

# Water Filtration

## A Guide to Combat Water Pollution

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### Lesson Overview

**Targeted grade level – 6<sup>th</sup> to 12<sup>th</sup> grade**  
**Lesson time – 1hr to 1.5 hrs**

The aim of this lesson is to prompt students to contemplate the factors contributing to water pollution and explore natural methods of filtering contaminated water. Encouraging healthy competition among students fosters active engagement and empowers them to apply their newfound knowledge effectively. Emphasizing local instances of water contamination, such as vehicle emissions, agricultural practices (including fertilizer and runoff), and wildfires, serves to contextualize the lesson and motivate students to extend their learning beyond the classroom.

### Guiding Questions

- Where does your water come from?
- Do you filter your water? What are ways that water gets filtered for drinking? How does water get filtered naturally?
- What makes water non drinkable? Drinkable?

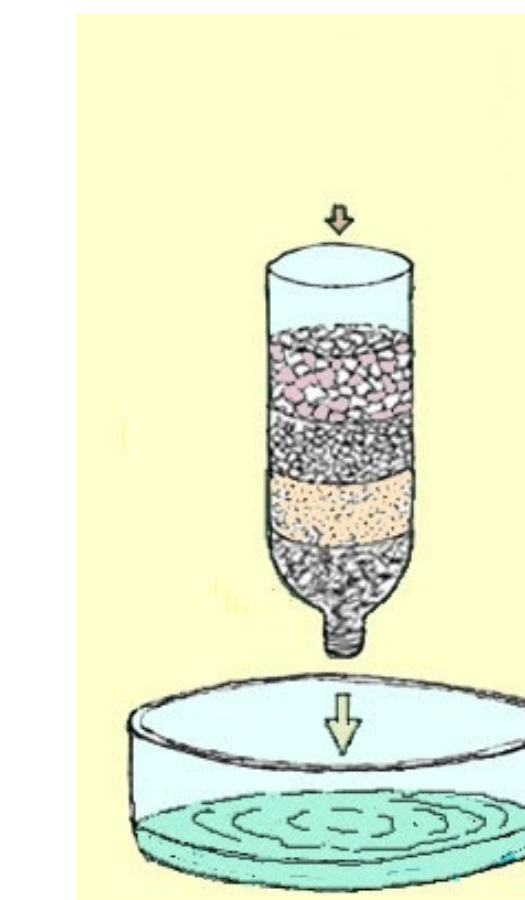
### Introduction

The human body can typically survive for about 3-5 days without water. Dehydration sets in rapidly, leading to intense thirst, fatigue, and eventually, organ failure, culminating in death. Symptoms progress swiftly, with an individual transitioning from mild thirst and sluggishness on the first day without water to organ failure by the third day. Although humans may have access to water, this does not mean that the quality of water is safe for human consumption. Having clean water to drink is becoming more and more scarce due to human activity and the effects of climate change. In this lesson you will learn how to effectively filter water using the materials provided.

### Materials and Procedure

#### Materials Needed

- Presentation, videos or posters about water filtration methods
- Samples of different filtration materials (sand, gravel, activated charcoal, cotton, pebbles, etc.)
- Containers of dirty water (representing contaminated water)
- Containers for clean water
- Scissors
- Filtration apparatus (e.g., funnels, filter paper, plastic bottles, rubber bands)
- pH strips



