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Tunisia, Factor 2: Water Scarcity

Tunisia: The Building Block of Agriculture

“Anything less than a continuous supply is not an option, as water is an engine of development” (World Bank). This statement by the World Bank Organization proves true for many developing countries and areas, but especially for Tunisia. A country nestled between Algeria and Libya, in northern Africa upon the coast of the Mediterranean Sea, Tunisia is all but familiar with this statement (Every Culture). With Tunisia’s rapidly growing economy, culture, and population, water has been found to be the building block of their agricultural development and innovation.

On the coast of the African continent, Tunisia is exposed to a hot summer Mediterranean climate in the north, where winters are mild with moderate rainfall, and summers are hot and dry. Most temperatures can exceed 104 degrees Fahrenheit during the late summer months of July and August, when the continental air mass of the Sahara Desert reaches the whole country. Throughout this dry and arid climate, a yearly average of 8 inches of precipitation has been recorded since 2002. (World Bank) This particular type of climate prohibits the growth and productivity of Tunisia’s agriculture and economy, due to the negative impacts of water scarcity.

Tunisia’s economy relevant to agriculture goods and processing focuses heavily on olive exports, as well as cereal and fruits. Agriculture alone contributes to 12.6 percent of the country’s gross domestic product (GDP), and employs almost one quarter of the country’s labor force. Olive oil is Tunisia’s largest agricultural export, which makes it the second largest producer of olive oil, after Spain. The average yearly olive oil exports range between 280,000 to 300,000 tons, and have been increasing exponentially each yearly season. Olive oil represents about 40 percent of Tunisia’s total agricultural exports (Nations Encyclopedia).

After olive oil, cereal and citrus fruits represent the other larger portion of Tunisia’s agricultural exports. Citrus growth reached about 440,000 tons yearly since 2000, some of which is exported, others are sold locally for the typical family’s diet. Cereal shows its importance through exports and local sales, and accounts for the second largest export portion (Nations Encyclopedia).

The northern part of the country supports citrus fruit growth, while the central region sustains the cattle production. The Sahel region is famous for their olive groves. Further south, date production is well-known. Almost more than 60 percent of cultivated land in the southern region of Tunisia is sown with cereals and barley, which is prevalent throughout all parts of the country (Nations Encyclopedia) The remainder of most of Tunisia’s agricultural production contains various vegetables. This can include tomatoes, peppers, and sugar beets. Some other fruits can also be grown, such as melons and apricots. With an agricultural production as important as this, water is heavily relied upon. With a lack of reliable precipitation, Tunisia’s agriculture suffers yearly to meet quotas of their yearly production for exports and local sales. With the wide-spread problem of water scarcity affecting both the agricultural production and daily life of the average Tunisian farmer, it is imperative that this factor be looked upon and solved.

In Tunisia, the average family size depends on whether the family lives urban or rurally, but it is mostly based on the patriarchal family. It is most consistently seen as a family with a dominate male head, an average of 2 to 4 children, and sometimes the family unit contains extended family as well, such as grandparents (Every Culture). Agriculturally, a larger family allows for more workers and help during

growing and harvesting seasons. Within the household, chores are assigned to assist the household according to age, gender, and personal skills.

The typical rural family relies on strong ties to local and home-grown agriculture in order to provide for the family's diet. Their diet is very dependent on the resources in the regions around them. It has heavy focuses on wheat, especially in the form of bread or couscous, olives and oil, meat (especially sheep and fish), and fruits and vegetables. Many of these items provide the essential nutrients needed to maintain energy and a nutritious diet, and typically are incorporated into everyday meals.

Since Tunisia is in the Mediterranean basin, they offer mostly 'sun cuisine'. This means many dishes include olive oil, spices, tomatoes, seafood, and lamb or mutton. Couscous is in almost all dishes as well, and is found in foods for every occasion. Many other dishes tend to be egg-based, and cooked with various meats and vegetables. Tunisians mainly drink milk and water. It is very normal for the family to either provide most, if not all, of their diet from their own personal farms if they live rurally. A local market usually provides fresh fruit and vegetables, various spices and grains, and certain meats. It can also provide rural families with an economic opportunity to sell their goods and products locally. This gives both rural and urban populations of Tunisia an opportunity for a fully beneficial and nutrient rich diet.

