ACTIVITY 7.1

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

ACTIVITY 7.1: THE SOIL FILTER (WATER AND SOIL) (Adapted from Swarovski Waterschool Austria)

Good-quality soil is essential for plant growth, the recycling of dead materials, regulating and filtering water flow, supporting buildings and roads, and providing habitats for many plants and animals. Healthy soil provides us with food and filters our water.

An ecosystem can be disturbed by natural disasters (hurricane or drought) or human causes such as roadways and other construction, and by the use of pesticides and other chemicals. When we mismanage, pollute, or overexploit our land, we cause a disruption of the ecosystem that affects the land's fertility and healthy production capacity.

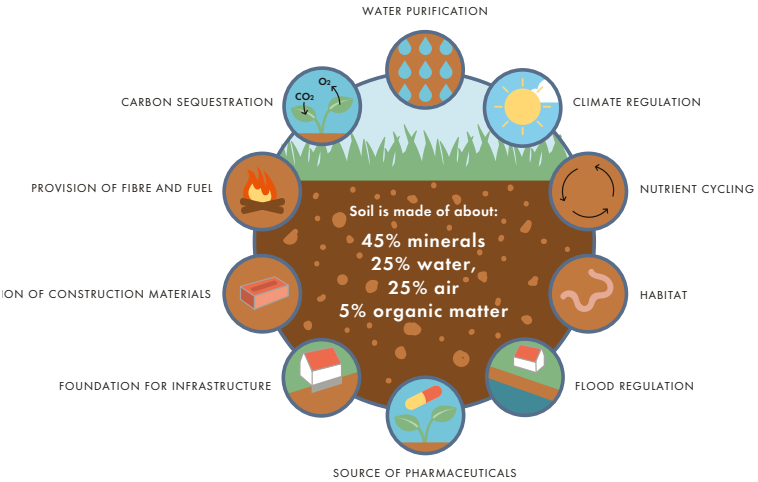
The simple experiment in this activity is designed to promote students' understanding of water in the Earth and stimulate discussion on aquifers. Before beginning the activity, prepare the students by discussing the following questions: When water flows across roads, paths, or other surfaces, the dirt and debris it picks up are often clearly visible. Rainwater will also contain various pollutants that we cannot see, such as fertilizers from agriculture. How can it be that we still find clean water? Why can you drink spring water that gushes out of the ground? How does rainwater become clean in a natural system?

Time: 30 minutes / **Thematic Areas:** Science, Mathematics / **Goal for Learning:** Gain an understanding of how water sinks through the various layers of soil and is filtered and cleaned in the process; become aware of the natural purification system of the soil and the fact that the cleansing effect can decrease with heavy contamination.

Materials: ☐ 1 plastic cup sized a half-liter (2 cups), plus 2 transparent cups of a quarter-liter (1-cup) size / ☐ Small knife or scissors / ☐ Drinking straw / ☐ Glue or caulk applicator, duct tape or packing tape / ☐ Clean gravel, sand, soil, and moss / ☐ 1 shallow bowl / ☐ Ink, washing-up liquid, salt, coffee, oil, etc. (the "contaminants") / ☐ 1 gallon of water, or running water, if available from a tap

35 WBCSD, "Facts and Trends: Water," Geneva: World Business Council for Sustainable Development, 2006, p. 1. Open PDF from: www.unwater.org/downloads/Water_facts_and_trends.pdf. **36** UNEP, Water Security and Ecosystem Services: The Critical Connection, Nairobi: United Nations Environment Programme, March 2009. Open PDF from: http://www.unepdhi.org/publications. **37** EPA, "A Watershed Approach," Washington, DC: U.S. Environmental Protection Agency, September 12, 2013, http://water.epa.gov/type/watersheds/approach.cfm.

ACTIVITY 7.1



Source: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/oh/soils/health/?cid=stelprdb1143889
http://www.fao.org/soils-2015/en/

WATER FILTER ACTIVITY, SWS BRAZIL

ACTIVITY STEPS:

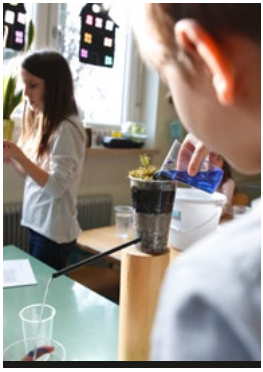
1 Take the larger plastic cup and make a small hole in the side toward the bottom with a knife or scissors. The hole should be big enough that the straw fits in well.

2 Stick the straw halfway into the cup so that one end sits in the center of the bottom of the cup. Then glue or caulk the edges around the straw, on the inside and outside of the cup, so the straw is secure and watertight.

3 Add a layer of gravel in the bottom of the cup, making sure it covers the straw, then add layers of sand and soil, placing the moss on top.

SOIL FILTRATION ACTIVITY, SWS AUSTRIA

4 Put the cup on a platform, such as a block of wood or a sturdy cardboard box, and place the shallow bowl under the end of the straw.



SOIL FILTER, SWS AUSTRIA

5 Pour clean water from one of the smaller cups into the larger cup (the "filter") and watch the water sink. Discover how groundwater reaches the bottom of the cup, then flows out of the straw like a spring.

6 Now, test the function of the soil filter by making a mixture of "contaminants" and water in one of the smaller cups. Pour a portion of contaminated water into the soil filter and observe whether it is possible to purify the water in this way. Compare the appearance and smell of the water that has flowed through the soil filter with the remaining contaminated water in the cup. Note that a similar process happens with aquifers (underground water), and that there is clean water in the soil that we can extract and use in our daily life.

OBSERVATION AND DISCUSSION:

After the first filtering of the contaminated water, pour the water from the shallow bowl back into a cup. Then pour the purified water from the shallow bowl repeatedly through the soil filter. Does the water get cleaner and clearer each time it goes through the cycle? Or is there a point where the filter is not as effective?

Even if the filtered water looks clean and clear, beware! It still may not be safe to drink.

ADDITIONAL RESOURCES:

Dr. Dirt K–12 Teaching Resources, "Soil Is a Filter," www.doctordirt.org/teachingresources/soilfilter

Oregon Agriculture in the Classroom Foundation, http://AITC.oregonstate.edu

Play with Water, "Introduction into the Water Cycle," Coordinated by the University of Applied Sciences Zurich, https://www.zhaw.ch/de/lsfm/dienstleistung/nachwuchsfoerderung-angebote-fuer-schulen/play-with-water/cleaning-water-with-plants/introduction-into-the-water-cycle/

Soil Science Society of America, "Soil Experiments and Hands-On Projects," www.soils4kids.org/experiments

SWS BRAZIL

DID YOU KNOW? On the Earth today, there is just as much water as when the planet was formed. There is no water lost; everything remains in the circuit.

The distribution of water volumes, however, is unequal geographically and seasonally. For example, the groundwater level near a river rises and falls as the water level in the river becomes higher in rainy seasons and lower during dry seasons.

SOURCES: Lenntech, Water Facts and Trivia, http://www.lenntech.com/water-trivia-facts.htm, US Geological Survey's Water Science School, The Watercycle: Freshwater Storage, May 2016 http://water.usgs.gov/edu/watercyclefreshstorage.html

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