



EDUCATOR'S GUIDE

Student Activities

GRADES 9-12

Please use these activities to reinforce information provided in the **Lifestraw® Educator's Guide**.

- National Science Content Standards and connections to the *Guide* topic areas are identified below each activity.
- The Water Stories Supplement, with Luis and Ajia's "water stories," will make these important topics more personal for students.
We encourage students to share their own water stories with one another and with us.
- Together with the *Guide*, these activities and supplements are designed to introduce water-related topics in depth, through active learning. The materials will encourage students to think about the importance of water in their own lives, and what actions they can take to help protect this vital and precious resource.

We invite you to share your feedback with us at info@celfeducation.org.

Download all activities free at celfeducation.org/waterguide



1. Activity: Amazing Water

Used with permission from Earth Day Network

Objective: To measure personal water-usage and calculate an individual “water footprint.” To promote an awareness of daily water use. To teach students how to collect quantitative data, calculate finite measurements using estimations. To introduce the concept of unequal distribution of water and volume of water consumed around the world, and encourage a relevant discussion about this comparison. To use critical thinking skills to debate issues regarding water scarcity in the United States. To encourage students to identify daily water conservation strategies.

Description: Students will measure and analyze their personal daily water usage for a better understanding of how water is used and wasted on a daily basis. They will research and learn essential facts about freshwater, its properties and uses and will recognize it as a precious resource. They will look specifically at a water conflict and debate the various positions. They will read an article about water and energy and discuss why it is relevant.

*National Science Content Standards:
B: Science in Personal and Social Perspectives; Physical Systems;
National Social Content Standards: NSS-G.K-12.2 Places
and Regions; NSS-G.K-12.5 Environment and Society
National Mathematics Content Standard: NM-NUM.6-8.1;
NM-NUM.6-8.3*

Guide Connections: Water Scarcity

2. Investigation: Water Laws

Objective: To familiarize students with ways in which freshwater is regulated, protected and conserved—both officially and unofficially—across time, cultures and countries. To enhance students’ critical and collaborative thinking skills as they navigate the complex and often conflicted world of competing water rights claims and traditions.

Description: Students will learn about traditional systems and strategies for freshwater regulation and conservation throughout the ages and across cultures. They will study water issues of two

communities—one in rural Kenya, one in urban New York—and craft regulations which ensure sustainable solutions. Students will learn how different attitudes toward water rights and regulations evolved in the United States. Specifically, students will examine how mining practices in the California Gold Mines of the 1800s influenced western water rights legislation.

National Science Content Standards A: Science as Inquiry; G: History and Nature of Science

Guide Connections: Pollution, Water Scarcity

3. Connection: Who Owns the Water?

Denver Post Educational Services

Objective: To develop or nurture research capabilities as students find archival material on an historic water dispute. To foster debating skills while also teaching essential information regarding water rights, state conflicts, town meeting processes, Supreme Court proceedings and historical research.

Description: Students will research the Colorado Historic Newspaper Collection as they prepare for a town meeting in which they will present positions of the Colorado farmer, irrigation ditch owners, engineers, and lawyers for both sides in the Kansas-Colorado Water Dispute. This conflict, which began in the late 1800s and continues today, was argued as a U.S. Supreme Court case focusing on water rights along the Arkansas River. Students will read archival and current accounts regarding Colorado’s withdrawal of water by means of irrigation ditches, which resulted in Kansas cities along the Arkansas River claiming diminished water flow. Students will read and review articles in the provided lists as well as research additional articles to support their positions.

*National Science Content Standards: A: Science as Inquiry;
G: History and Nature of Science
Information Literacy Standard: 1;2. Reading and Writing Standard: 4;
History Standards: 2; 2.1; 2.2; 4; Economics Standard: 3; 3.1*

Guide Connections: Pollution, Water Scarcity

3a. Is Water a Human Right? The International Conflict.

Who Wants Clean Water! Do You? (Ralph Russo)
Used with permission from
Yale New Haven Teachers Institute.

Objective: To enable students to demonstrate understanding both orally and in writing the causes of water contamination and water scarcity. To foster familiarity with and understanding of international initiatives to preserve water quality, reverse previous damage, and/or create infrastructure to better manage and encourage sustainable development of water resources. To encourage objective research, develop comprehension of complex international water rights conflicts, evaluate those conflicts and explain to others.

Description: The activity is aimed at eliciting thoughtful response from high school students considering water rights on an international scale. Since 1900, the global demand for water increased 900 percent. In parts of the world, primarily in much of Africa, the Middle East, Mexico, and India, the quality of drinking water is dangerously substandard. Growing population, increased consumption patterns, natural phenomena, and pollution threaten to make freshwater scarcity a global problem. Students will review water rights from an historical perspective and evaluate how precedence and property rights may have led to human strains on our worldwide water supply. Students will learn about current international water conflicts in Europe, Africa, the Middle East, and Asia, and choose one conflict to study closely. They will consider the UN's philosophical position that access to clean water should be recognized as a human right. They will analyze and evaluate causes, consequences and solutions and explain their conclusions either orally or in writing.

