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Malawi: Developing and Implementing Sustainable Agricultural Practices for Rural Farmers

Sub-Saharan Africa is well known for its poverty and lack of sustainable agriculture. Within this region, Malawi sits tangent to Lake Malawi, Zambia, Tanzania, and Mozambique. Malawi has a total area of 118,484 square kilometers (45,747 sq. miles), approximately the same land size as Pennsylvania but with many more starving people. Although Malawi is one of the most densely populated sub-Saharan countries, its economy is heavily dependent on agriculture. Malawi has a subtropical climate with a long, hot dry season and a mild, rainy cold season. In recent years, however, the region has been devastated with drought, land mismanagement, and poor infrastructure. These factors have left Malawians suffering from immense poverty and hunger. The region faces a poverty stricken and malnourished rural class that has trouble supporting itself within its own marketplace, and the people of this rural class are utterly dependent on foreign aid to feed families and raise awareness about agriculture. For many, aid is the only factor that keeps their families alive. The country faces many barriers that will make this struggle to raise awareness difficult. Often short-run economic needs of survival beat out long term ideas about sustainability. However, Malawi also faces major barriers in the poor productivity of its soil, insufficient seed availability, high transportation costs, lack of financial management services, and poor market linkages (“Strategic Review”). In order to mitigate these challenges, Malawi must gain agricultural stability by teaching its people how to develop and implement sustainable agricultural practices.

According to the Food and Agriculture Organization (FAO), Malawi is a minimally developed country with correspondingly low personal income levels. It operates with large food deficits compared to the needs of its people (“Malawi.” *FAO*). Malawi is ranked 153 out of 169 on the 2010 Human Development Index with a national poverty rate at 52% (“Malawi.” *FAO*). Despite this, Malawi has a population of approximately 15 million people, and it continues to grow 2.8% annually (“Malawi.” *U.S. Department of State*). In fact, Malawi’s population has grown over 50% in the last 15 years. Still, roughly 60% of the Malawian population relies on subsistence agriculture although the vast majority of these farmers have less than one hectare of farmland which limits their harvest (“Strategic Review”). The farmers can afford raising only a few cash crops and staple foods, so the population receives little variety in its diet when it exchanges crops in its markets. An average Malawian can expect to live 53 years due to malnutrition, HIV/AIDS, malaria, and limited healthcare facilities in rural regions (“Malawi.” *FAO*). With access to free primary education, both young boys and girls experience the opportunity to attend school; however, males dominate the secondary educational sector. A typical family is composed of five family members (only about half of the children live past the age of five) that eat a cornmeal named nsima and maize. In this paternal society, most women are seen as inferior and are discriminated against in the farming communities. The women are discouraged to work outside the homes, a detriment if their husbands die. Left jobless, women often have to rely on their children to support the family. Despite the economic hardships that fall on the backs of many Malawian people, there is hope because Malawian government has made food security Malawi’s number one domestic policy issue (“Strategic Review”).

Malawi’s former President Mutharika created a subsidy program for smallholders to buy fertilizer and seeds to replenish the soil’s nutrients, increase seed varieties, and achieve sustainable crops—something that President Banda is continuing (Sachs). Essentially, the government gives a voucher for a small amount of fertilizer and seed and pays for the subsidy through its paltry budget. The vouchers are given to tribal leaders who distribute the vouchers within the community, but often, the vouchers are unfairly distributed based upon community politics. The government bears the burden of the price influxes; however, budgets are consistently being overrun, driving the government into debt. Although originally

funded by organizations abroad, the subsidy lost support because the government did not plan to get its people out of poverty and instead used the subsidy as a crutch. It fell to the government to accept the burden, leading to corruption (Sachs). Despite the subsidy program's efforts, the government has not addressed underlying barriers such as a small private supply market, lack of access to credit, lack of competitiveness in the market, and high costs of delivery. The government needs to effectively address these issues before the subsidy will make any headway. One way to fix these issues is to broaden the subsidy to include legumes (e.g. soy, groundnuts, pigeon peas, and cowpeas) and crop rotation. The government could incentivize farmers by giving them additional money for using a crop rotation and legumes instead of funding just maize. For example, if the current planting subsidy is \$100 per year for the three-year planting cycle, the farmer would receive \$300, but the farmer would not implement crop rotation. If the subsidy program is changed to pay the farmers \$110 per year when they use crop rotation, the farmers' total income will dramatically increase due to increased crop yield and nutrients into the soil. This would encourage the farmers to try new techniques. By doing this, the government could get the people on their feet and plan to withdraw the subsidy within 15 years. This would help to address the issue on aid. However, until these key issues are addressed, Malawi will remain dependent on food aid.

