

WATER SCIENCE

LESSON PLAN

Overview

This lesson will introduce students to the topics of water quality and water filtration. Students will collect water samples and assess the water quality. Using collected water samples, students will also design, construct, and test a water filter's efficacy.

Objective

Students will gain a better understanding of water quality and the process of water filtration.

NGSS Standards

LS2.C: Ecosystem Dynamics, Functioning, and Resilience
ETS1.B: Developing Possible Solutions

Ocean Literacy Standards

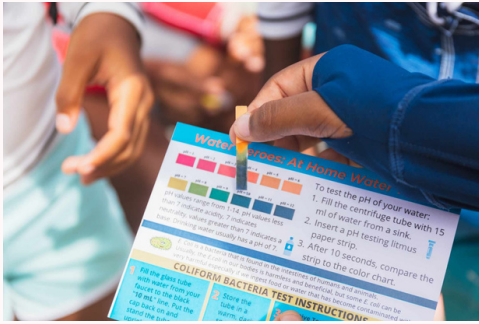
6. The ocean and humans are inextricably interconnected.

Background – The value of water!



Water is a **natural resource** that we depend on for our daily needs; this includes our health, sanitation, energy, and agriculture to name a few. About 71% of Earth is water which is in our oceans, lakes, streams, locked in ice, and even under the ground. Water can become contaminated by pollutants that could make the water unsafe to utilize; let's explore this idea further.

1. What parameters do we test for?



When testing water quality, there are several parameters that are tested for, some of which are summarized below:

- pH: A measure of how acidic or alkaline a solution is; pH values range from 1-14. The lower the number (1-6), the more acidic the solution whereas the higher the value (8-14), the more alkaline. 7 is considered neutral
- Heavy metals: These may be present in water from the result of corroded pipes and could have health impacts.
- Coliform bacteria: This type of bacteria is commonly found in the guts of animals and could also present health challenges if consumed.

2. Where could the contamination come from?



Water quality contaminants vary in type and by source:

- Coliform bacteria can enter our water from the feces of animals like birds and frogs.
- Trash and other debris may contain hazardous chemicals that could enter water.
- Heavy metals like lead and copper can enter water from corroded pipes.

3. How can water be “cleaned” / purified?



Water can be “cleaned” through a variety of approaches:

- Water filters can be used to remove specific contaminants from water like sediment, leaves, bacteria, and organic compounds.
- Water can be boiled as a means to remove pathogens like bacteria and viruses.

4. Why is water quality testing important?



Testing water quality is paramount because we all depend on having access to safe and clean water for:

- 1) Recreational needs like swimming and snorkeling.
- 2) Consumption to maintain hydration.
- 3) Corals and other marine life can be sensitive to changes in water quality.
- 4) Sanitation needs such as showering, brushing your teeth, washing your hands, etc.

Overview of the Water Science Activity

Equipment

During the Water Science activity, the following equipment will be used/needed:

- Water sampler
- Water Heroes water quality testing kit
- Water Heroes water filtration kit

Attire

Students should have the following:

- Comfortable clothing
- Closed-toe shoes
- Hat

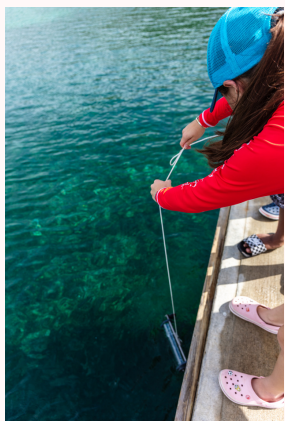
Safety

The following precautions will be taken during the Water Science activity to ensure safety of all participants:

- **Safety briefing administered prior to the start of activity.**
- **Gloves will be worn while using chemical reagents.**
- **Filtered water will only be used for demonstration purposes.**

Explore

Examples of students collecting water, assessing water quality and testing designed filters are pictured below.



Overview

- Organize into small groups and receive their equipment.
- Receive the safety briefing and introduction to water quality testing.
- Students will safely collect a water sample which will be used to conduct the water quality tests (testing for pH and coliform bacteria).
- Students will use the Water Heroes water filtration kit to design, build, and test their filter.

Duration

Approximately 1 hour

Critical Thinking

While conducting the Water Science activity, use these prompts to encourage further discussion:

- How can you tell if water is contaminated?
- How could you improve upon your filter's design?

EVALUATION:

Evaluation Rubric:

Can identify 3 common water quality parameters tested for.

1

2

3

Can identify 3 ways water can be “cleaned” / purified.

1

2

3

Needs work

Great

Excellent

1

2

3