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Algeria, Water Scarcity

Algeria: The Water Crisis

Algeria is a country located on the northern coast of Africa on the Mediterranean sea. It was granted independence from France in 1962. The capital city is Algiers, with a population of around 3,500,000, a little less than Los Angeles, the 2nd most populous city in the US. It is the largest country in Africa with 2,381,741 square km of land (World Atlas, 2018). However, about 80% of this land is located in the Sahara Desert, making it uninhabitable. That cuts the inhabitable land down to about 476,349 square km, the size of the 24th largest country in Africa. 90% of people in Algeria live north in only 12% of the land, by the Mediterranean Sea. The estimated population is about 42.01 million, with a very low density of 18 per km. These 42.01 million are not very diverse religiously, with about 96% of them being Sunni Muslims. The other 4% is made up of Jews, Shia Muslims, and Christians. The primary ethnic groups located in Algeria makeup 99% of the population and are Arab descendants along with descendants of Berbers, who are the native ethnic group of Algeria. The other 1% consists of mostly French immigrants. Algeria has dual official languages with Arabic and Tamazight, a common language in northern Africa. Although they are both official languages, Arabic is more popular with nearly 75% of the population. French is also a popular language, with the majority at least understanding it, while about 20% can speak it (Algeria Channel, 2006).

Citizens in Algeria have a generally high quality of life compared to other regions in Africa. Citizens have access to public healthcare. However, the health facilities have varying quality throughout the country. Even with these potential issues, the average life expectancy according to the World Bank is 76 years(2016). Primary education is available and required for anyone between the age of 6 and 15, with further education being available. The transportation infrastructure is quite advanced, with a large network of roads and trains (InterNations, 2015). There is, however, some political unrest in the area. Algeria ended a civil war in 2002, and it still isn't the most stable area politically.

Algeria is fairly successful economically, with a GDP of about 3,800 USD per capita, putting it at the tenth most economically successful country in Africa. Most of their economy comes from its large reserves of oil and gas, which account for about 30% of its GDP and 95% of its exports. Algeria is the 6th largest natural gas exporter in the world. This industry has in the past allowed Algeria to be very successful due to the high prices of oil, and until 2014 this was enough to maintain economic stability. However, when oil prices began dropping beginning in 2014 they wreaked havoc on Algeria's economy. Due to the large hydrocarbon industry, Algeria never fully developed its other industries. Since 2014, Algeria's GDP has fallen by 25% or 50 billion USD. The economy had been reliant on making money through hydrocarbons, then importing anything else they needed (World Factbook. 2018). With the declining GDP, the government has passed new restrictions restricting the number of imports allowed. In the future, a high priority of the Algerian government is to reduce its reliance on the hydrocarbon industry and imports. The unemployment rate among Algerians is 11.7, and while that is somewhat average for the region, it is still enormous compared to most non-African countries. Another major industry that has declined in importance since the discovery of the hydrocarbon industry is the agriculture industry, which was Algeria's largest until the rise of hydrocarbons. This industry faces some major problems, namely the

lack of farmable land and water.

Algeria is facing major problems most prominently in the areas of water supply and waste treatment. Algeria has a seemingly insurmountable barrier in their way of having water across the entire country. That barrier is the Sahara Desert. The desert covering the entire southern half of the country makes it extremely difficult to move water or farm in that area, effectively forcing anyone living in the desert to go without safe drinking water. But the Sahara isn't the only region struggling with bad water conditions. Algeria's water availability is about 480 cubic meters per year per capita, 520 cubic meters below the water poverty line of 1000 cubic meters per year. This supply is estimated to drop to under 400 meters by the year 2050. This supply is increased by a large number of desalination plants being built using the money from the hydrocarbon industry. Due to the area the country is located, desalination is one of the only methods of increasing the water supply. According to Stratfor, Algeria has increased the daily desalination production capacity from 50,000 cubic meters per day in 2002 to over 2 million cubic meters per day in 2015, and that number is ever increasing (2016). Even so, with a population of just over 42 million Algeria has a need of over 110 million cubic meters per day to reach the water poverty line of 1000 meters per capita.

