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Sustainability Research in Kenya

Kenya is a country in East Africa and is bordered by both land and water, including the Indian Ocean, Lake Victoria, Ethiopia, Sudan, Uganda and Tanzania. More than half of all Kenyans live under the poverty line. Kenya is ranked 134th on the Human Development Index. This index portrays the quality of life of people, especially the most impoverished, based on factors such as life expectancy, production, and education. A major factor for Kenya's poverty rating is its water supply. It is considered a water scarce country and only 42 percent of its residents have access to clean water. Kenyans only have one tenth of the water that the neighboring countries Tanzania and Uganda have. Although Kenya is a water scarce country some improvements can be made in order to reduce the severity of this problem. Solutions implemented from sustainability research could reduce the environmental problems over time. Several improvements can be made that would help the country make better use of the water that is already available. Water is not only contaminated at its source but also in the way it is transported and stored. Also few households boil their water which would reduce the bacteria content and reduce water-borne illnesses. However, the lack of water itself is not Kenya's only problem. The mismanagement, increasing rate of deforestation and pollution of water supplies has also lead to this predicament. These factors have led to a decrease in Kenya's life expectancy, infant survival rate, and school enrollment. There is no end in sight to the droughts affecting Kenya and in order to improve Kenya's poverty conditions water conservation and conservation of natural resources is a priority. In recent years, the dilapidation of Kenya's natural resources has increased. Over the past thirty years the desecration and intrusion into the forests has greatly reduced forest cover now only covering 2 percent of the land. Deforestation is not the only environmental issue Kenya is facing. Soil erosion is also a main concern. Soil erosion makes the land less productive which means farmers are not able to produce enough food to allow them to be self sustainable. Soil erosion also leads to the build up of silt in reservoirs. This contributes to water contamination. Having access to water and fertile soil are essential to the well-being of rural underprivileged people and vital to Kenya's development. Kenya's renewable resources make up the backbone for agricultural production and tourism in addition to serving as the country's main economic asset.

One example of the human impact of Kenya's problems is the Neebe family. The Neebe family is a Kenyan family with five children. Before the droughts they made a living by selling milk from their goats and cows in Marsabit, a nearby town. They made up to eighty five shillings a day selling 5 liters of milk. With their earnings, equaling a little more than the U.S dollar, they bought the sugar, oil, tea and maize that they needed for the day. But that was before the drought. Since the drought began, more than twenty of their animals have died leaving only four for the Neebes to earn a living from. After their animals continued to die, even while out at pasture, they have decided to keep their remaining animals close. Now, three of the five Neebe children must take a five hour walk to the nearest waterhole, fourteen kilometers away each day to fetch water for the herd. However, even if the rain, they so desperately need, finally does come their animals still may not survive. The pastures will take weeks to grow enough for the animals to survive on and the cold weather brought by the rains may prove too much for the weakened animals. The lack of water has greatly decreased the income of the Neebe family because even the remaining animals do not produce milk. Due to this the Neebe family has been living on food supplied by Food for the Hungry since 2005.

The number one reason that Kenya's forests are disappearing at such a rapid rate is the soil and climate conditions. These conditions in the forest area relate closely to the conditions needed to grow crops such as maize. More than two thirds of Kenya is arid or semi arid, too dry for forests or crops. Another reason for deforestation is the people of Kenya. Due to the rapidly increasing population and the lack of land that has the ability to sustain crops, farmland is a prized commodity. Many choose to cut down forests to gain farmland without realizing how the environment is affected. Protecting the remaining two percent of Kenya's indigenous forests is vital to its environmental health and the health and well being of its people. This becomes obvious when a closer look is taken at Ethiopia, a neighboring country of Kenya. The removal of their hill- top forest cover was a contributing factor in the recurring waves of drought and famine. Drought is encouraged by deforestation. Without tree cover the water is exposed to the sun and is evaporated at a faster rate. This decreases water availability.

