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Jordan, Water Scarcity

Extreme Water Scarcity in Jordan

Water is an essential component for every living organism. It helps the process of digestion, it allows the body to metabolize fats better, and it acts as a transport for oxygen and nutrients for the human body. Because water participates in all of these processes, it is an essential component for all organism to sustain life. In addition, water is the foundation for a country to flourish. Water can affect education, health, and hunger. In the United States, Americans are not conscientiousness of water preservation. They let water run as they shower, brush their teeth, and water their garden. Water is plentiful in the United States and many places offer free water like restaurants, parks, and schools. Unfortunately, most countries do not have the privilege of having a great water supply. The supply and demand for water cannot simply withstand their population. One prime example of water scarcity is in Jordan. Annually, the average American has access to water 45 times than an average Jordanian ("Water Management"). Water scarcity negatively impacts all aspects of Jordan.

Jordan is located between Saudi Arabia, Syria, Iraq, and Egypt. Geographically, Jordan is marginally smaller than the size of Indiana. The climate is usually hot and dry, while the western areas of Jordan is slightly rainy at times. Its population is approximately 9,825,266 with 67.8% of it being urban and 32.2% rural (Dadax). The average farm size in Jordan is 20 acres, which is substantially smaller than that of the average farm size in the United States (The World Factbook). Jordan's agriculture consists of a great supply of tomatoes, cucumbers, olives, and strawberries despite only 11.4% of its land is able to be cultivated. Overall, Jordan is a small, hot, and dry country.

The lifestyle of Jordanians consists of various aspects similar to those of third-world countries. The average Jordanian family consists of six people living in a one-room apartment ("Jordanian"). In addition, the average household income is approximately $637 a month ("Kingdom's Average"). Many families earn their income through the service industry. "The service industry accounted for an estimated 82.5% of the nation workforce" ("Jordan"). Education in Jordan is required for children age six through sixteen years old. After that, they must pass an exam called Tawjehieh in order to pursue further education. Unfortunately, most do not go on to secondary education and those that do are mostly males ("Jordan"). A lack of education is very common in Jordan. Although, the lack of education is a problem in Jordan, it is not the country's biggest problem.

Water scarcity is a daily problem for Jordanians. Water shortage can negatively affect many aspects of life, such as health and hunger. The lack of water can cause a negative impact on a person's health due to drinking low quality water, which can contain water-borne illnesses like cholera ("What are the Effects"). Usually, most people who drink unsanitary water will get an illness. Sometimes these illnesses could spread quickly within the urban area, resulting in a disease outbreak. In addition, water is necessary for the people of Jordan to farm their crops and to raise their animals that will be used as food supply.

Therefore, the shortage of water will cause a small yield of crops and animals not being able to reach a mature age for food, resulting in more hungry and thirsty people (“What Are the Effects”). Water scarcity in Jordan has many complications to the well-being of its citizens from their food supply to their health.

The water is becoming scarcer because of many factors including poor wastewater management. “Many households dispose of their waste in natural cesspits, which can quickly contaminate groundwater supplies with pathogenic microorganism” (“Water Management”). Because of the contaminated groundwater, there is a lack of clean water for the Jordanians. In addition, the increase in population contributes to this negative trend. The increase in population is caused by Syria’s civil wars because “Jordan is a safe haven for people escaping war and persecution in their native countries- including people from Palestine, Iraq, Yemen, Libya, and Syria,” (“Jordan”). Jordan can house refugees and oftentimes they are settling in the urban areas. Approximately 1.3 million Syrians have fled to Jordan as refugees. Not only did the water demand increased significantly, but because people are drinking unsanitary water, a potential disease outbreak could take place anytime (“Syria’s Conflict”). Because of the increased population, the demand for water is high and there is a rise of pollution in the ground water (“Water Management”). Lastly, the unsustainable groundwater extraction is severely worsening the water conditions in Jordan. Thousands of wells are being illegally extracted from its ground water, which puts a strain on the available water in Jordan. “Ground water is being used at twice the rate at which it can be recharged,” (“Water Resources”). Ultimately, these factors are worsening the water scarcity issue in Jordan and immediate actions need to take place

Fortunately, there has been many projects developed to lessen the increase trend of water scarcity. Currently in Jordan, one solution to help water scarcity is the Red Sea Dead Sea Project. The Red Sea Dead Sea Project has not started yet due to controversy over environmental impact. The main goal of this project is to connect the Red Sea and Dead Sea through a canal in order to provide a safer drinking water for the Middle East. Although this project sounds simple, many negative complications can come with it. For example, connecting the Red Sea and Dead Sea will disrupt the ecosystem because the Red Sea has an abundant diversity, while the Dead Sea extreme saltiness only supports Archaean organisms and algae. “Another conflict is how the neighboring countries will decide how to share the water resources and how the connection will affect mineral mining in the Dead Sea,” (“Water Shortage”). Ultimately, the Red Sea Dead Sea Project is a great idea, but there are too many complications involved in order to carry out the project.

