

Identifying Sources of Freshwater in The Bahamas Presentation Script

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Introducing Lesson 3, which is identifying freshwater resources in The Bahamas. Today, we will explore the term resources and the various forms of resources in regards to freshwater.

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What is a natural resource?

A natural resource is anything that can be found in nature, not made by man, and can be used by people. Earth's natural resources include: light, air, water, plants, animals, soil, stone, minerals, and fossil fuels. Natural resources can be divided into two groups: renewable resources and non-renewable resources.

1. Renewable resources are ones that can be used again and again. For example, soil, sunlight and water are renewable resources.
2. A non-renewable resource is a resource that does not grow and come back, or a resource that would take a very long time to come back. For example, coal is a non-renewable resource.

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We know that water was included as a renewable resource; do we think that, freshwater is a renewable resource. Yes, freshwater is a renewable resource! Unfortunately, sometimes water is not easily renewed. Fresh water is not evenly distributed around the world, and its availability is really important for where living things can exist . Getting enough fresh water is a serious problem in many places and water pollution is a world-wide problem affecting even areas with a large water supply. So, even though water is a renewable resource, the supply of fresh surface water is limited in some places. So water is both a RENEWABLE and LIMITED resource. Freshwater is a limited resource and this is due to its high demand. A limited resource is one that can run out; there might not be enough for everyone in the future. Humans make the water recycling process difficult for Mother Nature to keep up with. How do you all think that we as humans make it hard for Mother Nature to keep up with the water recycling process? As population and industries grow, the demand for water becomes too high, which results in *water scarcity*. Water scarcity is a lack of drinkable water available in a given area.

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Earlier we spoke about how water is unevenly distributed throughout the world, but water is also unevenly distributed right here throughout the islands of The

Bahamas. The difference in our location affects where our water comes from. Here in The Bahamas we have multiple sources of freshwater, which vary, on the different islands.

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Rainwater is a common source of freshwater; particularly on smaller islands and cays that do not have connection to any water utility company. Some individual homes have gutters installed to collect rainwater that is stored in a tank for use. Rainfall decreases from north to south throughout the archipelago so this is not a good option for the more southern islands. For example, Inagua the southernmost island is practically a desert. Do you all know what a desert is? A desert is a barren area of land where there is barely any rain so it is hard for plant and animal life to thrive there because of the extreme conditions.

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Groundwater is exactly what it sounds like; it is water found in the ground! Groundwater is defined as water held underground. This water is either absorbed within the soil, or found in crevices in rock. The Bahamas bedrock is made up of a very porous rock called limestone. What do I mean by porous? Has anyone ever watched SpongeBob? Similar to SpongeBob or our average kitchen sponge, limestone absorbs, or sucks up and stores, water really well. When the freshwater from rain seeps into the ground it becomes trapped as ground water.

So how is this groundwater used by us?

1. Wells are dug accessing groundwater by water authorities on a large scale then pumped to consumers
2. Private water wells are dug
3. Groundwater is barged from one island to another
4. Groundwater is piped from one island to another by underwater lines for example water is pumped from mainland North Abaco to Green Turtle Cay

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Has anyone in here ever been to a blue hole? Does anyone want to take a guess at what a blue hole is? A blue hole is just a flooded cave! So maybe at one point long, long ago the blue hole was once a dry cave but over time as sea levels raised it became filled with water. There are two types of blue holes:

- 1) Ocean Holes- is exactly what it sounds like blue holes found in the ocean (Dean's Blue Hole- Second deepest blue in the world!)
- 2) Inland Blue hole- which are blue holes found on land, very popular to be found on the northernmost islands in the pine forest but are scattered throughout the archipelago.

Inland blue holes are the blue holes we are speaking about when talking about Bahamian freshwater resources. Inland blue holes are the ONLY source of surface freshwater in the Bahamas! Surface water is water found on top of the Earth's surface like rivers, lakes, creeks, streams and other wetlands.

