



Water Microbiology

GLOBE		Associated SDG	Type of Activity
Sphere	Protocols	Associated SDG	Type of Activity
Atmosphere	Precipitation.	6 (Clean water and	
Hydrosphere	Water temperature. pH. Alkalinity. Electrical conductivity. Transparency. Salinity. Nitrates.	 6 (Clean water and sanitation) 7 (Affordable and non-polluting energy) 12 (Responsible production and consumption) 13 (Climate action) 14 (Underwater life) 15 (Life of Terrestrial Ecosystems) 	Exploratory
Bundle	Agriculture ENSO Oceans Rivers and lakes Water cycle. Water quality Soils Meteorology		

Overview

Through this activity students understand that water from a river or any body of water can be clean, but not drinkable because it is not treated. Students will build a homemade microscope and will be able to observe two water samples: one from the tap and the other from a river.

Time

1 class

Prerrequisites

Basic knowledge of ecosystems, ecology, conservation, and meteorology.

School Level

Elementary and high school students

Purpose

- To understand the importance of microorganisms present in water and their behavior • in their environment.
- To understand the relationship between water quality and human health.



Student Outcomes

- To bring the student closer to understanding the microbiology of water.
- To design a simple microscope model.

Introduction

Water, an essential element for humans, animals and plants, frequently acts as a vehicle for the transmission of microorganisms.

International standards establish or recommend quality requirements for water for human consumption. In general, the standards establish that water is bacteriologically fit for consumption if it is free of pathogenic microorganisms of enteric and intestinal parasitic origin.

In order to study the relationship between water quality and human health, it is necessary to introduce the concept of microbiology, and from this to assess the presence of microscopic organisms in drinking water, the competitive and/or synergistic effects of the different species and the possibility of applying disinfection technologies.

The microbiological variability of natural waters encompasses numerous organisms and includes eukaryotic cells (algae, protozoa and fungi), prokaryotic cells (bacteria) and viruses (microorganisms with zero synthesis capacity).

The importance of knowing the microorganisms present in water bodies and their behavior in their environment lies in the possibility of implementing technologies to eliminate them and thus control waterborne diseases.

Guiding Research Questions

What is the microbiological quality of our school water?

How do human activities affect water bodies?

Scientific Concepts

- Human uses of water
- Water availability
- Water quality
- Ecology

Material and Tools

- 1 long-range green laser pointer
- Sample of water from a puddle or river.
- Tap water sample
- Object to act as a holder
- 2 large syringes
- Rubber bands
- Adhesive tape

What to Do and How to Do It

Beginning

You have two clear water samples that appear to the naked eye to be the same and clean. The students must find out if they are drinkable.

Choose the surface on which to project the image, it can be the parde, if it is white and smooth. Otherwise, you can place on it a screen or large white paper.

Development

Perform the following experiment to build a homemade microscope:

- 1. Create a structure with the stand and rubber bands or tape to keep the syringe placed upright.
- 2. Take a water sample with the syringe.
- 3. Fix the syringe with rubber bands or adhesive tape.
- 4. Press the syringe so that a drop is hanging, but does not fall.
- 5. Place the laser pointer aligned with the drop of water so that it passes through it, at a distance of 1 to 2 cm.
- 6. Hold down the button on the pointer using a rubber band to press it and make sure it passes through the drop and the image is projected.
- 7. Turn off the light.
- 8. What did you observe? Tiny microorganisms will appear moving. They managed to magnify the image by 1000.
- 9. Repeat the same thing using the other syringe and tap water. What did you observe? In principle, you should not see any microorganisms.
- 10. You can add a third sample of tap water with some food coloring to give it a nondrinking appearance. In principle, no microorganisms should be present. You can also add a few drops of sodium hypochlorite (Bleach - Clorox) to the river water and observe if it has less or no microorganisms.

Closing

From the observation students will be able to construct their own microbiological catalog of species. Ask students to draw the observed microorganisms. Additionally, they can classify and identify them according to their characteristics (shape, size, type of movement).

Bibliography

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