Another project to combat water scarcity in Asia was the invention of a special drinking bottle. In 2004, a Boxing Day tsunami hit Asia. The floodwater was simply too dirty to drink and people were running out of water. As a result, Michael Pritchard developed a special drinking bottle. “This bottle uses a pump to push the water through a 15-nanometer filter, which cleans it of any bacteria, producing clean drinking water” (“6 Solutions”). This drinking bottle filters out any contaminated particles that is in the water, which allows many people to drink clean water. This could be a good solution for Jordan, but because the ground water has been contaminated with pathogenic organisms, the drinking bottle may not be able to filter out all of the bacteria (“Water Management”). Ultimately, these innovative projects have too many complications in order to help fix the water scarcity problem in Jordan.

My solution to improve the water scarcity issue in Jordan is to build a hydroelectric dam with a reverse osmosis system through the Jordan Valley in the Jordan River. The Jordan Valley would be an ideal location because some parts of the land dips down allowing the Jordan River to flow readily. The dam

will process the water for the Jordanians and it would produce enough energy to desalinate the water using a reverse osmosis system. The creation of a hydroelectric dam will be very suitable for Jordan because there has been many effective dams created in the Middle East. For example, the Aswan High Dam created in Egypt in 1970. This hydroelectric dam has provided Egypt an excellent irrigation source and hydroelectric power ("Aswan High"). The hydroelectric dam I am proposing would be relatively similar to the Black Eagle dam, which is located in Great Falls, Montana. The Black Eagle dam is also a run of the river dam, meaning that it uses the rate flow of the river to generate electricity while still allowing the fish and other creatures to move down the river as necessary. Thus, it would create a less environmental impact than other hydroelectric dams. To conclude, due to many successful hydroelectric dams in the Middle East, building a hydroelectric dam would be very suitable for Jordan.

The USAID could manage this project because they are currently working on a solution to help lessen the conditions with water shortage in Jordan. Also, the USAID has created a partnership with Jordan for over 60 years. In addition, the conflicts concerning water is very important to the USAID because they have invested in the water sector more than any other sector ("Water Resources"). First, the USAID would need to fund this project. The Black Eagle dam cost 2 million dollars in 1890 or approximately 53 million dollars today ("Black Eagle").The cost to build a reverse osmosis system is about 1 million dollars ("How Much"). Therefore, the cost to build the hydroelectric dam with a reverse osmosis system would be about 54 million dollars, not including labor. Many refugees and people who are looking for employment could help build this project. With a diverse working crew, the Middle Eastern communities could become more united and stronger. In addition, with the USAID working with Jordan, their alliance could become stronger and more secured. Ultimately, it would be very reasonable for the USAID to take on this project because they have invested over $700 million dollars in the water sector over the 60 years they have worked with Jordan ("Water Resources").

With a gross domestic profit of 38.65 billion dollars, Jordan is one of the lowest in the region ("The World"). It may be hard for them to see the benefit of essentially taking a loan out for the 54 million dollars plus the cost of labor; not to mention, the loss of these workers on other tasks while completing this dam. Labor costs could be kept down by the refugees helping provide manual labor so Jordan wouldn't have to bring in outside sources. which would help decrease unemployment while not taking away from other tasks that still need done around the country. One big issue they would need to avoid would be throwing off the economy too quickly by paying too much money too fast thus throwing off inflation. If they began paying these workers significantly higher wages than most jobs, the other employers in the region would also need to provide a higher pay to be able to keep current employees. If that continues to happen until the dam is completed, it would create a situation where once the high paying jobs at the dam is gone, the cost of many goods would be too high versus the wages the people normally make pushing people further into poverty and hurting the economy more than helping it. Having a strategy to meter the growth would be vital to allow the economy to grow while also allowing people a way to a better quality of life.

The approximate rate at which water would be produced from the hydroelectric dam with the reverse osmosis system would be 53,000 gallons of water per hour. The hydroelectric dam would produce about 1000kW of electricity and the reverse osmosis system would produce about 100 gallons of water per minute. According to Requirement of Desalination Processes, it would take 5 kW per hour to desalinate a cubic meter of fresh water ("Encyclopedia for Desalination"). As a result, there would be about 53,000 gallons of water per hour being produced by the hydroelectric dam with the reverse osmosis system. The amount of water being produced can be altered when less water is needed.

