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Kenya, Factor 2: Water Scarcity

**Kenya: The Advantages of Irrigation and Water Management**

Imagine you wake up, no electricity, no plumbing and a continuous odor from lack of sanitation in your house and from the neighboring families.. The severe droughts have caused your farm family an extensive amount of suffering and malnutrition. You are unable to afford the luxuries of health care, because your family has not made an income from crop production in years. You are unable to attend 12 years of schooling, because your labor is needed for the upkeep of the family farm. The crop yield seems to be on a steady decline every year due to deforestation, lack of conservation practices, and of course your family does not have the education to manage water systems. You find that your body is continuously dehydrated. If you do happen to have water for drinking and plumbing needs, consider yourself very lucky. Water has a direct impact on your state of living. Long hours in the field with no water affects your health and you find yourself continually fatigued. Without water for your crops you find that the soil is helpless and cannot infiltrate any moisture for plant development. Without proper growing conditions there is no way your family will be able to make a living from farming. As the climate changes your crop production and irrigation adaptability needs to change to help your family survive living in the impoverished country of Kenya.

Kenya, is an eastern country in Africa, which consists of approximately 44 million people (UNICEF). The country is undoubtedly growing in terms of population, but decreasing in the amount of secure water available for crop production. It is known today that 17 million of those 44 million people do not have access to clean drinking water (Marshall 31). In addition, more food needs to be produced to nourish the bodies of many. Unsuitable environmental conditions such as continuous desert and arid environments affect the farming communities and the ability to construct sustainable agriculture in Kenya. In addition, drought, diseases, and inflicted agriculture practices take nutrients out of the soil. These problems impact the small rural farming communities . The communities that drive Kenya's economy. Kenya Agricultural Research Institute informs that, ". . . 45% of the Government is derived from agriculture" ("Food Security Report"). Production problems lead to rural families not being able to afford the necessities of living. In fact, a crucial source indicates that 42% of Kenya's population are below the poverty line (UNICEF). Sustainable agriculture needs to be practiced. To create sustainable agriculture there needs to be three environmental factors present sunlight, appropriate temperatures, and water (FAO). Without sustainable production, families continue to live in poverty.

Water scarcity is a severe deficit facing Kenya. Project Water informs, "Kenya's natural water resources also do not provide an equitable delivery of water to the various regions of the country and the country's water basins do not reach an equitable area of the country. This leaves most of the population without any fresh water." Without water, plants cannot flourish, resulting in an extreme drought and no way to adapt farming practices or technology to accommodate the plants for a desirable yield. Marshall identifies, "The lack of rainfall affects also the ability to acquire food and has led to eruptions of violence in Kenya" (31). For many years Kenya has struggled with the management of their water systems. All in all, there has been a significantly large increase in the demand for water because of the population growth. Many organizations such as the World Food Bank, education centers, health centers, and nonprofit organizations like Project Water are helping to assist this ever growing crisis of food insecurity, poverty, and water scarcity.

Kenya has, on average, 3 million small rural farms. Roughly 75% of agriculture production transpires from rural farms ("Kenya- Agriculture"). A typical family is comprised of 4 or more children with a mother and father. A prototypical Kenyan meal predominantly contains maize and other cereals. Stews containing meat, vegetables, and beans are the most desired foods ate in the Kenyan culture. Middle class families live with more amenities such as electricity and separate bedrooms. Unsanitary living has resulted in 1.5 million cases of HIV/Aids ("Majoring Problems Facing Kenya"). Many children are unable to attend school, because of their devotion to the family farm. The government has instituted free primary and secondary education from an act established in 2003, but 1 million students are still uneducated (World Education News and Reviews).

Healthcare can only be utilized by those who can afford it. Quality services like healthcare, education, and sanitary water is a luxury for most people (UNICEF). A typical subsistence family farm owns a little less than five acres of farmland (UNICEF). The family grows a diverse variety of crops varying from corn, bananas, and their most common cash crops are tea and coffee. Kenya, as an underdeveloped country, is rooted in the traditions of farming rather than the advancements of the world and technology. Kenyan farmers typically are very simplistic with the process of planting and harvesting. Their first step is tilling the soil done by man labor, then planting, and lastly harvesting. Kenya lacks in fertilization, irrigation, and disease resistant methods. Ariga states, "Fertilization is notably lower in Sub-Suburban Africa than in other developing regions" (YAC 269). Kenya has made progress in terms of use of fertilizer, however. It is noted in a source, from 1992-2007 fertilizer use has doubled (YAC 269). These deficiencies allow for disease of plants, poor yields, and extreme flooding or drought to take place within the plant's period of growth. Loss of plants results in the family's overall financial loss. Important food staples are also non-existent when plant life has been lost, and the rural farms are unable to boost their overall impact on the country's controversies of food insecurities.