#### Procedure

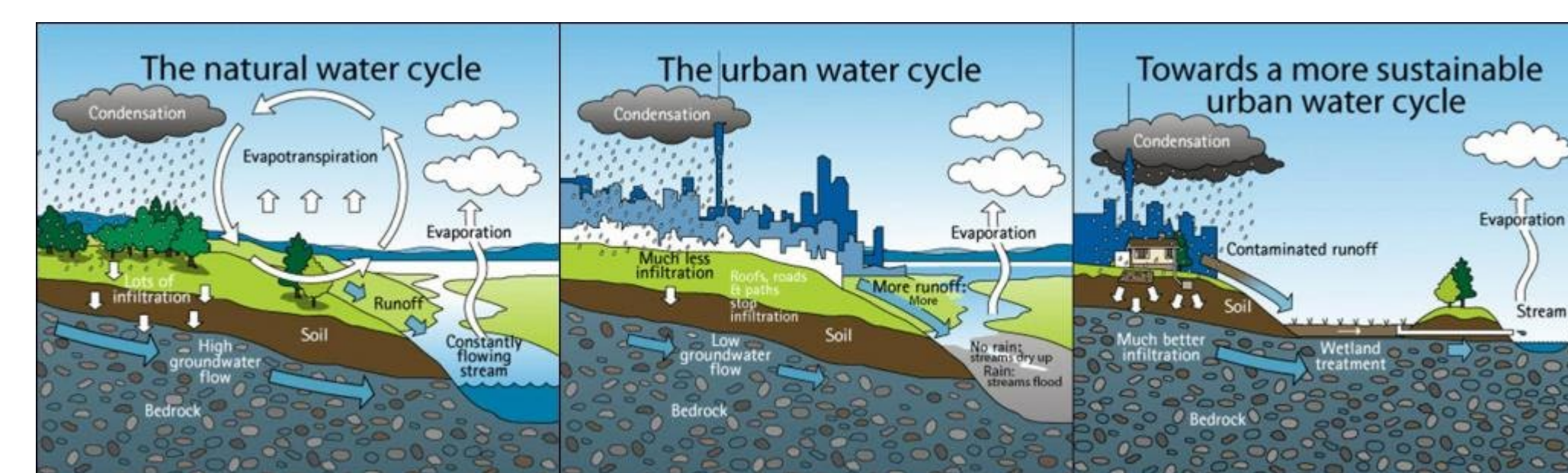
- Describe to students how filters function and have them research any materials with which they are unfamiliar (usually zeolite and activated carbon, if using)
- Students should work collaboratively in groups of 2-3 and participate in discussions regarding filtration methods and outcomes. This group dynamic promotes teamwork and knowledge-sharing throughout the activity.
- Students will participate in a hands-on activity to construct water filters. Foster healthy competition among students to determine whose filter produces the cleanest water.
- Encourage students to build upon their understanding and explore additional techniques for water purification

**Engage:** Students will view the video below to understand the dynamics of water movement in soil. Through this visual aid, they will grasp the mechanisms by which activated carbon purifies water and gain insights into the human influence on the water cycle.

- <https://www.youtube.com/watch?v=RlscZuGejis>
- <https://www.youtube.com/watch?v=oG9vIboMMEw>
- <https://www.youtube.com/watch?v=Q8B4tST8ti8>

**Explore:** Students will be given materials and a set time of 20-30 minutes to build their own water filters.

**Elaborate:** After the procedure, students will be asked to reflect with a group next to them on what worked and what didn't work when building their water filters. Students will answer guiding questions as an exit ticket.



Me and my colleague's building a water catchment system for a medicinal garden in Universidad Interamericana Barranquitas, Puerto Rico

### Teaching Tips

**Preparation:** Teachers need to have background knowledge of what contributes to pollution in waterways such as aquifers, rivers, creeks, and hydrologic cycle. Emphasize health effects of drinking contaminated water. Briefly explain cause and effect of bottled water (i.e. greenwashing, pollution of plastic, who needs/ doesn't need bottled water and who uses bottled water the most).

- Encourage competition between students
- Students should research the definition of pure water, as it is defined for safe human consumption
- If you have time allows, discuss the meaning of pH (acidity or alkalinity of the solution), the ideal pH of drinking water, and measure the pH of the tap water in your school. For contrast, consider having students measure the pH of other common liquids such as vinegar, soda pop, and baking soda dissolved in water

### Lesson Objectives

- Students will:
- Understand the importance of clean water and its significance
  - Learn about toxins in water such as agricultural runoff, acid rain, and car oil runoff and how water filtration systems can help address this
  - Design and build their own water filters using common items

### Career Corner

By shedding light on the careers in environmental engineering and water quality management, we not only showcase the practical applications of water filtration and sustainability principles but also highlight the crucial role that skilled professionals play in addressing global issues related to water quality and accessibility. Through these careers, individuals can actively engage in designing and implementing innovative solutions, leveraging their expertise to safeguard precious water resources and ensure a healthier, more sustainable future for communities worldwide