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**DEVELOPMENT OF A PRODUCTIVE BOREHOLE IN A FRACTURED BASEMENT COMPLEX REGION**

Fractured basement complex are good sources for potable water in many part of the world. However, sitting of highly productive wells in these rock units remains a challenging and expensive task because fracture development at regional scale is both heterogeneous and anisotropic (Oluwadare Joshua OYEBODE, 2015)

Boreholes are effective way of tapping into the water bearing aquiferbelow the ground and pumping the water to the surface. Boreholes for extracting water consist essentially of a vertically drilled shaft, a strong lining (casing) to prevent collapse of the walls, which includes a means of allowing clean water to enter the borehole space (screen), surface protection, and a means of extracting water (Oluwadare Joshua OYEBODE, 2015)

The geophysical survey was carried out on the borehole construction site beside in order to determine the ground water potential of the area. The method used in geophysical survey for the proposed water boreholes is the electrical resistivity sounding. The electrical resistivity sounding method is the most common method used to carry out geophysical surveys in fractured basement complex region. The site selection strategy is to maximize the probability of successfully completing the borehole, at a site with favorable geological, hydrogeological, and geochemical conditions, within budgetary and schedule constraints

Once the water requirements are known and an assessment either by a hydrogeologist or an examination of geological maps has been undertaken, the borehole can be drilled according to the information found. Typically, a borehole used as a water well is completed by installing a vertical pipe (casing) and well screen to keep the borehole from caving in. Drilled wells are typically created using either top-head rotary style, table rotary, or cable tool drilling machines, all of which use drilling stems that are turned to create a cutting action in the formation, hence the term 'drilling'. Boreholes can vary in depth and design depending upon the level of the water table, quantity of water stored in the ground and the requirements of the customer but typically are between 60-120 vertical metres. Normally the inner pipe is at least 4" in diameter to accommodate a 3” or 4” borehole pump and must be surrounded by gravel to prevent dirt clogging up the plastic pipe then sealed near the surface using a special grout. This grout usually goes down as far as the impermeable layer and is designed to prevent contamination from surface water entering the borehole. The outer metal casing pipe is usually at least 6" diameter to accommodate all this

**DISADVANTAGES OF LARGE DAM PROJECTS**

**1. Dams can displace a significant number of people.**  
An estimated 500 million people have been displaced by dams in the last two centuries because of the reservoirs that form behind each structure. As the surrounding dry areas get flooded, we no longer have the option to use land that was previously accessible for a variety of purposes. That means local agricultural activities go through a disruption process, even though the eventual increase in available water supports more irrigation. (miller, 2020)

**2. Reservoirs behind a dam can lead to higher greenhouse gas emissions.**  
When vegetation gets engulfed in water, then the plants will eventually die. When this outcome occurs, the dead organic material releases methane that ultimately makes its way into the atmosphere. The increase in the production of greenhouse gases is significant because methane is up to 20 times more potent as a reflector than carbon dioxide.

The use of a dam in certain areas can also contribute to the loss of forests. When we lose a significant number of trees simultaneously, then there is a corresponding uptake of carbon dioxide that occurs because there are fewer photosynthesis processes happening each day. (miller, 2020)

**3. This technology disrupts local ecosystems.**  
Dams create a flooding issue behind the structure as a way to form a reservoir. Not only does this disrupt human activities, but it also destroys the existing wildlife habitats that exist. This issue can disrupt entire ecosystems, which can have an adverse effect on a whole regional biome. Marine life that relies on an unobstructed flow of a river, such as migratory fish, can be adversely affected by the decision to dam the water.

**4. Some river sediment is beneficial.**  
Dams can have a profound impact on the overall aquatic ecosystem of a region. The transformation upstream creates a lack of settlement that moves down the waterway to support the entire marine habitat. It can also cause changes in temperature, chemical composition, and shoreline stability. Many reservoirs also host invasive species, such as algae or snails, that undermine the natural communities of the plants and animals that lived on the river before.

The riverbeds that are downstream from a dam can erode by several yards within the first decade of operations. This damage can extend for hundreds of miles downstream afterward.