The supply of water isn't the only thing wrong with Algeria's water industry. The current infrastructure allows only a few areas access to water constantly. Some regions only have access to water every 2-3 days, with some regions gaining access as little as every 10 days. Much of the blame for these issues can be placed on the government, rather than the geography. Since they declared independence in 1962 Algeria has been very slow to recognize the issues with their water supply and infrastructure. Although in recent years they have passed policies to try and resolve these issues and have invested billions of dollars, Algeria retains one of the worst water supplies in the world.

Even still, there are other factors that have reduced the amount of water available to the average citizen. A very large portion of the blame can be placed on Algeria's agricultural industry. Agriculture is certainly a very important industry for most countries, Algeria included, but the current set up of the industry does almost more harm than good. Agriculture makes up about 10% of the GDP of Algeria. The agriculture in Algeria is mostly for use within the country. The soil in Algeria is generally poor for farming and is easily eroded. The agriculture industry does not produce enough food to even feed the entirety of Algeria. Not only that, but the industry uses up large amounts of Algeria's most precious resource: water. According to the Food and Agricultural Organization of the United Nations, more water is used for agricultural purposes than any other purpose in Algeria. By coming up with alternative or more efficient methods of growing food the amount of water used for agriculture could be drastically cut to make way for more water accessibility for the common people. But the agriculture industry is not just using up the water supply. They're poisoning it. According to the World Bank Organization, drainage from the agriculture industry deposits significant amounts of fertilizers into the main water supply of Algeria (2003). Pesticide residues have been found in some surface waters as well. The main portion of the blame for this issue can be put on the government. They have restrictions in place to prevent things like this. However, they just aren't enforced enough.

For such a populous and wealthy country, there is surprisingly little Algeria can do to remedy these issues. There just isn't water to go around. An estimated 3 million cubic meters of water is withdrawn from aquifers and other sources per year, but only 1.5 million is renewed each year. Some of this water has sat still for thousands of years and has had a significant degrade in quality, having increased nitrate and salinity levels. (Stratfor, 2016).

There are, however, some solutions that could help improve the situation. Algeria is obviously unsuited to agriculture, but removing that source of income and food would be economic suicide. The next obvious improvement is to increase government restrictions and to crack down on negligence in enforcing them. This would decrease the amount of pollution being deposited into Algeria's water system from farmland.

Another improvement that could be made to Algeria's water system is more government assistance. As it stands, the quality of Algeria's water transport system is not what it could be. According to Stratfor, 30% of all water in Algeria is lost in transportation due to leaky infrastructure (2016). If the government was the put more money into maintaining and building new pipelines the amount of available water in rural villages would grow, which would hopefully result in more people living in these rural villages. Another needed solution for the government that would help increase the total amount of freshwater in the economy is to build more desalination plants. As it stands, Algeria is doing very well in building these plants. The government has been funding the current ventures into desalination. However, this is a very expensive solution and one that is being performed at a loss to the government (Stratfor, 2016). In 2014 Algeria opened its largest desalination plant yet, the Magtaa Reverse Osmosis (RO) Desalination Plant opened. It has the ability to desalinate 500,000 cubic meters of water per day. The cost of the plant was $468 million (Water Technology, 2018).

Even with these efforts, the amount of water in circulation in Algeria comes nowhere near the water poverty line. More production of water is needed at some place in the country, and due to the desert, the only options are importing and desalination. And the demand for water will only increase in the future. For Algeria to remain one of the most advanced countries in Africa they must put millions into research for more effective methods of desalination and transportation. Lots of water is lost due to leaks and general disrepair of pipelines.

