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Egypt, Water Scarcity

Egypt: Solutions to a Potential Water Crisis

In North Africa sits Egypt, and it is one of Africa's superpowers that is known predominately for its ancient pyramids and rich history. Egyptian civilization dates back over 3,000 years with a city more than 7,000 years old unearthed in 2016 (*Egypt unearths 7,000-year-old lost city*). Ever since the beginning of time, Egyptians relied immensely on the fertility and overall conditions of the land, due to the Nile River and surrounding deltas. Ruled by a myriad of dynasties for a millennium, Egypt fell under Ottoman rule in 1517 until it was shortly occupied by Napoleon I in 1798. The United Kingdom took charge of Egypt in 1882 until World War I when Egypt, along with many other colonized countries, gained their independence. In 1953 a Republican form of government was declared in the country and continues as the form of government today (Goldschmidt).

Egypt is the third most populated country in Africa with 100.4 million people inhabiting the land. Of those people, approximately 44 percent live in urban areas and the remaining 56 percent live in rural areas (*Population, total - Egypt, Arab Rep*). While Egypt has lots of land being more than 1,000,000 km squared, approximately only 7.7 percent of the land is habitable with the rest being desert (*Country Background*). The majority of the population lives kilometers from the Nile and its basins. The government has been implementing irrigation systems from the Nile River to sustain more life on previously uninhabitable land. The amount of arable land is around 73 percent of the total cultivated area. However, land that is currently being used for agriculture is quickly lost to recent urbanization. Farms in Egypt are small; 70 percent of farms in Egypt are less than 0.42 hectares, which is equivalent to less than half of a racetrack (Egypt[31]). Egypt's predominant crops are sugar cane, sugar beet, wheat, and tomatoes. The nation borders Libya to the west, Sudan to the south, and Israel to the east. Egypt has coastlines in the Mediterranean and the Red Sea which has made it an important trade route for imports and exports. The nation’s primary exports respectively include crude and refined petroleum gas, gold, as well as nitrogenous fertilizers. Egypt primarily exports to the United States, the United Arab Emirates, Italy, Turkey, and Saudi Arabia. The imports that come into the country are abundantly from China, Russia, the United States, and Saudi Arabia. Major imports into Egypt include crude and refined petroleum, wheat, cars, and medicaments (*The Observatory of Economic Complexity*).

In Egypt, the average family consists of four people living in a nuclear family dynamic, although living with extended family members is also common. The government has been making an effort to persuade rural families that two children are enough to slow down population growth. This effort has been relatively successful in previous years as family sizes are declining (Masri). The typical Egyptian diet is comparable to those of Arab and northern African ones as well. Beans, lentils, bread, and rice are common dietary staples that can be found virtually everywhere. As a result of the primary religion, Islam, typically of the Sunni sect, meat must be Halal meaning slaughtered in a way deemed humane by the Quran, for most. The most common meats are lamb, beef, and chicken. Pigeon is also a common delicacy that is eaten stuffed (Wise). Schools have lunch programs that are funded by the government and other organizations, so children may get a free lunch. The Egyptian workforce is predominately male; in 2019, less than 20 percent of women were employed in comparison to 71 percent of their male counterparts (*GDP growth, inflation, and other indicators*). This could, in part, be due to the 10 percent divide in

literacy rates between genders and social norms. Education in Egypt is free and mandatory for children between the ages of six and fifteen. After a student reaches 15 years of age, it is the parent's obligation to pay for the rest (Roach). Free public healthcare is provided for the citizens, and while it is not the highest quality, many depend on it. The government has plans on reforming it in the coming years. Private health care is also an option, but it comes at a higher cost (*Guide to Healthcare in Egypt: Allianz Care*). Everyone in Egypt has access to electricity, with the Aswan Dam providing the power needed.

The Nile River has long been a lifeline of sorts to Egypt and the people who inhabit there. Since the beginning, settlers chose to settle and live where there was fertile land and that was as a result of the Nile. In recent years, the river has been drying up and droughts are becoming more abundant. In 2019, Egyptian officials estimated around 570 cubic meters of water were available per person, per year. Hydrologists consider a country to be facing water scarcity if supplies drop below 1,000 cubic meters per person. Annually, Egypt's figure is expected to drop to 500 cubic meters, so by 2025, this will be considered absolute water scarcity (Ebrahim). Along with the natural decreases in water, Egypt's water supply faces another threat: The Grand Ethiopian Renaissance Dam. This dam was completed in 2020 after construction began in 2011. It is located on the border of Ethiopia and Sudan where it tapers the flow of the Blue Nile. The Blue Nile meets the White Nile in Sudan and takes the path into Egypt. Ever since construction began, tensions have risen to higher stakes than ever before between Ethiopia and Egypt. The dam is a symbol of patriotism for many Ethiopians who have invested their own money into its completion in hopes of gaining electricity (Mbaku). The remaining electricity will be sold to neighboring countries, as another source of income for Ethiopia. While the Grand Ethiopian Renaissance Dam is a great accomplishment for Ethiopia, it will bring catastrophic effects to Egypt. Approximately 80 percent of the water that goes into Egypt is from the Blue Nile. As a result of this, even a small decrease in the water supply will have detrimental effects on this already water-deprived nation.