**5. Dams create a flooding risk if they experience a failure.**  
We might use dams to provide us with a form of flood control, but the failure of this structure can have devastating consequences for downstream communities. The Vajont Dam Failed in 1963, only 4 years after its construction was finalized just outside of Venice, Italy. A landslide during the initial filling triggered a tsunami in the reservoir, causing over 50,000,000 cubic meters of floodwater that impacted nearby towns and villages. Some reports say that the wave was over 820 feet high.

Almost 2,000 people died in this disaster, and it was all because the dam was located in a geologically unstable area. When the Banqiao Reservoir Dam failed in 1975 in China, it caused an estimated 171,000 deaths.

**6. Dams can have an adverse impact on the groundwater table.**  
When riverbeds experience deepening, then this problem creates a lower groundwater table along the river. That means it is more challenging for plant roots to reach what is required for survival. Homeowners in the vicinity must also dig deeper wells to draw water for their households. This issue can even change the mineral content and salts found in the fluid, creating damage to soil structures along the way.

**7. The construction of a dam is a costly investment.**  
A large dam is defined as a structure that is higher than 15 meters. This definition means there are more than 57,000 structures around the world. Major dams are over 150 meters tall, and there are over 300 of these. China has the most, with over 23,000 operational facilities. The United States is in second, but far behind at 9,200. The cost of a large dam today can be over $20 billion, and it may take between 7 to 10 years to complete its construction. Those are resources that many communities could put to better use.

**8. Dams can block water progression to different states, provinces, and countries.**  
When a dam gets built at or near a border between two states, provinces, or countries, then it might also block the progress of the water in one of those areas. That means the supply from the same river in the neighboring country is no longer under their direct control. This disadvantage can result in severe issues between neighbors, creating a constant source of conflict that can sometimes even lead to war.

**9. It can make the water too shallow for navigation.**  
Dams try to avoid environmental impacts by releasing water downstream and creating marine life channels that allow for upstream movement. Although this approach is imperfect, the updates to this engineering process have had some benefits. What doesn’t get solved through this process is the depth of water that might be available downstream. The Colorado River is an excellent example of this issue because the waterway doesn’t make it to its outlet most years because of all the damming activity that occurs.

If the waters are too shallow to use in a river, then there is no way to use it for transportation benefits. This issue also changes the settlement profile so that marches and wetlands no longer receive the healthy supports from the river that they need.

**10. Reservoirs can be challenging to maintain.**  
When drought is a significant issue for a community, then a reservoir that’s behind a dam can be a vital resource. Maintaining this new body of water comes with a set of its own challenges because evaporation can happen during dry times and result in an increase in environmental problems. There also tends to be a significant buildup of organic matter in the sediment with this disadvantage, resulting in potentially carcinogenic trihalomethanes when the water gets chlorinated for drinking purposes.

**EFFECTS OF WATER POLUTION ON THE ENVIRONMENT**

In order to thrive, healthy ecosystems rely on a complex web of animals, plants, bacteria, and fungi—all of which interact, directly or indirectly, with each other. Harm to any of these organisms can create a chain effect, imperiling entire aquatic environments.

When water pollution causes an algal bloom in a lake or marine environment, the proliferation of newly introduced nutrients stimulates plant and algae growth, which in turn reduces oxygen levels in the water. This dearth of oxygen, known as eutrophication, suffocates plants and animals and can create “dead zones,” where waters are essentially devoid of life. In certain cases, these harmful algal blooms can also produce neurotoxins that affect wildlife, from whales to sea turtles.

Chemicals and heavy metals from industrial and municipal wastewater contaminate waterways as well. These contaminants are toxic to aquatic life—most often reducing an organism’s life span and ability to reproduce—and make their way up the food chain as predator eats prey. That’s how tuna and other big fish accumulate high quantities of toxins, such as mercury.

Marine ecosystems are also threatened by marine debris, which can strangle, suffocate, and starve animals. Much of this solid debris, such as plastic bags and soda cans, gets swept into sewers and storm drains and eventually out to sea, turning our oceans into trash soup and sometimes consolidating to form floating garbage patches. Discarded fishing gear and other types of debris are responsible for harming more than 200 different species of marine life.

Meanwhile, ocean acidification is making it tougher for shellfish and coral to survive. Though they absorb about a quarter of the carbon pollution created each year by burning fossil fuels, oceans are becoming more acidic. This process makes it harder for shellfish and other species to build shells and may impact the nervous systems of sharks, clownfish, and other marine life. (Denchak, 2018)