

Marissa Pries  
Northview Middle School  
Ankeny, IA  
Mozambique: Climate Volatility

### **A Sustainable Future to Combat Climate Volatility**

For citizens of Mozambique, the reality is that food is not something they just go to the store and buy. For most, the food they eat is something they have gathered, hunted, or grown themselves. Spending all their time and effort on planting and farming crops just for it to be destroyed by droughts, cyclones, or other inclement weather events is devastating. Those who sell crops are unable to make a profit, and those who would keep the food for themselves do not have anything to eat. Both outcomes are devastating to those who rely on crops for survival. The best way to increase the survival rate, and yield of these crops is education on suitable sustainable agricultural practices.

Mozambique is located on the southeastern coast of Africa, with a population of thirty-three million people, 37% being urban and the other 63% rural. It is about twice the size of the state of California and consists mostly of coastal plains. In the northern and central regions of the country, a high percentage of the land is mountainous. Mozambique is a part of the tropical climate, with an average temperature around 75°F - 64°F (“Mozambique”, *CultureGrams*). Over the years there has been a decrease in annual rainfall averages due to climate change. Even though the location, climate, and soil are good for farming, the decline in rain has made it hard to continue production.

In relation to the decrease in rain, there is little irrigation and only 7% of the land area is cultivated. The main crops grown are rice, maize, and cassava. The average farm size is 1.2 hectares which is roughly 3 acres of land (CIAT). Even though the average farm size is small, agriculture is responsible for four out of five jobs. Mozambique’s GDP per capita is \$1,200 compared to the United States GDP per capita which is \$60,200, or the lowest GDP per capita that belongs to Burundi, which is only \$700 (“Mozambique”, *CultureGrams*). But this is not where the GDP comes from (“Mozambique”, Britannica). The low GDP is an effect of subsistence farming that a large percentage of people in Mozambique practice. Some families with small plots of land only grow enough food to feed their families, and therefore they do not sell those products.

The houses in Mozambique are different from rural to urban areas. In rural areas, the walls of the houses are circular and tend to be built of sticks being held together by mud and thatch roofs (thatch can be straw or grass used to cover shelter). The people build their own houses. In urban areas people often use cement bricks to build their homes. Most houses still have a circular shape. Rural and urban areas are small and are built in clusters around a common area where everyone prepares and eats their food (“Mozambique”, Britannica). Most people in Mozambique do not have access to electricity in their self-built homes. Only 28% of people have access to electricity that mostly comes from the Cahora Bassa dam (“First”). What this shows is that overall Mozambique does not have high living standards. The impact of this is overall lower human health, education, and equality.

Another factor contributing to Mozambicans food insecurity is that Mozambique’s population has little access to reliable transportation. Their problems go back to when the nation's roads, railways, and ports were just being developed. Because they wanted to trade with the countries to the west, the systems were well developed going east to west, but not as well going south to north. North to south have little paved roads and almost no railroads (“Mozambique”, Britannica). Even the roads going east-west are mostly there for other countries’ goods and services. This plays a key role in one of the reasons why they have food insecurity.

Agriculture’s growth is limited not only by transportation, but also limited by climate shocks. The effect of the decreased agricultural productivity and growth will have rural families facing food insecurity. This will increase survival deficits because they will not be able to meet all of their necessary food needs (“Northern”). In Mozambique, the most commonly

eaten foods consist of rice and a paste made from cornmeal (xima). In the north, people tend to eat dried meat, not fresh. Other wildlife like gazelles, monkeys, baboons, and hippos are more commonly eaten in rural areas. Some tropical fruits are eaten as snacks or desserts. There is a high supply of vegetables and leaves such as pumpkin leaves, cassava leaves or even types of beans' leaves ("Mozambique - AFS-USA").

Of the many issues with Mozambican agriculture is the quality of the products. Not only is this from poor quality resources being used, but also the effect that climate volatility has on production. Weather events like droughts and some of the more extreme disasters such as cyclones and tropical storms have repeatedly altered daily life for Mozambicans.

