Brendan Bussinger
Rock County High School
Bassett, NE
Sudan, Factor 5; Climate Volatility

Sudan's Diverse Climates

What would life be like if there weren't any land that could produce crops? What if there weren't any food at the supermarket or even at the local farmers market? Sudan, which is located in Eastern Africa, has a huge problem growing its own food. The climate and amounts of precipitation are also barriers to solving food insecurity. Imagine this; Nebraska is under one-twelfth the size of Sudan, but irrigates over 185% more land. NSTATE, LLC. (2016) claims that Nebraska's total land mass is approximately 77,000 square miles and 17% of it is irrigated. In Sudan, which has an area of almost one million square miles, only 0.7% is irrigated (Advameg Inc., 2017).

1. Sudanese Farm Families

Sudan is Africa's largest country, but due to many different geographic features and climate changes, only about 35% of the total land is actually adequate to produce crops. Still, large numbers of Sudanese people attempt to farm. 65% of the population live rurally, and 80% of the jobs are agriculturally based (Gale, 2007). An average farm family consists of six people, with two of them being the parents. There are also extended farm families that can house cousins and uncles, while a herder family's size depends on the herd (Embassy of the Republic of Sudan, 2017). The houses these people live in are usually unclean and cramped, and they are mainly built of mud or clay with straw rooftops. Over 50% of the population live in one-roomed houses and about 33% have houses with more than one room and a bathroom, but almost all have a garden (Gale, 2007).

2. Schooling and Health Sectors

Due to the rural population, many people lack proper education. There are three levels of education; primary, secondary, and third-level schooling. Gale (2007) says that less than 58% of kids get primary education, 32% get secondary, and only 7% become enrolled in third-level colleges. Without the proper education, few people become doctors. There is about one doctor for every 6,250 people, but hospitals and health services are mainly free. Most Sudanese children are immunized, but malnutrition is a problem. HIV and AIDS are just a few of the problems for adults, and they are spreading very quickly (Advameg Inc., 2017).

3. Typical Food and Crops

Many families grow their own food if the climate allows it. Most families have three meals a day, starting off with tea or coffee. Some main dishes include "asida" and "kisra," commonly known as porridge and cornbread. Advameg Inc. (2017) states that potatoes, beans, and camel dairies are also very common, along with peanuts for a snack. Meat isn't eaten very often because it costs too much, but for special guests, sheep meats and organs are cooked in a dish with chili peppers called "marara." Since almost all the food these people eat is grown and cooked at home, land is no issue.

Even though there is a lot of open land in Sudan, some of it isn't suitable for crops, including deserts, mountains, and river washouts from the Nile. An average farm is around 2 acres, but extended family farms are much larger. When climate permits it, cotton is produced, with most of it being exported. Other major agricultural crops include sorghum, peanuts, sesame, and gum Arabic (Embassy of the Republic of Sudan, 2017). These crops are mainly grown using irrigation. In Northern Sudan, the only land that is irrigated is that close to the Nile River, because everywhere else in the north is dry, stony, and overall, desert-like. In the south, where ever there aren't tropical trees, the rainforest climate feeds natural irrigation to the crops.

4. Distinct Environments

Sudan has a large variety of topographic qualities, and therefore, many different climate conditions. One major feature is the Nile River, entering Sudan in the north and slicing through its two deserts. Almost 30% of the land is made up of two rocky, low-rainfall plains and they are both in the north. West of the Nile is the Lybian Desert while on the east side is the Nubian Desert (MiddleEast Arab, 2010). Along with many long-lasting droughts, dust storms, called haboobs, are common. These make the production of agricultural foods very difficult.

The south has a completely different biome. High-rainfall savannas, tropical rainforests, and swamps take over this part of Sudan. Advameg Inc. (2017) claims that almost 10% of the south is the called the “flood-region,” differing from the northern deserts. This area is commonly affected by floods, including flash-floods. These, like the northern deserts, make crops hard to produce.

Since the amount of rainfall increases from the north to the south, the central part of Sudan is nearly perfect for large crop yields. With fertile soils, ideal temperatures, and just the right amount of rain, the central grasslands are luscious and the fields grow flawlessly. The land is irrigated when the rain doesn't fulfill its duty, farm machinery is often used, and terraces have been developed to maximize use of mountainous terrain (Zaroug, 2000). Even though some parts of the country don't allow food to be grown, the inner terrain and climate does.