The most important thing Algeria must do if they are to survive the coming water shortage is to create a more efficient agriculture system. Worldwide agriculture uses about 70% of water from lakes, rivers, groundwater, and glaciers (Modern Agriculture, 2017). The current system is completely unsustainable from a water perspective. It is the biggest waste of water in Algeria. To help mitigate this water cost the use of water in agriculture must be restricted to sustainable levels. Funding research and subsidizing the increased cost of agriculture are both ways the government could support the shift to a more water efficient farming system. According to Modern Agriculture, Water Efficient Maize for Africa is a genetically modified strain of maize that is more drought resistant than other strains (2017). This allows the crop to be grown in areas with low rainfall and large periods of time without water. Developments like these allow farmers to use less water to grow crops in areas that don't have much natural rainfall. From 2013 to 2017 farmers in Italy used advanced sensors, were educated, and used superior irrigation technology to not only reduce water used by 17% but also increase yields by 27%. (Modern Agriculture, 2017). Another technique that could be used to help combat water waste in agriculture is closed environment agriculture. Aeroponic and hydroponic farms grow plants without using soil. Aeroponics use a mist rich in nutrients to grow the plant, which is not planted in either water or soil. Hydroponics plant plants in a water solvent rich in nutrients to give the plant all the things they need to grow. According to NASA, using a closed aeroponic system can reduce water use by up to 98%. Not only does this method reduce water needed to grow plants, but it also reduces fertilizer use by up to 60% and eliminates the need for pesticides altogether (2008). Tests have also shown that plants grown in aeroponic environments grow significantly faster than their counterparts in soil. Testing with a tomato plant allowed for 6 entire harvesting seasons over the course of the year, almost 3 times more than the normal 1-2 harvest periods

(NASA, 2008). Using very specific LED lights alongside an aeroponic system allows growers to control many aspects of a plant, including size, shape, texture, color, flavor, and nutrition (AeroFarms, 2016). Another benefit of aeroponics is that the chemicals and nutrients never touch the leaves of the plants. They are sprayed directly to the roots of the plant, and therefore the leaves are never contaminated with chemicals. The first large-scale farms have begun to show up in places such as Vietnam (Modern Agriculture, 2018), which shows that this type of production is a very viable solution to one of Algeria's largest problems - water for agriculture. Algeria's government has the money to invest in these technologies and try to reduce the amount of water used in the parasitic agriculture industry, they just need to find the right solution.

It's not only the national government that can make a difference in this battle against nature. The citizens and local governments of Algeria can make a difference too. Local governments can place restrictions on the amount of water farmers can use and be sure to check farms for illegal fertilizer runoff. Local governments can put more money into water transportation systems and subsidize farmers willing to switch to closed environment farming. Citizens can become active in their local communities and fight for the people with a lack of water.

There is not one single solution to the water issues Algeria is facing. The only way these issues can be fixed is by the combined effect of many different solutions, but it won't be easy for anyone. Building more desalination plants is very important, but that is useless unless Algeria fixes the other problems plaguing their water systems. The water infrastructure needs updating, and the agriculture system must use less water if Algeria wants to keep up with the ever-increasing demand for water in its citizens' everyday life. Algeria may need to import large quantities of water as a band-aid solution so that their citizens don't suffer while they are creating more long-term solutions.

Through all of these daunting challenges, Algeria has made surprising progress. Faced with nearly insurmountable obstacles, they have managed to not only survive with the lack of easily accessible water, but to thrive. Algeria is one of the most successful countries in Africa. But this is not sustainable. As the 2014 GDP dip shows, Algeria simply cannot continue to be propped up by only one industry. Algeria must diversify their economy. With the limited resources available to the country, they could try to improve their fishing industry or attract new tech investors to bring more stable income into the economy. However, none of this can happen before the water crisis is solved. If Algeria wants to move into a new era not only surviving, but thriving, better water systems are absolutely essential. Water is a basic component of life, and without it, there is no way a civilization can prosper. As Benjamin Franklin once said, "When the well is dry, we know the worth of water." So going into the future, will we stand by while the well dries up, or will we fight for everyone so no one has to find out the worth of water?

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