Nearly all of Kenya's natural remaining forests are in mountainous areas. These forests, classified as afro-montane, shelter the headwaters of major rivers and naturally control the river flow. The Mount Kenya and Aberdare Forests control the flow of the Tana and Athi rivers. These forests are disappearing due to settlement and illegal tree removal and the river flow is slowly but surely changing. The trees had previously held the soil in place but their removal also causes the removal of the soil and the riverbanks. This greatly decreases soil fertility and, therefore, it becomes difficult to grow anything on the land. This also makes the once-clear water muddy and full of silt. This silt makes the water unsafe to drink unless filtered.

The Mau forest is greatly depended upon to control the flow of many streams located in the Mara basin. It is in this basin that dozens of tributaries originate. If deforestation in this area continues it will cause many negative issues to occur downstream. Low flows and standstill periods will become more common and last longer than before. Also, the risk of harmful flash floods will greatly increase. The refilling of the water table will decline and as a result the vegetation dependent on it will also. With less vegetation and water available, the numbers in herds of animals will decline. The decrease of animal life will greatly affect tourism in Kenya.

Much of the remaining forest is unique to the Nairobi region and would be a devastating loss if cut down. The forest consists of several species of indigenous plants and animals that are becoming more and more rare. Brachylaena, is a high quality hardwood found in this forest that houses several species of birds, butterflies and mammals. Half of all the native trees and shrubs are not surprisingly found in the forests. The forest is also home to one third of the one thousand species of bird native to Kenya, thirty five of which are threatened species. Forty percent of Kenya's mammal population lives in the forest and the forest is where seventy percent of the threatened species of mammal live. Likewise, one third of butterfly species are forest dwellers. All these species live in an area that covers only two percent of a nation, and this area is being threatened and it is becoming more and more obvious how critical the conservation of the forests is.

There are several ongoing projects in Kenya geared toward providing safe drinking water to its citizens. The Water Credit Project is one of these programs. The goal of this project is to reduce the frequency of water and sanitation related illnesses by supplying people with access to clean drinkable water. This project establishes a revolving loan fund in two non-government related organizations located in Kisumu. This project will provide safe water to 12,300 people and it endorses hygiene awareness programs in communities. This project also provides sufficient latrines to families who wish to have them, resulting in decreased water contamination.

The Grant Project is another project oriented around reducing water borne illness. This program targets four specific communities and it focuses on water supply and sanitation, and educational programs pertaining to hygiene. This program will affect 2000 people and is located in Kisumu. This program

allows communities to address their own needs on their own schedule. It allows communities to fund water systems through small loans of fifty to one hundred dollars. This program plans to drill four boreholes and provide equipment and reticulation systems. Also they plan to supply the communities with proper latrines and promote hygiene awareness in the communities' schools.

Currently the Machakos District in Kenya has the highest level of soil and water conservation in Kenya. This has been a result of strong campaigning by the National Soil and Water Conservation Project and local Mwethya Groups. Mwethya groups are self help groups that focus on soil conservation. There are over three thousand of these groups registered in the Machakos district with membership ranging from twenty to one hundred fifty people. Most of the Mwethya members are women. One of these Groups is called the Kyungu Mwethya Group, founded in the year 1986. This group covers five kilometers in an area south of Machakos. The Kyungu group has seventy eight members, all of which are women. Majority of them are married and over the age of twenty five, many of their husbands work in Machakos and others are unemployed. In order to become a member of this group the women pay a membership fee of 100KSh, or about five American dollars. To keep members from missing weekly meetings there is a 10 KSh fine for anyone who does not attend. The money collected is used for buying tools and other purposes. Every Wednesday members attend a weekly work meeting on a fellow members farm to do soil conservation work. Each member brings their own tools and is expected to do their share of the work. In creating a fanya-ju terrace their share averages to be two lengths of a shovel. In 1990, every member had some, if not all of their farmland terraced. The Kyungu Group not only does work on its members land but the group also works on the one acre plot that it owns. This plot is planted with vegetables such as beans and onions which provides food for its members. These Mwetha groups are also a form of insurance to its members. If a member becomes ill the group may decide to help plant, weed or harvest their plot so that the work gets done.

