the 100 ml cylinder, take 200ml of water from the bucket and place it in the cup labeled Icecaps/glaciers. This will represent all of the water on Earth that is located in icecaps and glaciers.

Use the following table to determine how much water needs to be in the remaining cups. The water that remains in the bucket represents all of the water in the Earth's oceans. **Teacher Note:** You may want to determine how many drops using an eyedropper are in 1ml so you can tabulate the number of drops needed to represent some of the smaller amounts, (\* 20 drops = 1 ml, so 1 drop = 1/20 ml (.05), or you can simply use a single drop from the eyedropper to represent each amount that is too small to be measured with the cylinder.

If all of the water on Earth was equal to 10,000 ml, you would find the following amounts in these locations:

Oceans	9,720.0 ml
Icecaps/Glaciers	200.0ml
Groundwater	62.0ml
Great Lakes	0.18ml = 4drops
Freshwater Lakes	0.72ml = 14 drops
Inland Seas / Salt Lakes	0.8ml =16 drops
Atmosphere	0.1ml = 2 drops
All Rivers, Streams	0.01ml = dab it
Unaccounted for	16.19ml

- Give each learner a copy of **Attachment One: Water on Earth**. Allow time for the learners to answer each question after the demonstration. Discuss their answers.

- Ask the learners what the term Common Good means. It Involves individual citizens having the commitment and motivation to promote the welfare of the community (even if they must sacrifice their own time, personal preferences or money) to work together with other members for the greater benefit of all. For example, if families in your neighborhood work to clean up a vacant lot and plant it with flowers to create a neighborhood garden, everyone in the community would benefit from the garden.
- Ask: Does it seem important for us to watch over our freshwater supply and protect it from pollution? Why? Why is this an example of the Core Democratic Value: Common Good?

### **Day Two:**

**Teacher Note:** *A day or two prior to the lesson, it would be beneficial to your explanation of the water cycle to have set up a simple terrarium through which students can view a controlled water cycle, especially if you will have time to allow students to make their own (individually or in groups) to observe over an extended period of time. Be sure to draw learners' attention to the water cycle telling them to make daily observations which will come in handy in a few days. Some districts may have, or may be able to order an enclosed model. If not there are several ways you can make your own. The following are instructions for a simple set up. (Included is a web-site where you can get details on making a more complex model. [www.ucar.edu/learn/](http://www.ucar.edu/learn/)).*

- Cut a two-liter bottle in half.
- Place potting soil in the bottom half of the bottle
- Plant one or two small plants in the soil. (Or two peas, marigold, or bean seeds)
- Water the terrarium and close it back up, either by using clear packing tape to put the two halves back together or by squeezing the top portion of the bottle into the bottom to make a dome. Put the bottle terrarium in a window that receives plenty of light or place it under a lamp if a window is not available. Keep in mind too much light is not good for the plants! Allow students to make initial predictions as to what will happen over the course of the next several day.

### *Anticipatory Set:*

*Have each learner write or draw what they think happens to a drop of water after it falls from the sky. When they have finished, have them share their thoughts with a partner. As a class discuss: "Yesterday, we talked about water as a nonrenewable resource, yet it rains. Doesn't this mean we are getting more water?" Use student responses as a springboard to a general discussion of the water cycle – the process through which water moves from the ground to the atmosphere and then back to the ground again. "So, the same water is continually being processed throughout the Earth" – new water is not being made. Point out to the learners that only 3 percent of the Earth's water is usable for humans.*

- Discuss the three states of matter with the learners. (solid, liquid, gas). Tell the learners that water is matter and it can be found in all three forms depending on the temperature of the water.
- Show the learners a glass of water. Ask: "What state of matter is represented by the glass of water?" (liquid) Discuss where water may be found on Earth. Be sure to mention that rain is counted as liquid water.
- Show the learners an ice cube or representation of an ice cube. Ask: "What state of matter is represented by the ice cube?" (solid) What would happen to the ice cube if left in the dish for an extended period? (It would melt or become liquid)
- Show the learners a wet paper towel. Ask: "What will happen to the paper towel if it is left out for a period of time?" (It will dry out or the water will evaporate) Tell the learners evaporation is a form of gas. (**Note:** Another way to demonstrate steam is to use a heating device and water container to bring water to a boil.) **Teacher Note:** see <http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=393> for an in-depth water cycle lesson.
- Using the terrarium, discuss the water cycle further. Ask the learners to identify the state of water that are represented in the terrarium.
- Discuss the following terms, using a diagram of the water cycle as an overhead transparency.