Education comes in many forms and opportunities in Tunisia, but remains a high priority for many families. Tunisians have an average of nine years in education. Typical families do not have members that have gone onto higher education opportunities, such as college. After the primary education of nine years - which includes basic reading, writing, and math skills - families can decide to send their students to a secondary or vocational school. The secondary school - which is typically four years - is either technical or academic and focuses on skills in either of those categories. This is usually a stepping stone into a tertiary academic path. If one chooses vocational school, this usually involves an apprenticeship for employers. This provides training opportunities in a particular job field. Tertiary school is the highest academic achievement and has started growing into a more familiar opportunity for most students. In the year of 2015, it was recorded that 350,000 students attended tertiary schools. This education is mostly focused towards medical and technological innovation and training, as well as some teacher certification. In Tunisia today, there are 13 universities, 24 institutes of technological studies, and 6 higher institutes of teacher training (Class Base). The most popular school, the Zaitouna Mosque and University, currently resides in the capital city of Tunis and contains the most tertiary students.

The Tunisian access to healthcare is quite modern. It has continued to become more modernized through many advancements and innovations. In rural areas in particular, traditional healing methods are practiced as well. Most health care is distributed evenly throughout the country, but it tends to be most diverse around Tunis. There are many private doctors and facilities, with many practices stemming out of the universities and tertiary schools. The biggest medical college resides in the University of Tunis, and provides the most diverse healthcare. Through the many new advancements Tunisia has made, it is still very common and popular to see more traditional healthcare. Many traditional healers become botanists, herbalists, or something else of religious context. Acupuncture is the most common of these practices, and can still be seen in many of the urban areas.

Though Tunisia can be an extensively industrial area around the bigger cities like Tunis, Sfax, and Sousse, the rural community is still largely spread. There are many agricultural production sites that are government or community run, but traditional rural farms dominate the landscape. Typically, an average farm is sized around 13 hectares, or approximately 32.1237 acres. This land includes the living situation of the family, as well as the agricultural operation. 80 percent of farms are smaller than 20 hectares, and only 3 percent are larger than 50 hectares (Nations Encyclopedia). Irrigation is relied upon heavily, due to the inconsistent rain patterns of northern Africa. With the land being split into so many smaller farms,

production is much less efficient than its potential. Also, without a stronghold in newer farming technologies, many farms are not highly mechanized. This slows productivity, especially in the planting season when plowing a field could take five times longer than in the United States. With Tunisia's incredibly diverse landscape and topography, it holds many different agricultural production opportunities. In the Northern region, citrus and various vegetable production is grown and sustained. More centrally, cattle and sheep populations are more prevalent due to the drier, central plains. Further South, olive production is at its absolute finest, especially in the Sahel region, and date production and growth is followed after. Generally, wheat and barley is grown in almost every area, and provides a sizable chunk of Tunisia's exports. Cereals alone account for 1,347,000 hectares (3,328,000 acres) alone, while tree crops utilize 2,000,000 hectares (4,920,000 acres). Olive oil is the other largest exporter for Tunisia. Over 70 percent of olive production is exported, from the 7 million trees grown (CNN). Animal production is widely popular as well, besides the centrally located cattle operations. Some familiar animals can include dairy cows, goats and sheep. Many families use these particular animals for their own meat or milk source, instead of production. Along the coast of Tunisia, fishing is another prominent agricultural product. The fishing industry alone provides over 25,000 people employment opportunities, and catches an average of 93,000 tons of fish a year. However, coastal fishing has disappeared slowly due to pollution and absence of larger fish stocks.