In calculations completed by Aljazeera, the amount of time Ethiopia takes to fill the dam will impact how much water Egypt loses out on. The best-case scenario for Egypt's water supply would be if Ethiopia spends 21 years to fill the dam. This would result in less than a two and a half percent loss of agricultural land and a five percent loss of its annual water supply. Ethiopia, however, plans on filling the dam in five to seven years. The effects of this would be catastrophic, with Egypt losing 50 percent or 50 million acres of agricultural land and 36 percent of their annual water budget. While the effects of the dam have not yet been felt in Egypt, the effects of water shortages have. Farmers are losing much of their land. One farmer, Ahmed Abd- Rabo, has felt them severely. Water shortages have forced him to abandon half of his seven-acre farm. He fears the Grand Renaissance Dam will not make his situation any better (Ebrahim). Egypt's urban population will also be affected by these water shortages. Domestic agriculture is viewed as a way to feed its own population, particularly the urban communities (*Egypt's options in the development of the Ethiopian dam*). The reduction of the farming infrastructure will impact virtually everyone in the country and the economy. Environmental quality will be changed drastically as the agricultural land and streams will virtually disappear.

In this publicized case, awareness has come to the problem of water scarcity and now a solution must be proposed in order to solve the situation for the many livelihoods at stake with decisions being made. In this case, drip irrigation is one way that farmers can continue growing their crops while using less water. "Drip irrigation can reduce a farm's water consumption by as much as 60 percent and increase crop yield by 90 percent, compared with conventional irrigation methods." (*Watering the world*). Some farmers in Egypt have already begun implementing this system of irrigation and are finding great success. One farmer named Hassan Abdel Salam began using drip irrigation and he has noticed how much water he is saving. Salam is in the minority as less than 6 percent of Egyptian farmers use drip irrigation (*Improving*

irrigation efficiency will be insufficient to meet future water demand in the Nile Basin). This is partially due to the large price tags associated with it, many farmers simply cannot afford it.

Many farmers have adapted to the scarcity of water and instead have planted crops that require little water. However, many farmers plant crops like rice that are challenging the water supply by not using it efficiently. An estimated 20 percent of Egypt's cultivated land is used to grow rice. (Elbasiouny). Seeing how little land is cultivated in Egypt, this can be viewed as a waste. The government should incentivize farmers to plant crops that require less water such as peas, beans, lentils, and fava beans. These foods are also popular in Egyptian cuisine, but they do not burden the water supply as much as rice does. Other Middle Eastern nations such as Saudi Arabia have begun planting trees to change the desert landscape into one that is lush and able to sustain life. Egypt unveiled the Serapeum Forest project in 1998 by planting trees in the desert, and it was highly successful in growing a 200-hectare forest. Egypt has slowed down with its tree planting initiative since 2014. Reforestation is something that should be continued actively to benefit the environment and overall cultivation of lands for the better.

To the east of Egypt lies Israel, and they rely on desalination for over 80 percent of their water, but they hope to make it 100 percent in the future. This is done with just five desalination plants in the country, with them they are able to produce over 585 million cubic meters of usable water. Additionally, Israel's government has approved the construction of two more desalination plants that will increase the amount of water they use from desalination to 85-90 percent (*Background - Seawater Desalination in Israel*). Desalination is the process of Turing saltwater from the oceans into regular water by removing certain minerals. While desalination can be expensive and harmful to the environment, there are ways to make it sustainable. Peng Wang, professor of environmental science and engineering at Saudi Arabia's King Abdullah University of Science and Technology began using solar power to generate the electricity necessary for the process (*StackPath*). Solar power is a convenient form of energy for Egypt because it is abundant and less expensive than any other means of producing energy. Nonetheless, desalination still has a hefty price tag. Egypt will need to consider it an investment, with the ability to produce a surplus of water Egypt may also consider exporting water to neighboring countries such as Sudan and Yemen. There is no doubt that salination plants will be a major source of water for Egypt in the future.

The Grand Ethiopian Renaissance Dam is another strain on Egypt's water supply. The dam is a matter that is immensely concerning to both nations and they need to find a compromise to this impending problem. Foreign parties have tried to intermediate these negotiations but that has proved to be unsuccessful. In 2020 Egypt, Ethiopia, and Sudan met in front of the United States for a settlement, and while some tensions dwindled there were no new specific agreements made. The United States decided to suspend 130 million dollars of aid to Ethiopia because of the lack of progress in negotiations over the Dam. In this situation, the United States has a clear bias and that should not be the case with such pressing matters at hand. The intermediating party should not have a predisposed opinion because both countries have stated that they would not be opposed to violent measures of resolution such as Egypt threatening to bomb the dam and Ethiopia saying nothing will stop them from filling their reservoir. (*Ethiopia blasts Trump remark that Egypt will "blow up" dam*). This situation needs to be de-escalated diplomatically. One way of doing so would be with the United Nations facilitating the conversations. As original members of the UN and with 193 other nations, the conversation would not be skewed in one direction. Through the United Nations, a diplomatic solution can be found and implemented. Perhaps Ethiopia will lengthen the amount of time they will take to fill the reservoir and fund some of Egypt's water projects with a percentage of the revenue they collect from selling electricity. Then perhaps Egypt will renounce the military threats and give them more access to their trade routes at an affordable price.

No matter how they chose to resolve their conflict, it should be peaceful and free of bias from other foreign parties.

As a nation with such a rich history and being thousands of years in the making, the potential water crisis would be catastrophic to Egypt and all of those who have inhabited the lands. As WH Auden said, thousands have lived without love, not one without water. As a result of land drying up and water becoming more and more scarce, many farmers are unable to grow crucial crops and as a result, some have even been forced to abandon their land. The time frame for this is very limited, there are roughly five to seven years left until the reservoir is filled, otherwise a large portion of the water is lost, and by then the conditions of the environment, economy, and people will suffer the most. Lots of damage has already been done, people are running out of water, and politics have gotten in the way towards finding a solution.

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