

Measuring Water Quality and Contamination

Slide 1, Measuring Water Quality and Contamination: Water quality is extremely important for us in The Bahamas - for both our freshwater and saltwater. As we've learned, freshwater is necessary for our survival, so having the best quality of water is necessary for our comfort and health. Today we will learn what water quality is, and how best to measure water quality and contamination.

Slide 2, Where does our main source of freshwater come from?:

Where does our main source of freshwater come from again?

ANS: Groundwater. Remember, 90% of the countries water in The Bahamas is found in "freshwater lenses" in the ground. Because these lenses are so shallow, they can be easily contaminated, and we'll talk about that later in this presentation.

Slide 3, What is water quality?: Although most of the country's natural freshwater resource is found in groundwater, there are new methods of making fresh water, such as reverse osmosis (which we've already learned about) which helps with water quality in The Bahamas.

Water quality is basically just the condition of water, including chemical, physical and biological characteristics.

Upper Primary

Some chemical characteristics of water include a high reaction rate with other compounds, it's amphoteric nature (meaning it can act as both an acid and base), and having a great source of hydrogen (meaning it can be oxidized or reduced in chemical reactions). Some physical characteristics include it is colourless and odorless, has a high specific heat, has a high

melting and boiling point and a high surface tension. These characteristics make it easy to check for water quality.

Slide 4, 90% of the countries freshwater is found in freshwater lenses lying on top of saltwater: This lens is called the Ghyben-Hertzberg Lens (pronounced GUH-BIN HURTS-BURG). Can you say that? This shows how freshwater floats on top of saltwater. Freshwater is lighter in weight than saltwater, so it is found on top. New limestone deposits (what our ground is made up of in The Bahamas) that are porous (like a sponge) have the best lenses. Some human activities can mess up this lens, causing saltwater to leak into the freshwater. This is called saltwater intrusion.

Slide 5, Early sources of freshwater supply: In earlier times, The Bahamas relied on water from rain and dug wells in the ground.

Slide 6, Problems with early sources of freshwater supply: However, rainwater collection supplies an EXTREMELY small amount of freshwater used in The Bahamas. It is not a reliable source because it is seasonal, meaning we only have a lot of rain certain times of the year. Shallow dug wells can lead to contamination of groundwater, making groundwater an unsafe water source.

Slide 7, Reverse Osmosis, what's that?: Remember - reverse osmosis (RO) is a process where saltwater is passed through a membrane (that removes toxins and other materials) and leaves behind freshwater.

Slide 8, Photo of RO system: This is a photo of a reverse osmosis system in The Bahamas. Although it is an expensive process, it is one of the best ways for us to get accessible, clean water by utilizing the resources that we have as an island nation.

Slide 9, Threats to groundwater supply: Humans, just like you and I, are the main threats to our groundwater supply both here in The Bahamas and

around the world. But what are the actions that we do that REALLY effect the groundwater?

Upper primary school

Human-induced threats are called “anthropogenic threats”, ie, caused by humans.

Slide 10, Oil spill photo: This is an example of a human threat- an oil spill in Grand Bahama after Hurricane Dorian. Oil drilling is done in order to covert that oil to gasoline and other products, but sometimes oil spills happen, polluting not just the ocean but also groundwater, as seen in the photo. This is very hard to clean up once it’s happened.

Slide 11, Landfill photo: This is an example of solid waste disposal at a landfill in Marsh Harbour, Abaco. This solid waste comes from homes, restaurants, construction sites and more. Without proper management of these landfills or laws to regulate them, it can create a toxic environment for our groundwater systems.

We can help with this threat by using less waste at home, properly disposing of our waste to designated dumpsites, and not littering!

Slide 12, Farm photo with bees: Fertilizers on farms!

This is known as “diffuse pollution”, which means that we cannot be certain as to where the pollutants came from exactly. Pesticides and fertilizers can enter our groundwater supply from runoff or even through the porous limestone bedrock. Even the bees flying in the air don’t like them! Using natural fertilizers with no chemicals as well as shopping locally for fresh fruit and vegetables is very helpful to this threat.

Slide 13, Septic tank photo: Septic tanks. Septic tanks have the potential to contaminate groundwater if they are not properly designed or taken care of. If we do not follow the rules set out by our government to build

them properly (which means digging them to the correct depth, maintaining them etc), then our home may be a threat to our groundwater supply.

Slide 14, How do we test water quality?: Water quality can be tested in a number of ways. The most common ways are testing to see how acidic water is (pH), looking to see how clear the water is (testing for turbidity) or measuring dissolved oxygen (the amount of oxygen that is present in the water).

Slide 15, The pH scale: The pH scale is one of the easiest ways to check that our water is good. Have you seen this before? It tells us how acidic, neutral or basic (alkaline) a substance is. Litmus paper, litmus liquid or indicators are the easiest way to measure pH. When you use litmus paper, litmus liquid or indicators, you insert them into the liquid, and the liquid will change color. Whatever color it changes determines what it is on the pH scale (red=acidic, green=neutral, purple=basic).

The average pH of groundwater is between 6-8.5.

Slide 16, The pH scale...what's that?: Let's watch a video that tells us what the pH scale is all about.

https://www.youtube.com/watch?v=V5Mq_cL9Bck

Slide 17, How do we control these threats?: Threats to water quality and contamination are mitigated by government enforcement, best practices and water quality control from local providers (Water and Sewage Corporation of The Bahamas). We can do our part by respecting the law and being responsible with our water usage. WSC is responsible for the water quality control of our public water systems in The Bahamas. As we always like to emphasize, education is one of, if not the most important way that we can control these threats. Tell your friends what we can do to help water quality, like following rules and regulations, being a responsible citizen, using less waste and more!