Though much of the country is dependent on traditional farming methods, organic agriculture has become relatively new in Tunisia. Even though it is broadly new, organic land area, number of supportive farmers, and crop production diversification has grown increasingly in the last ten years. Currently there are 155,323 hectares (383,811.492 acres) under organic use, which represents 1.59 percent of total agricultural area in Tunisia (Intracen). Tunisia is now one of the most developed organic sectors in Africa. This new method is largely due to active government policy in the promotion of organic agriculture since 2003 (Intracen). Since there is not a large demand market for organic products, most of the production is directed towards exports. Many of the key organic products include olives, dates, jojoba, almonds, fruits, vegetables, honey, and other plants. Recently, organic livestock production in Tunisia has expanded as well. However, through the advancements of organic technologies, it still requires the same amount of water as traditional methods, but should still be considered as an alternative method. While there may be many incredible advancements in specific areas of Tunisia, there still remain many major barriers. These barriers include anything from improving their agricultural productivity, employment of urban and rural workers, as well as the individual's access to nutrient-rich food and adequate markets. The agricultural productivity of Tunisia is not as efficient as it could be, since Africa as a whole is behind in farming technology. Their agriculture sector lacks returns of their natural resources, which depletes them quickly. They also lack management of their agriculture sector, in general. Many farms are 'family-owned' and managed by the family, which leaves the rest of the production companies without a knowledgeable manager or employees.

Entrepreneurs express need better skills, specifically in marketing, efficiency, and managing risk and uncertainty. They also desire more advanced knowledge in the newer technologies from around the world, since Tunisia is still so far behind other countries (Tunisia-Live). The main barrier of employees recently is the lack of legitimized workers. Most workers work 'informally' which means that employees can work illegally without many benefits. This causes much instability, poverty, and risk. For the protection of the workers, being informal also means that they do not have a 'back-up plan' in case of decreased yearly salaries, non-payment of wages, too much overtime, unsafe work conditions, or even being laid-off without compensation. According to the World Bank, 38 percent of Tunisia's GDP comes from the country's informal workers and economy (Tunisia-Live). It has also been recorded that the women's work in the informal sector, greatly surpasses their employee presence in the formal sector. Water scarcity affects urban women more commonly than rural, but gender isn't specifically impacted by the water issue. The economy as a whole is low in productive activities and produces many low-quality insecure

jobs. Since there are so many low-quality jobs, there are less high quality jobs, which leads to a surplus of skilled university students and graduates.

It is important that families get adequate nutrition and have easy access to it as well. Tunisia's greatest threat to these markets are their ever present drought seasons. Production plummets during drought season, not providing enough food for the community and families. Markets have also changed recently, because of the development of 'super-markets' or 'hyper-markets' (Euro Monitor). These markets are like large merchandise chains, which dominate the economy because of their 'one-stop shop' qualities. The fast growth of these markets threaten smaller entrepreneurs as well, by creating an even bigger competition. Finally, the lack of direct shipping lines to exporters, especially the United States, causes for higher export cost and taxes. This is incredibly prohibitory towards the export economy, in which Tunisia is largely involved.

Of all the barriers in Tunisia, the barrier affecting much of their daily life, is water scarcity. Water scarcity affects every part of the Tunisian lifestyle, from agricultural production, daily health and hygiene, and general well being. Over 87 percent of water resources in Tunisia are used by agriculture (Horchani, pg. 96). The Middle East and North Africa have always had a problem with water scarcity, due to their proximity to both the Sahara Desert and the Mediterranean Sea, but recent climate change has made it even worse. Since the climate has gradually become warmer, the precipitation patterns have been greatly compromised. Rainfall is inconsistent and that impacts the yield of yearly harvests, therefore affecting the agricultural economy and sale of that harvest. This inconsistent harvest affects the profit of these farmers, and causes more financial distress. Drought can last up to 2-3 years, which can greatly derail the harvest, causing an even more inconsistent agricultural output. Droughts also can restrict agriculture development altogether in more arid places.

