DROPS OF KNOWLEDGE FOR RIVERS OF CHANGE

GLOBAL TEACHING AND LEARNING MATERIAL

A hands-on guide to teaching
and learning about
water, sanitation, hygiene,
and the environment

SWAROVSKI
WATERSCHOOL

ACTIVITIES FOR WATER BASICS

ACTIVITY 3.1:   MAKING WATER SAFE TO DRINK

Depending on what we plan to use it for—drinking, cooking, personal hygiene, cleaning, or laundry—there are different types of treatments to make water safe. Home and school-based water purification makes good sense and "good cents" because they are simple, low-cost methods which help protect us from drinking or washing with unsafe water that can cause disease. For drinking water, treatments include disinfecting the water with heat (boiling), chemicals (chlorine), or sunlight. Another common treatment is to pass the water through a ceramic (clay) or sand filter.

Boiling is one of the most effective methods to make water safer to drink by killing disease-causing organisms, including viruses, bacteria, and parasites. If the water is cloudy or contains debris, it must be filtered first. Then the clear water must be brought to a rolling boil for three minutes and then cooled.

After an emergency, such as a flood, hurricane, or earthquake, drinking water may not be available or safe. As a result, residents often have to find a source of safe drinking water or know how to treat their water for drinking, cooking, washing hands, and brushing teeth. Even without disasters, many types of foreign materials and contamination make their way into our waterways. In developing countries, inadequate infrastructure for water treatment poses great danger to people's health and to the ecosystem.

DID YOU KNOW? Water that has been boiled to purify it should be handled carefully, stored in a covered container, and used within 24 hours to prevent recontamination.

Sunlight can be used to disinfect small quantities of water, by filling clean bottles with pre-filtered, clear water and setting them out in the sun (usually on rooftops) for six hours.

SOURCE: UNICEF, Water, Sanitation and Hygiene for Schoolchildren in Emergencies: A Guidebook for Teachers, New York: United Nations Children's Fund, November 2011, p. 21. Open PDF from: www.unicef.org/wash/files/WASH_in__Schools_in_Emergencies_Guidebook_for_teachers_.pdf.

In this activity, the participants will add a variety of pollutants to the water and experience the ease or difficulty in removing them by using different kinds of filters. While the experiment is not intended to teach children how to filter water, it is designed to encourage curiosity and stimulate experimentation, developing students'

problem-solving abilities related to methods for making water safe.

Time: 50 minutes / **Thematic Areas:** Health, Science / **Goal for Learning:**
Introduce the concept of filtering water at school or at home, and encourage
students to learn more about making water safe.

Materials: ☐ 2 large, wide-mouthed clear glass or plastic jars / ☐ Water (cool
or room temperature) / ☐ Miscellaneous small items, such as gravel, seeds, leaves,
paper clips, shredded paper, flower petals, seasoning, such as pepper, cinnamon or
other organic or nonorganic material / ☐ Small objects made of iron and a magnet,
if available / ☐ Liquid food coloring / ☐ Strainer (large enough to cover the top of
the jars) / ☐ Basket-style coffee filter, light cloth or robust paper towel

Optional Extension: ☐ One-liter clean/recycled soda bottle(s) filled with
dirty water / ☐ WADI device (a solar water disinfection device)

"I was selected to
participate in Escola
d'Agua (Swarovski
Waterschool)
because I like to
show my friends and
family how to use the
clay water filters."

—ODIRLE IA, AGE 12,
E SCOLA SÃO BENIDITO,
AMAZON RIVER.

SELF MADE CLAY WATER FILTER,
SWS BRAZIL

ACTIVITY STEPS:

1 Fill one jar more than halfway with water.

2 Add the miscellaneous small items, iron objects, and food coloring.

3 Let the mixture sit for a while, allowing the pollutants to settle. Ask students to notice the turbidity (cloudiness or haziness) of the water in the jar and to guess ways to make the water clean again

4 If using iron objects, wave the magnet around under the water and attempt to pull these objects out of the jar.

5 Hold the strainer over the second jar and pour the contents from the first jar through the strainer. Notice and discuss what was filtered out and what is left in the water.

6 Attach the coffee filter or paper towel to the top of the empty jar and pour the water through, filtering it one more time.

7 Use other types of household materials, such as a cotton t-shirt or a kitchen colander to filter water. Also try the filtering process with sand or charcoal, as available.

Optional Extension:

8 Put one or more recycled plastic soda bottles filled with contaminated water into the sun. Place the WADI device next to the bottle(s). When the smiley face appears, the water is safe for drinking.

LOCALLY ADAPTED WATER FILTER
ACTIVITY, SWS CHINA

OBSERVATION AND DISCUSSION:

Talk about how easy or difficult it is to remove materials and contamination from the water. After it is filtered, does the water return to normal? Is it clear and colorless, or do some stubborn contaminants stay behind? Talk about what kinds of contaminants these might represent (chemicals, bacteria, etc.) How could you filter these types of contaminants?

Learn more and talk about the ways water is actually prepared for human use in your area. How is sewage treatment handled? If there is a water treatment plant nearby, consider making arrangements to visit. To find local water utilities, refer to the national environmental protection agency, ministry of environment, or rural development agency. Here are two examples: Uganda Ministry of Water and Environment, Rural Water Department, www.mwe.go.ug/index.php?option=com_content&view=category&layout=blog&id=19&Itemid=182, and U.S. Environmental Protection Agency, Local Drinking Water Information, http://water.epa.gov/drink/local.

Compare and contrast the means of sanitation in other areas of the world.

Learn more about water, sanitation, and hygiene (WASH) at the UNICEF websites: "Water, Sanitation and Hygiene" (www.unicef.org/wash) and "WASH in Schools" (www.unicef.org/wash/schools). To find out more about water and health, see: World Health Organization, "Health Topics: Water," www.who.int/topics/water/en, which is available in Arabic, Chinese, English, French, Russian, and Spanish.

ADDITIONAL RESOURCES:

CELF, "Meet the Pathogens," Chappaqua, New York: Children's Environmental Literacy Foundation, 2014. Available at: http://www.celfeducation.org/Websites/celf/images/Meet%20 the%20Pathogens%20.pdf

Prüss-Üstün, Annette, et al., Safe Water, Better Health, Geneva: World Health Organization, 2008.

Open PDF from: http://apps.who.int/iris/ bitstream/10665/43840/1/9789241596435_eng.pdf

USAID Hygiene Improvement Project and Academy for Educational Development. "A Compendium of Resources: Integrating Water, Sanitation and Hygiene into Primary Schools and Teacher Training," Washington, DC: United States Agency for International Development, June 2009.

Open PDF from: http://pdf.usaid.gov/pdf_docs/Pnadw496.pdf

Water Project, "Lesson Plan: Dirty Water ... So What?" Concord, New Hampshire,

http://thewaterproject.org/resources/lesson-plans/dirty-water-so-what

Water Supply and Sanitation Collaborative Council, "Global WASH Campaign,"

http://wsscc.org/global-sanitation-fund/

The WADI is a solar powered UV-measurement device that serves as an indicator for the process of solar water disinfection.

https://www.helioz.org/index.php