5. Environmental Restrictions

As stated before, Sudan has a very diverse climate. Besides desert-like conditions, the north has many barriers to growing crops. Sandstorms, thunderstorms, and even heatwaves are common occurrences. In addition, water scarcity can be caused by droughts. One major problem leading to the food insecurity is the conservation of water (Zaroug, 2000). People need clean water to survive and rain isn't in abundance in the north, so it is very difficult to stock up on clean, natural water. Since little water is saved after the ephemeral rains in the north, there is hardly any irrigation on the land. This explains why only 10% of the arable land is actually irrigated (Advameg Inc., 2017).

Besides droughts, floods in the south have caused issues for Sudanese people trying to produce crops. The “Sudd” is the southern region that is mainly swamped (MiddleEast Arab, 2010), and it is among the largest freshwater swamps in the world. Along with swamps, heavy rains can cause flash-floods and the Nile can overflow and destroy crops. Both floods and droughts are huge causes of food scarcity. When people become hungry, the tiny amounts of food that are being stored worse problems start getting abused and used up. Consequently, this leads to large, starving groups of people not surviving the famines.

6. Climate Trends

Elgizouli (2008) explains that the standard amount of rain in Sudan is decreasing by about 5% during every month of the wet season. According to Zaroug (2000), the temperature is projected to majorly increase in the next 50 years, and the amount of rain is supposed to decrease. With less water and higher temps, the amount of droughts could increase. If these studies are correct, water availability could potentially become the country's largest problem. The northerners and southerners would either have to leave the country or move towards the center, where the climate is nearly perfect. This could cause a population growth right in the middle of the country, which would also decrease the amount of land that could be used to produce crops. In the end, every person in Sudan would be affected by these climate trends. Something definitely needs to be done.

7. Possible Solutions in the North

Since Sudan's climate is so erratic, many solutions would be needed to solve climate volatility and reach food security. In the north, the land is very dry and dusty, but that doesn't mean it isn't arable. Many people argue that droughts can't be solved, but I beg to differ. Britton (2017) agrees, saying that some places are in the process of being taught how to grow trees. She also states that the WFP has already built some water reservoirs to store water. Trees could be a tremendous help and step forward. They create moderate temperatures which allow clouds to rain. If there aren't trees, rain can't fall, creating a drought.

Along with trees in the north, nitrogen-fixing crops could be encouragers towards a more productive environment. Nitrogen is very important in the planting and production of crops. Even though most of earth's atmosphere is nitrogen, plants can't use it. They must use a "fixed" form of this. Nitrogen-fixing crops, along with the help of microorganisms, can change nitrogen in the air into usable fertilizers in the ground called nitrate (Hyden House LTD, 2015). Since this "nitrate" is so important and the land in the north is infertile, they are very much needed to alleviate problems of climate volatility. Some examples of these plants include soybeans, alfalfa, clover, and even peanuts. Some plants, such as alder and coffee bean trees and lupine flowers also help fix nitrogen in the soil (Homestead and Gardens, 2017).

Finally, wells could make a lasting impact on the people of Sudan. According to The Water Project (2017) there are several wells. First, there are hand dug wells. They aren't only unsafe to dig, since the hole can be more than 50 feet deep, but the water can be unsafe to drink. Other problems can also occur, such as the hole caving in and even people falling in. These wells are very low cost, but don't provide water to many people. The next type of well can be up to 200 feet deep, but are more expensive. Not as many problems occur though, because they are drilled using a machine and have a casing down around the hole. Also, hand pumps are usually installed along with a "lid" to seal off the hole. Lastly, the largest and most expensive wells can be the most effective. Being almost 1000 feet deep and providing water to up to 3,000 people, these wells come with a pretty penny. Large companies and equipment are needed to drill these wells and they can take many days. All the labor, electricity, and supplies needed for a well like this can cost an upwards of $30,000.

8. Possible Solutions in the South

Southern Sudan has problems that are very opposite of the north. The south, unlike the rest of the large country, actually receives too much rainfall. Contrary to dust storms, floods are an issue. These problems still need to be resolved. Water-resistant crops need to be grown that can withstand floods. Many crops are already being tested to create seeds that tolerate large amounts of water (Science X Network, 2017). Some plants include rice and certain types wheat, such as Chinese Spring wheat. Also, some maple trees grow well in these soggy areas. By growing plants that will increase productivity, more jobs, money, and products could be made available for Sudan. These can be put towards trading or buying and selling items the country needs.