The growth of urban populations has put a stress on water reserves and natural resources, which are even harder to regenerate. These can include dams, tube wells, springs, and groundwater. 84% of water also requires some sort of desalinization in one of four plants located in Djerba, Kerkennah, Zaarat, and Sfax. With the region's rapid growth and urbanization, there's even more demand for water. In order to keep up with the inconsistent access to water, farmers have started to use a electric pump method to irrigation. These pumps are powered by electricity which leaves water hot from the electric charge, and unable to use right away for crops. This particular method is also highly energy consuming (AgEcon Search). The typical farm family suffers greatly agriculturally, and this can affect their yearly income as well as their own food supply.

The present status of this factor is still considered developmental, because there are so many projects in process in order to suppress this stress on water scarcity. The trends of this particular barrier also still seem consistent, as the climate still remains inconsistent itself. There has not been much change due to a lack of knowledge of solutions to a climate change problem. Climate affects this factor mostly because of the irregular patterns and rainfall, which provide long droughts and very occasional floods. Population growth continues to put more pressure on water reserves and natural resources already obtained. Improving this factor would greatly help the agricultural and industrial portion of this country as well.

Even though water scarcity can be very dangerous, there are many ways that Tunisia can begin to support the problem. Many projects which are supported by the government, including The Urban Water Supply Project, The Second Water Sector Investment Project, and the Northern Tunis Wastewater Project, have started in order to take Tunisia's water scarcity problem a little more seriously. The Urban Water Supply Project's goal is to ensure the success of water service for much of Greater Tunis and other large cities, by upgrading the renewal water resources. The Second Water Sector Investment Project is aimed at promoting more efficient care and operation of public irrigation systems, improving access to quality drinking water for both urban and rural communities, and finally, they assist the Ministries of Agriculture

and Water Resources in making large decisions relating water resource management in Tunisia. The Northern Tunis Wastewater Project supports providing an environmentally safe disposal system for treated water which can not be reused, while also maximizing the amount of treated wastewater that can be made available to farmers, which in turn encourages its reuse in agriculture (World Bank).

All of these projects have immense support, and continue to grow yearly. Another solution to water scarcity would be to consider drip irrigation. This specific type of irrigation can save up to 20 to 50 percent more water, saving up to 30,000 gallons per year (EPA). This also limits the amount of water wasted due to losses through runoff, wind, evaporation, or overspray of the plants. This system distributes water directly to the roots of the crop, maximizing the irrigation efficiency, as well as significantly minimizing overall costs. The last technology that could greatly diminish water scarcity is the Solartech technology. Solartech is manufacturer of pumping inverters, solar water pumps and systems, as well as solar water-saving irrigation systems and solar desalination systems. All of these products use the ultimate renewable resource, natural solar energy. Since solar power is consistent, that makes these products even more effective, and they are also eco-friendly. Each of these products aid water management, either by solar sprinkler or drip irrigation, or even with micro-irrigation. These products have been used in over 100 different countries, and have proven to be successful in all situations (Solar Tech). The solar pumps combined with different types of irrigation can improve the application of water resources. The solar pumping systems stores water instead of electricity, and has cut down the overall cost. Water can later be used in irrigation after it cools down, proving efficient as well as cost-friendly. All of these methods of water reuse and conservation could be applied in Tunisia, and could potentially solve the water scarcity problem.

There are many solution possibilities with Tunisia's water scarcity threat. Solartech and new irrigation techniques should be applied to enhance Tunisia's agriculture and industry. Since Tunisia is widely involved in exporting their olive oil, cereals, and fruit, water scarcity affects all of these, and should be handled accordingly. The typical family's dependence on water proves its importance in their daily life. Plants themselves need a consistent water source, and rely on water just as much as humans do. In order to continue the agricultural exports of olives, cereal, tomatoes, and citrus, water is a huge dependency. Tunisia's economic growth essentially relies on their export industry. Though major barriers still display great importance, water scarcity still remains the most important. Though climate change can't truly be avoided or prevented, it can still be handled by water management techniques. Even though the present status of this factor is still considered in progress, the many projects already developed are helping. Through proper water management techniques like drip-irrigation, Solartech products, and even different organization products, the people of Tunisia have hope for consistent water resources and confidence in their natural sources.

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