The agriculture industry employs the majority of people living in Kenya. About 80% of the population are engaged in agriculture or food processing. ("Kenya-Agriculture"). A barrier facing those that are employed in an agricultural endeavor are their farming practices. The farming practices are indeed not up to date with the rest of the countries around the world. Kenyan people have not adopted efficient ways to deal with famine, drought, or even flooding. Over the past ten years, Kenya has been facing a severe drought with the typical farm family having a hard time adapting to this climate change. In December of 2000 there was a horrific drought, which left 4 million people desperately needing food (Marshall 36). Where rainfall is very inconsistent those with farmland need different technologies to improve overall plant growth.

To improve on this problem, water harvesting techniques need to be implemented. The Project Water Organization estimates 80% of the land around the world is rain-fed ("Water Scarcity and Agriculture"). Kenya is in absolute urgency for rain catchment systems such as a weir dam. This water collection system will, in turn, improve the availability of drinking water and also increase the groundwater levels.("Water Scarcity and Agriculture"). Systems of irrigation do allow stored water for human use. These complexes can help produce fertile soil, long term. For instance, when the water seeps into the soil from a dam or irrigation complex it will regenerate the soil minerals. Water storage and harvesting projects will aim to develop multi-purpose dams with a storage capacity of 2.4 billion cubic meters along the Nzoia and Nyando rivers (Marshall 43). Water storage dams are being structured to manage the rivers from severe flooding or possible drought. Water resources information management outlines a precise plan to restore and attain a new hydro-metric, which is installed in surface water and underground water storage. Hydrometry is the monitoring of the components of the hydrological cycle, including rainfall, groundwater, as well as water quality and flow characteristics of surface waters. ("Water Scarcity and Agriculture). Constructing hydro-metric complexes can decrease water scarcity in rural and urban areas.

Although constructing dams may be a solution to controlling water in Kenya, there can be negative effects on wildlife and water flow. Dams are known for changing the aquatic ecology and hydrology upstream and downstream affecting the quality and quantity of water (FAO). Dams have the power of isolating upstream fish like carp and also isolating catfish to just downstream because of the water flow of the dam (FAO). Overall a dam can affect the migration of fish in a negative way (FAO). The Food and Agriculture Organization (FAO) proves, "They create novel and artificial types of aquatic environment for the life span of a dam" (FAO 3).

Contrary to the effects that a dam has on the environment, it is a way to control river levels and contain water to a certain place improving water supply if the dam is placed in the right area. It all depends strictly on the flow of the river and the environment surrounding it (International Rivers). International Rivers identifies, "Dams change the timing, amount and chemical composition of a river's flow, leading to dramatic changes to groundwater-storing floodplains and wetlands." These changes can lead to the destruction of forests, which help regulate local climate (International Rivers). Kenya's Tana River floodplain forest is going to die out as it loses its ability to regenerate because of the reduction in high floods caused by a series of dams upstream (International Rivers). Overall International Rivers sees more downsides to dams than positives.

Another obstacle hindering agricultural productivity is the distinction of the surrounding forests. Deforestation has been prevalent in the Mau forest. The Mau forest distributes water to six lakes and eight wildlife reserves. Approximately 10 million people depend on its rivers for sustenance. The problem is loggers continue to harvest trees, destroying a massive 1 million acres of land (Marshall 37). Without consistent rainfall and appropriate vegetation, farming will be very unproductive. Therefore, food insecurity becomes prevalent with the destruction of natural soils due to runoff from deforestation. Deforestation has negative implications in rainy as well as dry seasons. The loss of forest cover does nothing but harm the wildlife, natural habitat, and surrounding valuable land near it. Managing forests are essential for Kenya to conserve their land, and overall have the ability to keep farms from collapsing.

To help improve the water shortage, it is critical for Kenya to make it a priority to restore the forests, and replant the millions of trees that have been depleted. Promoting the sustainable management of the many forests in Kenya is imperative. The forest management project goal is to establish a forest cover of 4 percent of the area destroyed by loggers annually (Marshall 43). This project accommodates management for stakeholders, local communities, civil societies and development partners through the preservation of forest life (Marshall 43). Preservation may include, but is not limited to the management of cultural and religious nature cites, and conserving and improving the threatened flora and fauna plants (Marshall 43).Conserving the forest's natural features can bestow an improvement in water scarcity as a whole.

