

Water Wonders

SDH 2017

OVERVIEW:

Water is the major ingredient of not only our bodies, but the earth as well. Every living thing in the world depends on it to survive. Students will develop a practical understanding of water's importance to a healthy and well-balanced world.

OBJECTIVES:

Students will be able to:

-) Understand the water cycle and its components
-) Identify origins of water for Southern California
-) Investigate different types of pollution affecting the water supply
-) Explain age-appropriate, environmentally responsible choices related to water conservation & water consciousness

VOCABULARY:

Abiotic Factor	Aqueduct	Aquifer	Biotic Factor
Chemical Pollution	Condensation	Conservation	Desalination
Ecological Pollution	Ecosystem	Evaporation	Groundwater
Irrigation	Organic Pollution	Percolation	Precipitation
Reservoir	Runoff	Spring	Transpiration
Thermal Pollution	Water Cycle	Water Consciousness	Well

NEXT GENERATION SCIENCE STANDARDS:

-) Describe the amounts and percentages of water and fresh water on Earth. (5-ESS2-2)
-) Demonstrate understanding of human impacts on Earth systems (5-ESS3-1)
-) Understand that water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation as well as downhill flows on land. (MS-ESS2-4)

MATERIALS:

bottles of "dirty" and "clean" water
retired rope
white board/marker
orange/apple
pollution cards

PROCEDURES:

1. Introductory Demonstration: Pollution Bottles (found in activity glossary)
 - A. Stop group for a water drink. Tell students to grab their water bottles.
 - B. Conduct demonstration.
 - C. Debrief: Looks can be deceiving, even with water. Ask them what is deceiving? Cleanliness. Have students hypothesize where the water bottles were filled. Answers vary. Segue into water cycle discussion.
2. Water Cycle Discussion
 - A. Ask students: Why is water important? Life depends on it (FWARPS). Is water **biotic** or **abiotic** in an **ecosystem**? Abiotic. What are some of its uses? Drinking, bathing, transportation, recreation. What words can you think of with the word cycle in it? Bicycle, recycle. What is the function of a cycle? A continuous loop or circle.
 - B. Explain to students that water on earth is limited. Nature never makes more water; we actually continue to reuse water through the **water cycle: evaporation, condensation, precipitation (runoff/percolation)**.
 - C. Activity: Water Cycle Tag (found in the activity glossary)
 - i. Conduct activity.
 - ii. Debrief: How did this round of tag demonstrate the water cycle? Why did the water droplets have to hold onto a rope when they went to the cloud? (water droplets condense around

dirt/dust particles) In real life, how could water evaporate from the shade? Are there any other ways that water moves into the atmosphere, other than through evaporation?

D. Introduce **transpiration** as a fraction of the water cycle.

3. Location of Water Discussion

A. Ask students: how much of the earth's surface is water? Answer: 71% How much of the human body is water? Roughly 65%. Where does this water come from? Lakes, streams, oceans, glaciers, air.

B. How much of that water/what proportion is usable by humans?

i. Demonstration: Water on Earth (found in activity glossary/activity video)

ii. Debrief: Why does the amount of available fresh water matter? Are we able to stop using water? What are ways we can conserve fresh water in our lives?

C. Define/discuss **conservation**.

D. Explain to students that water doesn't just come from the faucet. Where is it before they shower?

Reservoirs are often created to hold water for a community. Students might be familiar with Lake Elsinore, Big Bear Lake, or Lake Arrowhead. All of these are man-made reservoirs, holding tanks for toilets and showers. Some rural communities get water from **wells**. They often drill hundreds of feet to pull the water from the **groundwater** in an **aquifer**. The water at High Trails comes from a well. There are also natural **springs**, where the groundwater is so close to the surface it seeps out of the earth. Natural "hot springs" are popular examples of springs.

E. Water is also needed to grow food. Moving water to grow crops is called **irrigation**. Crops such as oranges, avocados and almonds grow well in the Central Valley of California, but need fresh water from Northern California snow melt. Southern California takes its water by building miles of concrete **aqueducts** that transport the water to treatment plants and reservoirs.

F. Ask: why do we need to get our water from so far away, when we live so close to the Pacific Ocean? Salt. In order to use the ocean water, we must remove the salt in a process called **desalination**. This is expensive and uses a lot of other resources. California is on the cutting edge of desalination technology and recently opened one of the largest desalination plants of the world.

4. Water Pollution Discussion

A. Ask students to think about how our water may become polluted. Generate sharing and lead into an explanation of the four types of pollution (**chemical pollution**: oil, acid rain, paint; **ecological pollution**: fire ash, landslide; **organic pollution**: phosphates, nitrates; **thermal pollution**: heated water and high temperatures from a power plant). **Water consciousness** is needed to prevent these types of pollution from happening or fixing it once it has happened. Segue into the experiment.

5. Experiment: Sum of the Parts

A. Conduct experiment.

B. Within teams or groups: Identify the four types of pollution in our town. Analyze how one plot of land may affect another.

C. Debrief: What challenges does the town face? *The water unintentionally became polluted; pollution increased further down the river.* What were some of the solutions to those challenges? Would they be practical? Discuss with students the effects pollution could have on human and plant life. Consult your partner for ways you could have prevented your pollution from entering the river and share with the group.

6. Wrap Up

A. [*What?*] Concisely review the major points of the lesson, all the way back from the introductory activity.

B. [*So what?*] What was important for you to discover from the lesson? Why was it important for all of us to take this class?

C. [*Now what?*] What can you now do with this information? What changes can you make in your life? What can you teach to others? Who will you tell? What will you say?

D. Pass out beads after all students have contributed.

THINGS TO THINK ABOUT:

Special Needs: Be very aware of all students around natural water sources.

Time Fillers: Sing Water Cycle Song on the trail. Incorporate the *Transpiration* activity during your hike (especially effective when Plant Detectives is also taught during the week).

Weather: Explore the snow—it's water all around you!