Guide Connections: H₂O: Earth's Essential Compound, Water Scarcity, Pollution.

*National Science Content Standards: A: Science as Inquiry;
G: History and Nature of Science
National Content Standards: History and Social Studies (see activity)*

4. Activity: Down the River

Objective: To foster an understanding of how human activities and land use affect water quality. To help students identify sources of pollution and how they contaminate water sources. To enable students to distinguish between point and non-point source pollution.

Description: Students will learn about sources of pollution by assuming roles of property-users along the Bronx River in New York. Students will connect certain activities/behaviors with the waste created and the pollutants discharged. Students will connect the hypothetical game to "real life" environmental circumstances affecting downstream communities all over the world; in particular, Luis's neighborhood of Hunts Point, in the South Bronx. (Meet Luis in Water Stories Supplement.) Students will explore and discuss pollution prevention, and why it matters.

*National Science Content Standards: A: Science as Inquiry;
C: Life Science*

Guide Connections: H₂O: Earth's Essential Compound, Pollution

4a. Connection: Water Stories Around the World

Although the river water in Luis's neighborhood is highly polluted, he is fortunate to drink from and bathe in filtered, piped water. In cities around the world, particularly in Asia, citizens have no choice but to bathe in and drink from foul rivers, such as the Ganges in India. Have students observe photos of the Ganges River, and discuss how the experience of those living near the Ganges might differ from those living by the Bronx River.

5. Connections: Potable Poison (1832 Cholera epidemic in NYC)

Objective: To conduct an epidemiological investigation and use hypothetical victim case studies and evidence to determine the source of cholera in the Five Point's neighborhood of New York City. To understand the science and methods of epidemiology by analyzing disease data and by developing hypotheses. continues

Description: Students will act as disease detectives as they investigate the 1832 Cholera epidemic that swept through New York City, most acutely in the Five Points neighborhood. Students will use victim biographies and other specific relevant details to analyze patterns of disease, human behavior, and contaminant exposure in order to hypothesize the cause(s) of the epidemic. As an extension, students will consider the economic and social aspects and impact of the Cholera epidemic, and extrapolate from that understanding as they look at other more recent disease outbreaks.

*National Science Content Standards A: Science as Inquiry;
F: Science in Personal & Social Perspectives*

Guide Connections: Water Pollution, Filtration

6. Experiment: Make Your Own Water Filter

Objective: To explore the mechanics of filtration and its importance as a health intervention to remove contaminants and pollutants from drinking water.

Description: Students will work together as a research team of hydro engineers to design their own water filters. The team will choose a variety of materials and different types of water samples to test and compare the effectiveness of the filters they have developed. They will repeat the process, comparing the second design results to their first attempts. They will compare their results to other teams and evaluate whose design was the most effective and why.

National Science Content Standards: A: Science as Inquiry; C: Life Science; E: Science and Technology; F: Personal and Social Perspectives

Guide Connections: Filtration, Pollution

7. Experiment: What's in Your Water?

Objective: To develop an understanding of water quality monitoring and measuring. To appreciate the methods and procedures utilized to keep water safe and healthy. To learn and demonstrate

knowledge of the chemical and physical properties of water, and methods and terminology related to filtration and water purification.

Description: Students will learn to perform some of the essential tests required for drinking water analysis. In small groups, students will collect water and analyze its pH, chlorine, nitrates and dissolved oxygen levels. They will share and compare data and respond to questions that encourage them to apply their knowledge to a wider context.

*National Science Content Standards: A: Science as Inquiry;
B: Physical Science; E: Science and Technology; F: Personal and Social Perspectives*

Guide Connections: H₂O: Earth's Essential Compound, Water Pollution, Filtration

8. Activity: Design a Solution

Objective: To introduce students to the concept of humanitarian design as a means of producing innovative and effective solutions to a variety of community needs. To enable students to think of their own creativity as a tool for good. To demonstrate how designing successful products for the developing world requires collaborative efforts between communities and designers. To encourage cooperative problem-solving.

Description: After reading the background information provided, students will read about several actual inventions or designs. They will form community councils and decide which design would best alleviate their community's most pressing problems, which they will identify based upon the background reading. Students will present their chosen design and an argument on its behalf to the class. In the optional Extension Activity, students will identify a community need that they believe is NOT met by the listed products/systems. They will then cooperatively design a solution, preferably using local materials and labor.

*National Science Content Standards: E: Science and Technology;
F: Science in Personal and Social Perspectives*

Guide Connections: Humanitarian Design