

BACK BAY SCIENCE CENTER

Watersheds and Water Sources

ACTIVITY: Water Water Everywhere

TIME: 30 minutes

GRADE LEVEL: 7th-8th

GROUP SIZE: 8-10 students

Theme: *The Earth is covered in water, so why should we care about using it wisely?*

NEXT GENERATION SCIENCE STANDARDS:

PERFORMANCE EXPECTATIONS

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4) <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3) <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MESS3-4) Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6) 	<p>Ecosystem Dynamics, Functioning, and Resilience</p> <ul style="list-style-type: none"> Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) <p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3),(MS-ESS3-4) 	<p>Stability and Change</p> <ul style="list-style-type: none"> Small changes in one part of a system might cause large changes in another part. (MS-LS2-4) Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6). <p>Cause and Effect</p> <ul style="list-style-type: none"> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3) Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-4)

Ocean Literacy 1: The Earth has one big ocean with many features

E- Most of Earth's water (97%) is in the ocean. Seawater has unique properties. It is salty, its freezing point is slightly lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic.

BACKGROUND INFORMATION

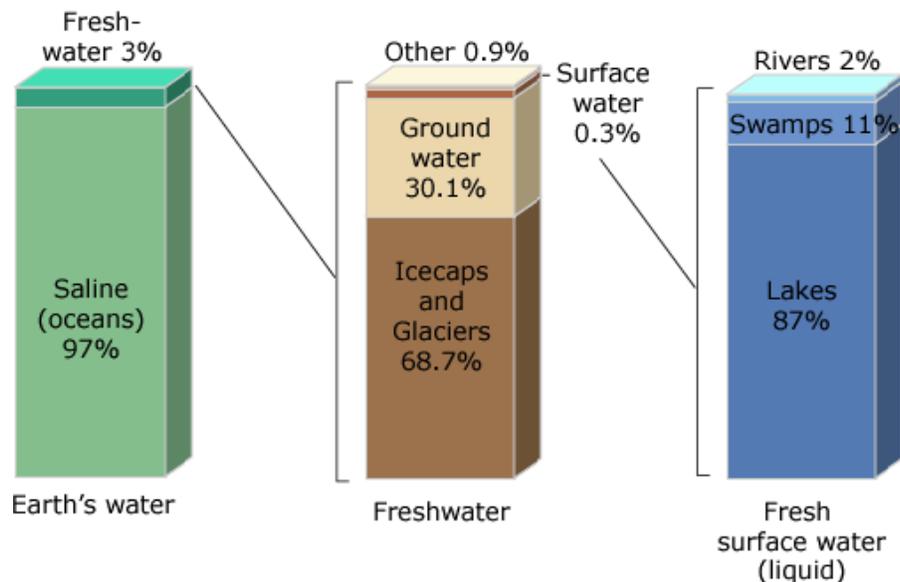
Water is a major natural resource, and is used in many ways: as a nourisher of plant, human, and animal life, a bearer of food, a prime element of industrial processes, and a medium for transportation. The earth has an abundance of water, but unfortunately, only a small percentage is even usable by humans. The rest is in the oceans, soils, icecaps, and floating in the atmosphere. Still, much of the water that is useable is unattainable.

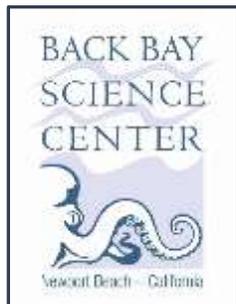
Roughly 97 percent of the earth's water is salty, and the majority of the under 3 percent that is freshwater is locked in glaciers and polar ice caps. The freshwater pool on which we are most dependent is the resultant run-off of a water cycle driven by the sun. Evaporation lifts purified water from the oceans and land, which then falls again as rain and snow. Our backup reserves of freshwater are held in underground aquifers, but are

energy intensive to extract from and slow to replenish. As is often the case with natural resources, a major problem arises from uneven distribution. In some environments this imbalance is exhibited in just a few surface miles.

Worldwide population growth (and associated food production) as well as increases in industrialization and consumptive lifestyles create ever-increasing demands on the planet's relatively finite sources of freshwater. To ensure a global water resource to meet the demands of the future, immediate improvements are needed in techniques for water conservation, collection, storage, treatment, and reuse.

Distribution of Earth's Water





TEACHER GUIDE – Watersheds and Water Sources

ACTIVITY: Water Water Everywhere

OVERVIEW OF ACTIVITY

In this activity, the students will divide all the water on planet earth into its respectable sources. The percent of each water source will then be determined by manipulating the volume units into percentage units. The students will ultimately decipher from which sources humans are able to utilize water, and what source(s) their community's water comes from.

OBJECTIVES:

Students will be able to:

- Correctly measure volume in milliliters.
- Convert milliliters to liters, and derive percentages from these numbers.
- Interpret charts and make inferences based on the data.

MATERIALS:

- (4) Earth's Water Distribution Charts
- (4) Wet Erase Pens
- (4) 1000 Milliliter Containers
- (4) 1000 mL Graduated Cylinders
- (8) 50 Milliliter Containers
- (4) 10 Milliliter Test Tubes
- (4) Calculators
- (4) Glass Vials
- (4) 6 mL/cc Syringes
- Towels
- (1) Bottle of Blue Food Coloring
- (4) Funnels
- (1) Work Board
- (2) Easel

ADVANCED PREPARATION

1. Set up the station workboard/posters and activity resources. Lay out the wet erase pens and the Earth's Water Distribution Charts. Add water and food coloring to the 1000mL samples.