An example of an extreme disaster could be cyclone Idai. The people of Sengo, located in the western region of Mozambique, depended on fishing and farming before they lost almost everything. Their boats were swept away, and the crops were carried or washed away by rain. Most houses were destroyed. A year later, things still are not the same. The fish that they need for a living have fled. They have replanted crops, but there is not enough rain to supply them. However, the few seeds that did stick were washed away by flooding from the new rain ("World"). The most important idea from this is the effect of the cyclones on the crops. When the cyclones go through, it destroys all the crops and then even when they replant, the new crops still do not grow because there is a drought. The drought will destroy anything that was there. Because they did not have any irrigation, they cannot just solve the drought with irrigation. They also do not have enough money to pay to install irrigation in these areas.

A rainfall trend analysis of Africa shows a significant increase in annual rainfall from a national level ("Significant"). The average amount of rainfall in northern Mozambique was higher than the average in the Southern regions. In the months December through March there is more rain compared to April through November there is a decrease in the amount of rainfall. With average rainfalls around eight hundred millimeters to three hundred millimeters per year ("Mozambique", Climate). The amount of rainfall has been increasing in other parts of Africa but not in the south and east where Mozambique happens to be located. This shows the specific amount of rain that places around the continent have gotten over the years. It also points out the lack of rain that Mozambique is receiving and the impact it has on food security ("Significant").

The effect of low rainfall has caused vulnerability among locals. One report describes exactly what pressure less rainfall puts on the Mozambicans:

Humanitarian distress has been exacerbated by poor rainfall in the semi-arid interior of southern Mozambique, including Gaza and Inhambane, as well as Sofala and Manica provinces, the second consecutive year of below-average rainfall, which has left households more vulnerable owing to depletion of assets and planting seed. Prices for maize, the staple crop, were between 40% and 70% above the five-year average, and this is causing distress to the population purchasing food supplies from local markets rather than being self-sufficient. ("Food Insecurity Likely")

Poor rainfall in southern Mozambique has made problems worse for citizens. In areas where the rainfall is below average for more than one year the houses are left with less resources. For crops that are highly important to the country the prices are rising because of this. The rising prices makes it more difficult for people to buy food and supplies from local markets. One of the main focuses of the solution has to do with the lack of rainfall in Mozambique and the possible things that they can do to combat that.

Education on sustainable farming practices such as no-till farming and conservation crop rotation are the best solution for this issue. Crops that are more resistant to such forces will make them more reliable. It will also ensure that farmers are more prepared for these situations before they occur. Implementing sustainable agricultural practices in these areas would not only improve production but also the quality of the products.

An example where sustainable practices are being applied to farming to increase food security is in India. Even those who have access to food might not necessarily have food security. The most nutritious food comes from good soil without any

chemicals. Farmers and consumers need to be protected by residu-free food production and maintaining soil biodiversity. Some eco-friendly practices that can be implemented are crop rotation, rainwater harvesting and integrated crop growing. Implementing these practices will be a step in the right direction to ensure food security. Other reasons to use more sustainable farming are better crop and soil health, balanced insect population and more jobs in rural areas. Switching to these practices not only improves food security, but also improves the economy all together (“Sustainable”). The idea applied here is if India is going the sustainable route to tackle food insecurity Mozambique could do the same.

Arkansas rice farmers have been doing their part by using sustainable practices, and The Arkansas Rice Federation has been keeping track of the land, energy and water usage from the past 20 years. Those studies have shown that land usage has decreased by 35%, energy use by 38% and water use by 53%. The reach towards more sustainable practices will be easier as technology improves. Some of the ways that Arkansas has been able to archive these statistics is using zero-grade fields that are perfectly leveled from one side of the field to the other and allow for controlled water levels, less water usage, decreased soil erosion, and no tilling (“Farming”). The zero-grade fields are specifically used on rice farming so this would not be applicable everywhere but only to the rice producers. Though a perk of zero-grade fields is that there would not be a need for tilling.

The best sustainable options for Mozambique are no-till farming and conservation crop rotations. No-till farming is effective but does need special equipment. No-till farming is when small furrows are drilled into the soil, then the seeds are planted in those and the soil is packed on top of them to cover. This is to prevent more disturbance of the soil and the seed ends up exactly where it will stay (No-Till). Some of the reasons why this would be good to practice are because it prevents erosion, helps the soil retain nutrients, and improves soil health. All of these things are beneficial to the growing crops one way or another. Even reducing the runoff would help maintain downstream water quality (“What”). No-till farming does not just include not tilling the soil after the seeds have been planted but a whole new system of planting them. There are some upsides, but there are some downsides to it too, the equipment is expensive, and lack of weed control. This is where crop rotation becomes helpful.