If you have ever been in an inland blue hole, what kind of water were you swimming in? Inland blue holes have multiple layers. Similar to groundwater, the very top layer of inland blue holes is made up of fresh water collected from rain. In the past, freshwater was harvested from this 'lens' to be used.

Below the freshwater lens, there is a layer of brightly colored bacteria which produces hydrogen sulfide (swamp gas). Then there is the area of brackish water, which is just a mixture of fresh and salt water and then at the very bottom is the anoxic (lack of oxygen) salt water. In this region of anoxic saltwater is where artifacts and fossils can be found because the lack of oxygen has protected them by preventing decay.

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Can you drink seawater? NO! However, there is a process that allows saltwater from the ocean to be converted into freshwater. So, in some cases freshwater can ever be considered an ocean resource.

The process that can be used to change seawater to freshwater is called Reverse Osmosis (RO). Reverse osmosis is how you can get small particles (salts) out of water by forcing it through a filter (a membrane). The particles in the water are left on the other side of the sheet, while the water travels through it.

Water and Sewerage Corporation has some RO plants, private islands and institution also have their own RO plants. Some of our drinking water suppliers (Water Mission and Aquapure) also use this method to provide pure drinking water.

Seeing as The Bahamas is an island archipelago, meaning all of our islands are surrounded by seawater, Reverse osmosis is amazing technology that can be used to combat the major issue that is water scarcity.

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Earlier we spoke about how water is unevenly distributed throughout the world, but water is also unevenly distributed right here throughout the islands of The Bahamas. The difference in our location affects where our water comes from. Here in The Bahamas we have multiple sources of freshwater, which vary, on the different islands. We will discuss some of the past practices for accessing freshwater throughout the islands of The Bahamas.

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As previously mentioned, rainwater collection was not a reliable source 1) all islands do not experience consistent rainfall 2) on islands that were more prone to rainfall, the rainfall is not consistent year round.

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Inland blue holes, karst features and ponds are all refueled by rainfall. Once these features had been exploited, meaning pumped of fresh water before they could be replenished, they were no longer reliable sources for freshwater.

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Shallow dug wells were used to harvest groundwater to be pumped throughout the islands for use. However, this was not an efficient way of harvesting water because these wells were more difficult to protect from contamination, and their yields were also very low because they do not penetrate into the reliable, productive water table aquifer.

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We have spoken about the past practices for accessing fresh water; now, we will discuss the current practices. Primarily, past practices were abandoned because of their exploitation of our natural water resources. Improved technology has also played a large part in our ability to make these transitions.

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Islands with larger and more readily accessible groundwater supplies like Grand Bahama, Abaco and Andros still rely on groundwater. Well fields still exist where groundwater is extracted, treated and then pumped to consumers. On the island of Abaco, a well field in South Abaco is in the process of becoming fully powered by solar energy thanks to Water Mission; making it one of the largest solar arrays in The Bahamas. In more southern islands, due to lack of groundwater supplies there is a reliance on reverse osmosis. There is a growing trend towards reverse osmosis; so we may see more islands, which are unable to sustain themselves with groundwater supplies moving towards the establishment of RO plants.

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What are some challenges that we face when sourcing freshwater supplies here in The Bahamas?

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A major challenge we face is that only 3 islands in The Bahamas have significant freshwater resources. Those islands are: Andros, Abaco and Grand Bahamas. Even though these islands have significant resources they also face the issue that the majority of communities and the most populated areas are located far away from good resource areas.

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Another major challenge is that some islands and cays have no naturally existing freshwater resources that can supply their needs. Aside from a lack of groundwater; rainfall varies due to geographical location and season. These

islands and cays are more dependent on the transport of water. Therefore, a need exists for high cost alternatives like the establishment of RO plants.

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Finally the greatest and most common challenge is man. Freshwater resources are easily destroyed by human activities. These activities include the dredging of canals, mining, digging of wells and pollution. Our ever-increasing carbon footprint on the planet is also influencing climate change that is resulting in sea level rise and increased storm activity.

Initiate discussion on how climate change affects freshwater resources.

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Every drop counts