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Morocco, Factor 5: Climate Volatility

Morocco's Irrigating Problem

Economics in today's world is most often defined as the knowledge we connect with the creation, use, and transfer of wealth. There are many branches to economics, but the one I would like to discuss at this time is agricultural economics. This field is an applied field dealing with optimization of production and dispersal of food and grown fibers, through efficient agricultural practices. To optimize these practices however there needs to be a distinction of what agriculture is. The very essence of agriculture, which interests us so much in the science to begin with, is the need for food among all organisms. We as humans, and even more as basic animals, require food to live. We can't make it without the energy, the concentration, and the essential balance that food gives us when consumed. The deep set need is what makes it impossible to go on without a healthy source of food, yet many are forced to go on without that source; so many are forced to go on without the vitally needed aspects of life. Throughout the world we call home, there are many countries where those without the necessary food are congregated, for many reasons. Some of these hungry nations have many substantial problems they are fighting to overcome, some only have a few, but not very many countries are lucky enough to have none. As I said many countries struggle with their agricultural practices, some more than other, but in this paper I will only focus on only one of these many challenged nations. With so many countries available I had some difficulty choosing one, when so many caught my eye. I sat on the bus, reading region after region, country after country, until I found one more familiar than the rest. The country I had spotted was "Morocco (including Western Sahara)." Now I had a country half the work was done, but choosing a factor that was lessening food security in Morocco was an equal challenge. I came to this choice with use of previous information on Morocco. Morocco and the Western Sahara are known to be countries with great temperature extremes resulting in arid, as well as densely humid seasons. Hot and arid of climates are quite difficult for many cooler climate crops, and even animals, and too cold of climates are difficult to raise warm, dry natured plants and animals in. That wildness possessed by Morocco and the Western Sahara's weather patterns gave me my factor, climate volatility, and with my country and factor chosen my essay had been formed. The following is my analysis of the issues poised by climate volatility in Morocco and Western Sahara and my suggestions as how to lessen its negative impact on the country's agricultural exploits.

As of July 2016 it was reported that Morocco is a country with an estimated population of 33,655,786 people, nearly six million more than live in the state of Texas. (Central Intelligence Agency, 2016) Morocco is located in Northwestern Africa, with an average rural family composed of two parents and two to three children per house hold. Healthcare for Moroccans is needed since it has been recorded that in unimproved urban areas only 15.9% of the population has access to sanitation facilities, and in rural areas only slightly more at 34.5% of the population having constant access. (Central Intelligence Agency, 2015) This is a problem of its own, but it is also told by the New York Times that, "Morocco has one doctor per 1,600 inhabitants, compared with the one for 800 in Tunisia, and one for 600 in Algeria," and, "Fewer than 30% of Moroccans have health insurance coverage." Even as the Moroccan government spends over five billion dollars on health care annually, this statistic remains shockingly low. (Alami, 2013) Another struggle is represented in the issue of literacy and education among Moroccans. 31.5% of Morocco's population over the age of fifteen cannot read and write, making many of the most mundane tasks near impossible for them, and many jobs unattainable. Education itself isn't as much of an issue, as most females

receive twelve years of education, and most males thirteen, (Central Intelligence Agency, 2012) but an equality in those numbers would certainly be beneficiary, as well as any lift in those numbers, as education can always be helpful, and rarely a hindrance. These people have many struggles, including food security and any lift in their standard of living is tremendous.

Climate volatility, for those with any questions posed, is having a negative impact on Morocco's food security, as it lessens the ease of agricultural productivity. The further east into Morocco one goes, the more volatile the climate becomes over the course of a year. Summers and winters become more extreme, and it becomes more and more difficult to maintain a stable agricultural practice through the changing seasons. According to Berkat and Tazi, "Agricultural exports include vegetables, citrus, olive oil and wine. The main products include wheat, barley, pulses, vegetables, citrus fruit, olives and olive oil, figs, and dates. Animal products are consumed locally, except for processed leather." (Berkat and Tazi, 2004) Many of these crops need stability in their climates, and without that stability, they fail to produce as needed by the country. This poses problems for many in Morocco. Subsistence farmers have poor food security, farmers selling products as exports or locally have a lack of steady income, and Moroccans buying products from local sources lack food security as well. The climate volatility does not just disadvantage one group, but several.