Conservation crop rotation, or crop rotation is “growing different crops on the same piece of land year after year in a planned, recurring sequence. This may include alternating row crop production with a high residue producing crop, such as corn, to a low residue producing crop like soybeans” (Conservation). In brief, every year it requires planting a different crop in the same place. This can reduce soil erosion, reduce the need for fertilizer and pesticide, improve soil health, and protect water quality. The soil gets extra nutrients from rotating the crops, reducing the need for fertilizer. Things like weeds, insects and diseases cannot get in a pattern with the crops and reappear, decreasing the need for pesticides. What no-till farming lacks, crop rotation makes up for, mostly in the instance of weed control. Crop rotation also has little to no additional costs, whereas no-till would need some funding.

Some issues that other counties are having, such as Pakistan, are similar to those in Mozambique. In a magazine published by Pakistan & Gulf Economist titled “Food security - serious and determined challenge” they talk about Pakistan’s food insecurity problems and what possible sustainable solutions there are. An important factor of what is impacting the production and supply of food is due to climate change and disasters. Producers are having a difficult time maintaining production with floods, and droughts. Some things we can do to make the crops more resilient are diversifying crops, improving irrigation, and promoting sustainable farming. All of these can increase the production and decrease the risk of more climate related impacts. This goes back to climate volatility where inclement weather is damaging the harvest of the crops. This mentioned the use of irrigation but it would not be a practical solution for the people of Mozambique. Instead, diversifying the crops and promoting more sustainable farming practices would increase turnout.

In Mozambique practicing subsistence farming means that locals only grow enough crops to feed and supply their families. On its own poverty cannot be resolved with just subsistence farming. The issue is making it profitable and to do so the small farms would need a larger scale of production and investors. There are high amounts of agriculture in African countries but, in order to grow the sector they need higher production levels. A key component to expansion in agriculture

it needs to be sustainable. Something that comes with growing the production is needing more people to work in agriculture. There are many people trying to find jobs but cannot, so one way to grow is marketing agriculture to the youth (“Caribbean”). Improving the scale of farming would increase crop yield, which is not accessible to people in Mozambique. If they could have had larger farms they probably would have already done so. However, they have not, which is why changing to practices that would increase yield without having to change the scale of the farm would be beneficial.

The reason why learning and teaching sustainable agriculture is so important is because “The world population is expected to increase from seven to nine billion by 2050, with much of that growth forecast to take place in developing countries” (“Caribbean”). A developing country such as Mozambique has a growing population with worsening food security. Teaching sustainable farming and other practices would help their production levels increase.

Sustainable agriculture can feed the growing population, replenish natural resources, and improve the lives of smallholder farmers. Not only would informing and teaching practices such as diversifying crops, zero grade and no-till farming help the locals who rely on the crops for food, but, “Growers can also use the information to make the shift to more climate-friendly farming practices, increasing earnings and reducing waste” (“Sustainable Agriculture Practices”). The shared information would take a step into eco-friendly agriculture that would be able to sustain growing populations. This would also increase crop yield, which would increase their earning, and in return improve the economy as well as local markets that citizens rely on for food.

The JICA (Japan International Cooperation Agency) has been giving instructions about different production techniques to farmers. This increased their agricultural production. When farmers interacted with markets they were able to see what crops were being grown during what time of the year. They were able to stay on track and increase their income. With the additional money they were able to afford education for their kids as well as upgrade their homes (Ten). All from education on what to do and how they were able to grow from that to increase their earnings this also improved the living standard

Increasing knowledge of sustainable farming practices around the world will improve productivity and long-term sustainability of agriculture. Droughts are one of the biggest problems that are causing crops to die. With irrigation not being a possibility for most and the never ending waves of cyclones and other natural disasters, reliable food sources are uncommon to come by in Mozambique. Over time, improving agricultural practices would help sustain a growing population. Improving sustainable agriculture will make food more accessible to those who have not always gotten it as easily. So let us spread knowledge for the greater good of everyone.

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