Another factor affecting water scarcity is conservation practices. Little to no sustainable agriculture practices are ever implemented in Kenya. Farming in Kenya is unfortunately lacking in diversity of production and agriculture practices. Non profit organizations such as the Food Security Portal aim to educate those that know nothing about conservation practices. An automated app-controlled system for irrigating fields has been developed by Kenyan engineers in a bid to help farmers improve their harvest in desperate times of drought. These technologies have a direct impact on conserving nutrient rich land and also cuts the consumption of water in half. (Eandt.Theiet.Org)

A study by the Engineering and Technology of Kenya confirms that the prototypical farmer lost an average of 70% of the produce due to insufficient irrigation or the rain-fed crops suffered from continuous drought (Eandt. Theiet. Org). Without the technologies and advancement in conservation practices, Kenya will be in fact stuck in the dark losing many lives to those malnourished. The app-controlled irrigation system would only be an appropriate solution for the people of Kenya with a mobile phone. The Guardian informs, "In 2012, there were more than 71 mobile phone subscriptions per 100 Kenyans – significantly

more than in neighboring Tanzania, where the figure is 57, and sub-Saharan Africa, where the average is 53. In the context of the past half-century, however, mobile phone use is still a new phenomenon" (Guardian). Therefore, the app-controlled irrigation systems provide a solution to approximately 3/4 of the population, providing they have the knowledge to implement it.

Improvements among conservation practices will indeed increase water security. Conservation practices may include bench terraces, fallow systems, tied ridges, conservation tillage, and mixed cropping (USDA-ARS). These diversified productions aid to administer to unexpected drought loss, and loss of topsoil or organic matter from overused farmland. Reports from the water conservation, harvesting and management services (WCHM) conclude that the objective is to increase soil moisture, by ensuring runoff is depleted and all rainfall effectively infiltrates into the soil (USDA-ARS). WCHM centers are experimenting with soil conservation and water conservation technologies to determine how different lands need different solutions. One solution is the act of developing "no till" farming which reduces runoff and protects the soil from erosion. Conservation is one of the biggest factors related to water scarcity. Kenya and the world are going to be approaching decades with less water and access to it so there is an increased need for such conservation practices.

It was proposed that organizations in developing countries like the United Stated, United Kingdom, and the organization Project Water are there to help with water scarcity in Kenya, but what are the people of Kenya doing on their own to help secure water? Well, a reliable source states, that the people of Kenya generally use barrels to store water, but those barrels have the risk of spreading disease. (Water.Org) The source confirms, "Water Credit can help people of Kenya get access to small, affordable loans that enable them to purchase things like the construction of home water connections, toilets, or a new enclosed water tank (Water.Org). A fully enclosed fiberglass tank ensures safe water for the people of Kenya (Water.Org).

Water Credit is an organization that is successful, because they are a non-profit organization in which they give out small loans to those in Kenya specifically for the improvement of their water quantity and quality. Water Credit has an online website where people all over the world can donate. The website promotes, "Charity alone is not a long-term solution. We seek sustainable financial solutions that empower people with access to the water and sanitation solutions they need"(Water.Org). Water.Org also explains why they established this organization saying, "That's why we created Water Credit, bringing small, affordable loans and expert resources to make household water and sanitation solutions a reality" (Water.Org). To this date, Water Credit has impacted 6 million lives with the access to sanitary water (Water.Org).

All in all, Kenya is one of the many countries in Africa that struggles immensely with food insecurity. One of the main factors that has caused food insecurity is water scarcity. The country of Kenya deals with severe droughts throughout the dry seasons. Organizations like Project Water, WCHM, and the Forest Management Project are just a few organizations establishing the means to help the millions of rural farming communities fight against extreme droughts and malnutrition with the result of a great crop yield. Project Water and Water Credit both are improving sanitation and water storage with the generous donations of people and loans. Although Kenya still deals with food insecurity, poverty, and water scarcity great strides from educators, organizations, and Kenyan farmers have been made.

Now imagine yourself living on a sustainable farm with fruitful harvests, a home accessible to water, and sanitary living. These are the strides that would like to be made within Kenya and other countries struggling with food insecurity. Over the years, things definitely are improving a little bit at a time in the country of Kenya. As Americans take many of these simple necessities for granted, one can be thankful for the roof above our head, availability of water, and food that is set on the table for every meal. Most Kenyan people do not even have the opportunity to grow old and experience the simple pleasures in life.

Let us help Kenya minimize the adversities of life. With one irrigation system, one agriculture education course, or one simple donation to a non-profit organization at a time.

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