Oddly enough many think as large scale problems as food insecurity can fix themselves. This as you might guess is not so. The planet, although many deny, is subject to global warming. Over the last century the average temperature of the planet has risen over a full degree Fahrenheit, or two hundred fifty five point nine two eight kelvins. (National Geographic, 2017) This does not just mean excessive heat at all times though, this means general climate change. The most related affect to Morocco is the extreme summer and winters the nation is victim to, may become more aggressively different, while many argue they may become less so. More drastically varying temperatures from one season to the next would do no favors for Morocco's agricultural sector. The agricultural sector is seen to be suffering, and will only suffer more, unless steps are taken to work alongside an unsteady climate before it can become even more volatile than it is at this time. Action must be taken, to ensure food security for the people of Morocco, not just today and tomorrow, but every day after that as well. These are not problems that will disappear if we look away. Some of the more substantial problems have at least partial solutions, and if steps are taken to address them true food security would be much closer.

Livestock is one of the aspects of agriculture that is affected by Morocco's climate. Cattle, sheep, and goats are a few of the major livestock types raised in Moroccan agricultural practices. More directly as told by Berkat and Tazi in their 2004 report, "There are about 2,700,000 cattle, 17,000,000 sheep and 5,300,000 goats in the country. Similarly to many other animals they show signs of discomfort when faced with too extreme of temperatures. The temperatures they are being raised in are erratic and can often cause unnecessary suffering to the animals which can often lessen the quality of the resulting products, whether that be milk, meat, or materials such as wool or leather. Besides the typical land livestock types, Morocco also profits from their fisheries, and the resulting seafood products. As to be expected erratic temperatures, and horrible sanitation of water can affect these creatures as well as Morocco's other livestock. When quality of a product decreases, nutrition naturally declines in an edible product's case. The nutrition of food is vital to those consuming it, giving us nutrients essential to many bodily tasks. In affect this means that the food Moroccans are able to secure, may be less beneficial than many suspect. This has a solution of its own. Besides the construction of shelter for livestock's protection there are some breeds that are better suited to the varying temperatures of Morocco. When it comes to cattle the Brahman would be well suited for its ability to withstand heat as well as much cooler temperatures. Whether it was the cooler, or increasingly hot season in Morocco, these cattle would be able to withstand it. This trait comes from its many physical adaptations that help the Brahman breed live in their country of origin, India. When it comes to sheep Katahdins' ability to shed their coat to suit heat and humidity would help them in the Moroccan

sheep. In winter, and even into spring or fall their thick coat would protect them from the elements, and as soon as the heat became more than bearable, it could be shed. This helpful adaptation would suit them to Morocco's climate quite well. As for goats the Spanish meat variety are very used to rugged environments and have thus been adapted to very adverse conditions. This is only a solution if citizens are willing to use these animals instead of those which may not withstand temperatures as easily. Many suggestions can be made, but it is in the hands of Morocco to enforce them.

Another major problem in Morocco as was addressed in the beginning of this essay that would need balancing before Climate Volatility could be dealt with is sanitation. Only seventy two percent of Morocco's population has access to improved sanitation facilities. (The Guardian, 2016) This seems like a decent percentage, but in truth it is a much too small fraction of the population. Without everyone having access to proper sanitation the people Morocco relies on to farm, or their families may very well not be healthy enough to work in order to produce the necessary products. Not only does sanitation affect the health of the people, but the health of their supplies they are working to produce. Raw sewage being disposed of into water directly causes bacteria, diseases, and infection to grow and run rampant further degrading the health of not only farmers, or those without proper sanitation, but those near enough that they share water sources.