**Evaporation** – The process of water changing from a liquid to a gas. This occurs when the sun heats up the water in oceans, lakes, rivers, etc., turning it into vapor, which goes into the air.

**Condensation** – The process by which water vapor changes from a gas to a liquid. Water that has been evaporated into the air by the sun gets cold and changes back into a liquid, collecting on tiny particles in the air and forming clouds.

**Precipitation** – When enough water has condensed that the air cannot hold anymore, the clouds get heavy and water falls back to the earth as rain, snow, ice or hail – depending on the temperature.

**Runoff** – Water returning to the oceans, lakes, rivers, groundwater, etc. by running over the earth to these locations (or soaking into the ground).

**Transpiration** – The process by which plants lose water through their leaves (as water vapor) – releasing the water into the air.

**Teacher Note:** An on-line source such as

[www.dnr.state.wi.us/org/caer/ce/ee/earth/groundwater/](http://www.dnr.state.wi.us/org/caer/ce/ee/earth/groundwater/watercycle.htm)

[watercycle.htm](http://www.dnr.state.wi.us/org/caer/ce/ee/earth/groundwater/watercycle.htm) has some interactive things for students to participate in if you have adequate

computer access and time or [www.njawwa.org/kidsweb/watercycle/watercycle.htm](http://www.njawwa.org/kidsweb/watercycle/watercycle.htm)

You can also go to the “*Water Cycle Boogie*” site listed below for a printable student page with a water cycle diagram, some true/false questions, and a word match.

- Point out to the learners that not all water is available at all times to be involved in this cycling. Some water is out of the cycle for extended periods of time as it is frozen in glaciers. This is another reason why it is so important to keep the available water clean

**Teacher Note:** You could then use the “Water Cycle Boogie” found at the following web-site

<http://www.songsforteaching.com/>

[bananaslugstringband/watercycleboogie.htm](http://www.songsforteaching.com/bananaslugstringband/watercycleboogie.htm) - to help students remember the terms and what

they mean. It includes an activity for which you make a bead bracelet while singing the song,

putting colored beads on to represent each of the phases of the water cycle. There is also a link

to this site from [www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=393](http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=393) The link is

listed under “Optional Activity.”

### **Assessment:**

Ask the learners to write two or three paragraphs explaining why it is important to take care of the Earth’s water supply. This could be in the form of a letter written to the city council or other local government agency asking that agency to help protect the water supply by creating policies and laws that will help clean up pollution.

Hand out **Attachment Two, Lesson One: *Find Someone Who...*** to learners. Create groups of three learners each to do the activity. Tell the learners that they must interview their partners to complete the worksheet.

### **Bibliographical References:**

- Bay Area Community Foundation and Others, Saginaw Bay Watershed Middle School Curriculum Guide.
- [www.ucar.edu/learn/](http://www.ucar.edu/learn/)
- [www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=393](http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=393)
- [www.dnr.state.wi.us/org/caer/ce/ee/earth/groundwater/watercycle.htm](http://www.dnr.state.wi.us/org/caer/ce/ee/earth/groundwater/watercycle.htm)
- [www.njawwa.org/kidsweb/watercycle/watercycle.htm](http://www.njawwa.org/kidsweb/watercycle/watercycle.htm)
- <http://www.songsforteaching.com/bananaslugstringband/watercycleboogie.htm>
- [www.units.muohio.edu/dragonfly/water/experiment.shtml](http://www.units.muohio.edu/dragonfly/water/experiment.shtml)

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**Lesson 1: [Water Is Cool!](#)**

**Handout 1**

**Water On Earth**

Oceans	9,720.0 mL
Icecaps/Glaciers	200.0mL
Groundwater	62.0mL
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Atmosphere	0.1mL = 2 drops
All Rivers	0.01mL = dab it
Unaccounted for	16.19mL

**Only 3 percent of the Earth's water is usable for humans**

Answer the following questions after the demonstration.

1. Is the distribution of water on Earth fairly even?
2. Is much of the total water on Earth available for human use?
3. Does it seem important for us to watch over our freshwater supply and protect it from pollution?  
Why?
4. Why is this an example of the Core Democratic Value – Common Good?

\* Info from Saginaw Bay Watershed Middle School Curriculum Guide

## Handout 2

### Find Someone Who...

...can list three different uses of water. Comments: Signature:	...can list three different uses of water. Comments: Signature:
...can tell why water is a nonrenewable resource. Comments: Signature:	...can tell why water is a nonrenewable resource. Comments: Signature:
...can tell why it is for the Common Good to be a good steward of water. Comments: Signature:	...can tell why it is for the Common Good to be a good steward of water. Comments: Signature: