

Grand Teton

Title: All the Water in the World

National Park Service
U.S. Department of the Interior

Grand Teton National Park
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Essential Question/Objectives:

1. Students will understand the distribution of global water resources and the proportions of water in different storage areas (e.g. oceans, ice caps, rivers).
2. Students will understand that the amount of global waters is constant, be able to identify water available for human use, and be able to explain why water quality conserving water is important.

Background:

1. Water is a finite resource and the driving force of life on our planet. Although water moves in a cycle can change forms, the amount of water on Earth is constant and more cannot be added to our world. This makes protecting our water resources and understanding water quality important, not just because we drink water, but because it is used in food and material production, and by entire ecosystems. Approximately 70% of Earth's surface is covered by water. Of that water, 97% is in the oceans and is saltwater which cannot be used by humans without expensive desalination treatments. Of the remaining freshwater (3%), the vast majority is trapped inaccessibly underground or in ice caps. Less than one half of one percent is stored in surface water.

Preparation:

1. Materials: 1 Liter of liquid. Six clear plastic cups, Instrument for measuring (ml), eye dropper (preferred). Global or map of world showing water features.
2. Split students into six groups. Tell students that each group will represent one location on earth where water is found (e.g. oceans, ice, lakes).

Lesson Hook/Preview:

1. Brainstorm with your students about how people use water. We need to drink water in order to survive. We also use water in many other ways, such as bathing, swimming, watering the lawn, doing the laundry, etc. Ask your students where we get the water we need. Have them brainstorm natural sources of water. If you have a map of the world, you can show it to students at this point to help them formulate their ideas. For this activity, we will be looking at

Grade Level: 3-6

Subject: Life Sciences

Setting: Classroom

Duration: 30 minutes

Common Core Standards:

Next Generation Science Standards:

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

5-ESS2-2 Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]

Additional Standards:

NGSS Cross Cutting Relationships:

Systems, Scale, Quantities, Proportions, Cause and Effect

how water is distributed across sources accessible to people, plants and animals: Oceans, groundwater, lakes, glaciers/ice/snow, swamps/marshes, and rivers.

2. Assign each group a water source and list each source on the board so they will be visible throughout the activity. Discuss them with your students making sure they understand what each one means. Note: There is also water stored in the atmosphere (clouds), soil, ground ice, and in plants and animals. The sources in this activity are the sources that are more easily accessible for people.

Procedure:

1. Distribute the liquid to the groups one by one using the amounts listed below. Measure out the portions into clear cups (so that the amount of water is easily visible) and hand the cup to the group assigned to that source. As you hand the cup to the group, tell them how much water it is, and write the amount on the board. Oceans: 970 mL. Glaciers/Ice/Snow: 21 mL. Groundwater: 9.0 mL. Lakes: 0.08 mL. Swamps/marshes: 0.01 mL (roughly 5 drops). Rivers: 0.002 mL (roughly 1 drop).
2. Explain that while the oceans contain most of the planet's water, that water is too salty for us to use. There are desalination processes that can remove the salt and make the water drinkable, but these processes are expensive and use a lot of energy.
3. Refer back to the numbers written on the board. Point out that while there is a large amount of water on the planet, only 3% of that is fresh water. 97% is found in the oceans. That limited amount of fresh water must support a growing population of humans in addition to plant and animal life and agriculture.
4. Elaborate: Have the groups discuss how they might share their portion of water, considering that the water has to accommodate the needs of plants and animals as well as humans. If desired, you can extend the discussion to consider how water might be distributed equitably. Some groups of students have more water than others. Is this fair? What could be done about it?

Assessment:

1. In the assigned groups, have each member of the group (or do one large drawing per group) make a drawing of their water source. Have them include one or more of the following in their drawing: 1) animals, plants or people that might use their source, 2) protections to their water source, 3) ways to conserve their water source, 3) a design to transport water cleanly to animal, plants and people, 4) a potential contaminant to their source. Allow time to debrief drawings...what action steps can WE take to conserve the limited amount of fresh water available to us?

Vocabulary:

- Groundwater
- Surface water
- Ice Caps
- Contaminant
- Conservation
- Pollution