Although the number of those with a clean water source is better than that of those with proper sanitation facilities, only eighty two percent of Moroccans have access to clean water. (The Guardian, 2016) Water is an issue of its own, able to be solved, but not easily. More sanitation facilities need to be built, water needs to be filtered and kept clean for people, livestock, and crops. For this to be achieved government action needs to be taken. A matter of this large scale is not an easy task, and must be focused on by a large force of people, such as the government. Although sanitation would definitely improve the standard of living, further the people of Morocco need to have a steady education to live their lives, and to farm or to have jobs that allow them to buy the products of the farmers. Yet another factor needing to be stable before climate volatility can be resolved is sustainable agriculture. The key to overcoming climate volatility however is not fixing any one of those aspects of Moroccan lives, or to change the climate. The key is finding practices that let one adapt and maintain the land in its current situation. Irrigation as it is being used in Morocco currently is not truly sustainable, coming to mean that agriculture, especially in an often arid climate in need of water, is not sustainable until irrigation has its processes in order. It is not at this point a matter of permanently fixing climate volatility, but working on all of the other factors to be able to work with the climate Morocco has.

Essentially it comes down to two things to master climate volatility and food security in Morocco. Irrigation, as has been stated before, is the first of the factors that needs to be organized to conquer the current climate volatility. An often arid climate means water is needed to farm, and the best way to supply that water is through healthy irrigation practices. Now the question of where to get the water for irrigation is posed, but quickly solved with enough thought. With the extremes of Morocco there is also a heavily humid season. The surplus water from that season can be collected and later used for farming during the arid period meaning it is possible for more crops to stay watered healthily the full year not just seasonally, and for animals to stay healthily cooled in the hot arid season with water being available to keep them safe in drought. This is still a difficult choice for the government though, since many argue that the clean water being used for irrigation should rather be going to the population as drinking water. When it is decided it is better off being drank by the people, rather than put towards their food, the third solution comes best into play. Third is the agricultural practices used themselves. Livestock types may need to be varied to suit the climate, by using heat and cool resistant cattle such as Brahman, or goats used to adverse conditions such as the Spanish breeds.

When it comes to plants one mean of fighting the climate is irrigation as said above, but another is drought resistant varieties of the already grown crops. Some examples of vegetables that grow without need

of as much water is miniature bell peppers, eggplants, rhubarbs once mature, some varieties of corn, chickpeas, moth bean, black-eyed peas, along with many other varieties of legumes. Past varieties of animals and plants that don't need constant heavy water supply there are many other agricultural practices that would help. One of these practices that would especially benefit the issue of depleting nutrients from low water is crop rotation. Use of rotation could further mean crops being able to grow yearly and not run out of resources to grow healthily, with great longevity and production. Switching between growing legumes in an area one season, and then another type of plant the next would allow Nitrogen deposits in the soil to replenish themselves, which would allow crops to grow healthily. It is to be said that with these sustainable practices, surpluses would be produced, and prices on products grown within the country would lower. With lowered prices, consumers would quickly be able to buy more of these products, and the people would have better health themselves. The more that is bought although cheaper, means more money is being given to the agricultural sector with more possibility of them becoming yet more sustainable. Sustainable agriculture is after all the end goal of any agricultural sector.

With food being closer to being secured Morocco could have more time to focus on improving healthcare, education, as well as putting yet more effort into improving the irrigation and sanitation that were such problems before. Then with people having a higher standard of living the cycle could repeat, and more focus could be put back to increasing food security further. Overall climate volatility could soon be, not eliminated, but overcome, and food security regained if adjustments are made. With the help of urban and rural families, Moroccans have the ability to change the ways animals and plants are raised. If the government of Morocco and those of other world powers get involved in helping not just Morocco, but every one of the countries we had the choice to write about there is more of a chance than ever before for harmony among people, and as simple as it sounds, that will achieve food security. We can't hope for all the things I said to be achieved above unless people work together. Yes, all of my solutions would, if ideally carried out, give Morocco some much needed agricultural security, but those means of a solution couldn't be carried out without people. We cannot just simply waiting to be saved. To achieve results we must take action, and I would be glad to do something to help make that happen.

Citations

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