

THE AMERICAN SOUTHWEST: ARE WE RUNNING DRY? WATER RELATED HEALTH ISSUES

Post Screening Activity 3 Water Quality

Overview:

What makes water drinkable? How are pathogens and sediment removed from water to keep our water supply safe? Throughout this activity students will construct an aquifer and observe how contaminants are filtered out.

Objectives:

- Identify water quality standards
- Measure dissolved oxygen, Ph, salinity, turbidity, and temperature of water
- Create a process to improve water quality

Materials:

- Water Samples
(if available gather water from nearby lakes, rivers, or washes)
- Thermometer
- Stream table
- Rock, soil samples, sand
- Ph test kit or test strips
- Salinity test kit
- Dissolved oxygen test kit
- Sodium carbonate
- Phenolphthalein
- Distilled water

Background:

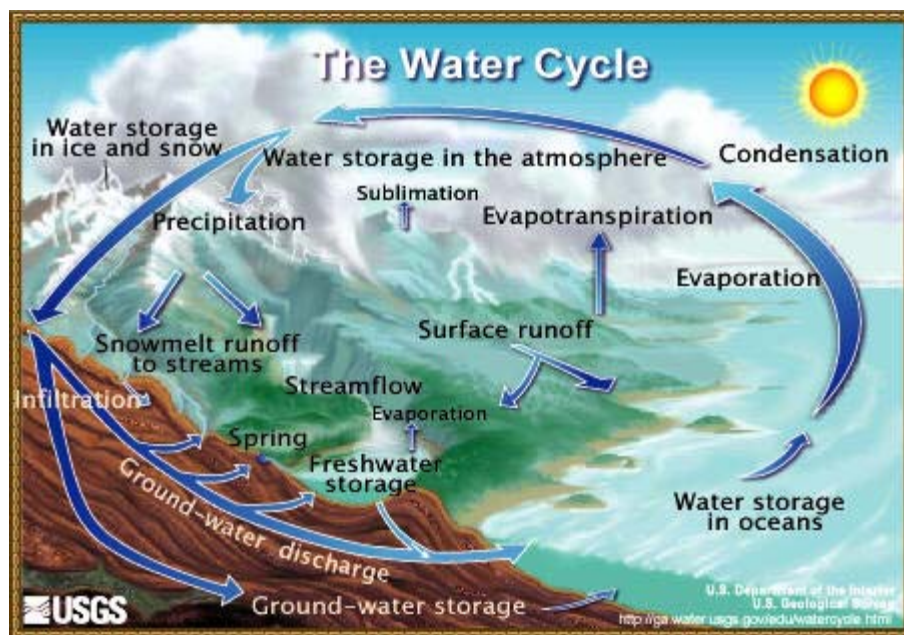
In 1972, the Federal Water Pollution Control Act, or the Clean Water Act, was passed to, "restore and maintain the chemical, physical, and biological integrity of the nation's water." States agreed to meet minimum water quality standards, monitored by the Environmental Protection Agency.

The Nevada Administrative Code (NAC), <http://www.leg.state.nv.us/nac/nac-445a.html> describes two types of water quality standards in narrative and numeric form. The first type applies to all surface waters in Nevada and requires waters to be "free from" a variety of pollutants including those that are toxic. The numeric standards are for the amounts of typical pollutants.

National use of pesticides grew from about 540 million pounds in 1964 to about 1.1 billion pounds in 1993, according to the USGS. Eutrophication is a term which describes the process by which excessive nutrients enter the water as by-products of human activities from fertilizers to sewage treatment discharges, disturbing the water quality and enhancing plant growth. Algae are usually prevalent.

Activity:

1. How is water quality determined? Ask students how many drink bottled water, filtered water, or tap water. Discuss the reason behind the choice to drink the various types of water. Is our tap water safe? Show students the Southern Nevada Water Authority Website http://www.snwa.com/html/wq_testing_contaminants.html and discuss the standards met and exceeded by the water authority.
2. Show students two different distilled water 150 mL samples (one with sediment at the bottom and a second clear treated with 30 drops of sodium carbonate and ask them which one they would drink? Once their choice has been made, add a phenolphthalein solution to show the one carrying pathogens. Can you visually determine potable water?
3. Many people depend on groundwater for their daily needs. Is it safe to drink? How are contaminants removed from an aquifer?
4. Your mission is to use the available materials (rock, soil, sand, stream table, and water sample) to filter the contaminated water sample. Use available test kits to measure water quality prior to the test and at the conclusion.



From the USGS

5. Students should work in small groups to develop a natural filtration system with provided materials. All aspects of the scientific method should be included in the group's final lab report. Controlling variables and measuring amount of materials should be emphasized.
6. Share and discuss findings.

Evaluation Rubric:

Exceptional	Acceptable	Unacceptable
Scientific method steps were followed; observations were thoroughly recorded; data was graphically displayed; conclusions were based on data collected and questions for further experimentation were included.	Scientific method steps were followed; observations were recorded daily; data was displayed; conclusions were based on data collected	Scientific method steps were not followed; observations were incomplete or inaccurate; conclusions were not supported

Extension:

(Groups focusing on the quality of water position should consider researching which contaminants are found in their area's water and how they are removed. Contact your local water agency to request a water analysis report or consumer confidence report. The federal Safe Drinking Water Act requires municipal water agencies to report annually on the quality of the water supply.)

What is the difference between point-source contamination and non-point source contamination? How are pathogens and other contaminants removed from the water? Include this information in your group debate.

Web Resources:

Ocean chemistry <http://www.unctv.org/waterquality/coastal/>

Groundwater utilization <http://groundwater.sdsu.edu/>

Groundwater quality <http://ga.water.usgs.gov/edu/earthgwquality.html>

Pesticides in groundwater <http://ga.water.usgs.gov/edu/pesticidesgw.html>