Another solution could be the use of irrigation trenches. If farmers want to produce crops that aren't grown totally in water, or if some areas don't experience as much rain as others, ditches or trenches can be dug. These ditches are usually man-made, long and narrow “gutters” that direct water from one place to another. They are usually dug next to crops to allow excess water to flow and keep nearby soil fertile and wet. Trenches can be excavated by hand, which can take lots of time and energy, or by machines. Depending on the length and width of these channels, choosing the appropriate labor force is important. Machinery or companies can be expensive to use, but only using local help can take lots of time. Either way, the problem of floods could be solved with the help of irrigation trenches.

9. Involvements

Along with Sudanese farmers growing the right plants and working hard to keep them alive, there are many organizations or companies that can get involved. By helping start fundraisers or giving grants, these organizations could take a huge leap on the road to food security. One of which that could potentially impact these ideas is the Rockefeller Foundation. This foundation funds certain projects to create smarter, healthier lives. The Rockefeller Foundation (2017) states that they strive to create a “meaningful and measurable impact for poor and vulnerable communities through smart globalization.” Other organizations just like this one are also willing to fund projects that push towards food security.

Not only can charity foundations be a huge help, but so can the government. Sudan’s government can also “pitch in” by starting fundraisers that can be put towards these problems. Additionally, it could use a percentage of the taxes it receives to pay for solutions. Besides Sudan’s own government, other countries’ government can help as well. Britton (2017) explains that Sudan gets a significantly smaller amount of foreign aid, or donations, than other countries. Sudan receives less than $50 million through foreign aid, while India receives over $1 billion (Britton, 2017). This is a substantial difference and if Sudan got donations the size India does, all these solutions could be easily paid for and put to work. Even though addressing a problem is different than solving it, I have high hopes these solutions will succeed.

In the future, Sudan could become one of the most productive and food-sustained countries in all of Africa. Not only will the climate volatility be addressed, but it will be resolved and potentially become a forgotten factor, including the floods and droughts. With the help of organizations and even their own people, Sudan could tackle most problems. Nothing could hold back their need to keep progressing.

Works Cited

Advameg, Inc. (2017). Sudan. Retrieved April 03, 2017, from

http://www.everyculture.com/Sa-Th/Sudan.html

Britton, B. (2016, December 08). Is Sudan doomed to become 'uninhabitable'? Retrieved April 24, 2017, from http://www.cnn.com/2016/12/07/africa/sudan-climate-change/

Dictionary.com, LLC. (2016). Dictionary.com. Retrieved April 03, 2017, from http://www.dictionary.com/

Embassy of the Republic of Sudan (2017). The Sudanese Family Life. Retrieved April 03, 2017, from http://www.sudanembassy.org/index.php/the-sudanese-family-life

Homestead and Gardens. (2014, December 05). List of Nitrogen-Fixing Plants. Retrieved April 24, 2017, from http://www.homesteadandgardens.com/list-nitrogen-fixing-plants/

Hyden House LTD. (2015, May 22). Nitrogen Fixing Plants & Microbes. Retrieved April 24, 2017, from https://www.permaculture.co.uk/articles/nitrogen-fixing-plants-microbes

I. Elgizouli, Mr. (2008, May). Climate Change Adaptation and Decision Making in the Sudan. Retrieved April 03, 2017, from http://www.wri.org/our-work/project/world-resources-report/climate-change-adaptation-and-decision-making-sudan

M. Zaroug, Dr. (2000, May). Sudan. Retrieved April 03, 2017, from http://www.fao.org/ag/agp/agpc/doc/counprof/sudan/sudan.htm

MiddleEast Arab (2010, April 24). Topography of Sudan. Retrieved April 03, 2017, from http://middleeastarab.com/sd/topography-sudan.html

NSTATE, LLC. (2016, February 25). 50 State Rankings for Size. Retrieved April 03, 2017, from http://www.netstate.com/states/tables/st_size.htm

Science X Network. (2017). Breakthrough in the production of flood-tolerant crops. Retrieved April 24, 2017, from https://phys.org/news/2011-10-breakthrough-production-flood-tolerant-crops.html

T. Gale (2007). Sudan. Retrieved April 03, 2017, from http://www.encyclopedia.com/places/africa/sudan-political-geography/sudan#1G22586700125

The Rockefeller Foundation. (2017). What We Fund. Retrieved April 24, 2017, from https://www.rockefellerfoundation.org/our-work/grants/what-we-fund/

The Water Project. (2017). Digging Wells In Africa: How It Works. Retrieved April 24, 2017, from https://thewaterproject.org/digging-wells-in-africa-and-india-how-it-works