With the help of these groups, farmers have realized the benefits of terracing. Most land in the Machakos District which is capable of yielding crops is already in use. This and the rapidly growing population make conservation and productivity even more of a priority. Machakos has a hilly terrain, increasing the rate of erosion. Due to this, over the last twenty years, erosion has become an increasingly serious problem. Most new farmland is found on slopes where the rate of erosion is higher. The need for suitable farmland is forcing livestock into smaller areas of land causing overgrazing which increases the rate of erosion in that area.

One proven technique of soil conservation is called 'fanya-juu' terracing, meaning 'do up' in Kiswahili, a native language. To farm fanya-juu terraces, soil is thrown up the slope from a ditch to form a 'bund' or earth embankment. This process is repeated several times across the field and after awhile, the land between bunds evens out, forming the characteristics of bench terraces. Through fanya-juu terracing, crop conditions are greatly improved. Because rainfall is conserved between the bunds, moisture is at an increased availability and therefore growing conditions greatly improve immediately. Also, soil is kept in the field, so in the long run, growth conditions improve.

Productivity is also increased because the fodder grasses farmers often plant to hold terrace banks together can be used as feed for livestock. Farmers often plant bananas in the trenches between bunds because they are well suited for the excess water that collects there. Although fanya-juu terracing is very time consuming it is still widely used due to its effectiveness. Terracing has been used on over 70 percent of the arable land in Machakos. Perhaps this has something to do with the fact that there is a 50 percent increase in crop yield. However, improved crop yield is not the only benefit to terracing. In areas where numerous farms have been terraced, stream flow is increased. This is very vital to village water supply.

There is a downside to fanya-juu terracing. It requires hard physical labor and often times tools are hard to come by. The hard soils of the Machakos District wear out tools at a fast rate. Therefore, the

need for tools such as shovels, hoes, pickaxes, crowbars, machetes and wheelbarrows far outnumber the supply. Because of this most of the work is completed using the farmer's own tools rather than those of the Mwetha group.

As previously stated, Kenya's lack of water is not its only water issue. Many areas in Kenya receive adequate amount of rainfall, however the accessibility and management of the water causes problems. It is also not as equally available in some areas compared to others, meaning that wells and sources of water are miles and miles away from rural homes, and that water must be piped to other places. Although huge amounts of money are spent every year on this problem, one half of Kenya's rural population and 25 percent of the urban population does not have access to clean water. Thirteen percent of the government expenditure is spent on water projects but to no avail.

One of the main issues with piping water to water scarce areas is the cost. With this system those living on poor developments pay more for their water than those residents who are connected to city water. Another problem is that not all areas in need of water can afford to pay for piping it to rural areas. Normally only the affluent can afford to pump their water. Often times electricity supplying pumping stations is cut off due to the inability to pay electric bills. Schools, hospitals, prisons and other government buildings are often affected by this. One more problem with water pipes is there upkeep and maintenance. There are often long delays in fixing damaged pipes and equipment resulting in low supply. Much of the existing pipeline is not water tight allowing much water to leak out before it gets to its destination. Another main issue in piping water to water scarce areas is the vandalism of pipes. Vandals often steal valuable parts such as valves that they can sell to make a profit. They have also been known to stop short a supply of water and then sell water to the area affected.

There are several diseases and infections caused by drinking water from impure sources. There have been countless cases of typhoid, dysentery and diarrhea that have resulted in death. As a result water departments often disconnect water to the area until the problem is solved. However this 'solving' of the problem also creates a problem because now water is in shorter supply than what it was before the illnesses began, creating a never ending cycle of water shortage and disease. The Kenyan government needs to create a plan of action concerning water-borne illnesses that would give instructions to preventing and providing solutions for the growing problem.

The issue with Kenya's water is that it is available only during certain seasons. In fact it is predicted that by 2010 Kenya will be using just 28 percent of its available water. This water is used to meet its domestic, agricultural, industrial and other needs. There are many probable solutions to Kenya's water crisis. A possible solution to this issue would be for the government to harvest water during the rainy season and store it until it is needed in the dry season. This would be an ideal solution because Kenya does not lack water all year just during the drought season. If Kenya manages its water and uses what is available the shortage of water will decrease. Also if soil conservation and forest conservation projects continue there will be more water with less contaminants and the land itself will be more productive. In conclusion Kenya's main sustainability issues can be resolved by better planning and by the enforcement of laws.

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