With a more available water source, farmers could grow a better food source which could be available to

the Jordanians. Due to the more available water supply, many crops could flourish, which could provide food for the livestock and for the people. In addition with more crops and livestock thriving, it could increase the economy of Jordan. Furthermore, sanitary water could help students pursue further with their education. For example, with unsanitary water, it becomes difficult for students to concentrate on their studies and it affects many students' health ("The Impact"). Therefore, according to Maslow's hierarchy of needs, with the students having access to sanitary water, the students could start concentrating on education, rather than basic needs like food and water. A specific way for this better lifestyle to pay a more immediate dividend would be to incorporate trade schools for water treatment and other basic jobs needed for the country to grow. By using trade schools, they could create experts in all fields of the workforce; therefore, creating a more efficient and innovative workforce to increase the country's quality of life and eventually get them to a point of self-sustainability. This would also allow the USAID to move onto more issues around the world. There could also be a diversity of higher-paying jobs due to increased innovation and growth in all sectors of the country. With the economy and education increasing, Jordan could soon rise out of being a third world country and become a country ripe for immigrants looking for a great place to grow much like the United States currently.

The first step for this process is for the hydroelectric dam to produce enough energy to desalinate the water. Then, the salty water will go through the reverse osmosis system to produce clean water. Once the salt is filtered from the water, the clean water would be distributed to the people, while the salt can be sold for $0.65 per ounce ("Salt Sellers"). Therefore, a salt company can be built and this will allow more job opportunities and less unemployment in Jordan. Another benefit of the salt company is that it would increase Jordan's economy. It is expected that the Dead Sea salt would sell because it has many beneficial usages. For example, the Dead Sea salt is deeply hydrating, it cleanses and disinfects, and it can heal chronic skin conditions ("Seven Incredible"). Furthermore, Dead Sea salt is used in making bath salts. "Global bath salts market estimated to reflect a value of more than US $2 Billion by the end of 2022…" (Transparency Market). Therefore, with the versatile usage of the Dead Sea salt and the estimated market for bath salts, it can be expected that the Dead Sea salt would sell. Eventually, the money would accumulate to a point where Jordan can repay the USAID and provide for their country for years.

Before this project can be completed, a peace treaty or at the very least an agreement would need to be made with Israel because some parts of the Jordan River belong to Israel. This dam will relieve some of Israel's water scarcity issues as well, so it could be enough of a launching point to get the peace treaty worked out. Also, it could strengthen Jordan's relationship with Israel because currently, Jordan's relationship with Israel has been shaky due to the conflict over the Al-Aqsa mosque. The water will be split evenly to ensure no conflict will ascend between the two countries. The main goal for this treaty is to peacefully build a hydroelectric dam with a reverse osmosis system in the Jordan River by providing Israel half of the water that is being collected; if necessary, there could also be an agreement on how to split the revenues gained from the salt that is sold to allow Israel to help its economy grow. Another way this could help Israel's economy would be to provide some of their citizens with jobs allowing them a chance to learn and grow their knowledge and possibly incorporate it into other areas of their country. I believe with these selling points some sort of agreement could be reached to launch this project.

Water scarcity contributes to bad hunger, health, and a lack of education in Jordan. Once this trend has been reversed, the result would be a positive domino effect in hunger, then health, and ultimately education. Clean water is something many people in our country take for granted, but around the world it is an endless struggle that seems insurmountable. Once the issue of clean water is resolved, their hunger

problem can also begin to fix itself due to better crops and livestock causing prices of these valuable commodities to become more reasonable to the families of the area. Then, the people can start to become healthier and stronger. An added benefit is less diseases that can spread throughout the Middle East due to water-borne bacteria. Providing clean water not only helps end hunger and improves health, but gives way to educating their citizens on ways to continue to improve these projects can serve as a template for other countries in the region. By allowing these other countries to see that the water scarcity is possible to combat, it could serve as the launch pad needed to drive innovation in the whole region not just one or two countries. Conclusively, water scarcity is a big obstacle that Jordan faces and will continue to face if the problem is not resolved immediately. This project is not only about improving water quality in the country. it can be used as a way to improve relations in the region as well as turning the area into a place of innovation for generations to come. The people of Jordan will be able to thrive in their everyday lives and be able to improve their country and the lives of its neighbors.

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