Malawi has received aid since the 1960's ("Strategic Review"). However, foreign aid is unreliable with varying amounts flowing in at any given time. When aid is dependent on other countries' budgets and political situation, it is an inefficient system for feeding the population. Malawi's government has not always been effective at getting the needed aid to its starving people with bureaucracies and corruption problems. For these reasons, Malawi needs to develop a sustainable agricultural sector.

Public Law 101-624, Title XVI, Subtitle A, Section 1683 defines sustainable agriculture as: "an integrated system of plant and animal production practices having a site-specific application that will, over the long term, satisfy human food and fiber needs...sustain the economic viability of farm operations; and enhance the quality of the life for farmers and society as a whole" ("What Is Agriculture Biotechnology?"). However, measuring sustainable agriculture is subjective based upon five different levels: international, national, community, farm, and field. On a national level, Malawi can measure sustainable agriculture by comparing crop yield, nutrition, percentages of hungry and malnourished people, and decreased soil erosion. Agriculture is stable if sufficient crop yield feeds the hungry population and increases the nutrition in its diet. When this is achieved, sustainable agriculture will support the population and enhance the quality of life in society even without a precise measurement.

In order to ensure food supply, Malawi needs to develop sustainable agricultural practices because current techniques have left the country with: (1) eroded soil conditions, (2) farmers having to rely on weather patterns, (3) poor nutrients in the population's diet, (4) the country requiring foreign aid to feed its population, and (5) the farmers using too many fertilizers and pesticides. The solution to all of these problems lies in developing a sustainable agricultural practice. While Malawi's millennium development goals dictate the need for significant decreases in the level of poverty and extreme hunger by 2015, reported results are mixed. The country's attempt to create sustainable agriculture has left no lasting impact. As a result, the issue of implementing sustainable agricultural practices is not being addressed, and Malawi still has a long way to go to ensure stable agriculture and livestock practices ("Malawi." *MDG Monitor*). The Malawian families continue to use the same poor techniques.

The vast majority of Malawian people attempt to support their families using eroded soil. Constant farming has left the soil depleted and in need of fertilizers that most farmers cannot afford. Due to the land degradation, the crops do not efficiently benefit as much from rain and irrigation. In fact, Halweil and Nierenberg report that only 15-30% of rain is taken up by the crops though sometimes plants only absorb 5%. By introducing new nitrogen fixing plant varieties into a crop rotation, the soil will end up healthier and able to produce bumper crop yields of maize in future years.

In order to apply these methods, the people need education on new farming techniques. The Gates Foundation, the International Crops Research Institute for the Semi-Arid Tropics, the International Center for Tropical Agriculture, and the International Institute of Tropical Agriculture have educated small farm holders (which constitute 80% of the Malawian population) about using more than 50 drought-resistant tropical legume varieties. In some instances, non-governmental organizations taught 25 Malawian farmers a technique, and then the farmers taught their villages; thereby, the organizations maximize their teaching potentials while respecting the Malawian farming traditions. In this way, farmers integrated their knowledge of the land with knowledge of legume varieties (Geoghegan). The government could sponsor a similar “grass roots” speaking tour by encouraging successful farmers who have practiced these techniques to teach their peers, thereby encouraging community involvement and peer education. The government could also reach out to charitable and private organizations such as Weyerhaeuser and Heifer International for support. These corporations could help to provide demonstrations and finance an educational program. Further, research organizations such as Iowa State University or the World Food Prize could sponsor a study to gain feedback from the farmers about crop yields or profits they experienced. The implementation of these methods will ultimately constitute anywhere from 18%-124% better yields for many of the farmers (Geoghegan). Cultivators also discovered that use of crop rotation instead of fertilizer has increased the productivity of the soil and increased yields. Evelin Msgwa, a local farmer, was surprised at this news in saying, “In fact when you use chemical fertiliser you effectively make a loss because you spend more money on the crop!” (“Malawi: New Farming Practices”).

Agroforestry is a relatively cheap solution to maximize the production of crop yields and improve water efficiency. Agroforestry, a form of agriculture in which trees are planted around the fields and houses, is useful in its resilience to climate change, its ability to increase water holding capacity, and its effects on increasing carbon in the soil (The World Bank). A study conducted by the World Agroforestry Center found that, by using fertilizer tree systems [FTS] as proposed by agroforestry, “incomes averaged US\$233-327 per hectare among farmers using FTS, compared to US\$130 for unfertilized fields. These increased yields provided between 57 and 114 extra days of food” (“Fertiliser Trees”). Additionally, when the trees bear their fruit, a family’s income increases from fruit sales. Furthermore, additional yields would not only feed the starving families of Malawi but also feed back into the marketplace where such products could help other families survive. Not only do these trees help boost yields, they help shield and capture some of the water that causes run-off and soil erosion which remains a barrier in ensuring adequate food supply. The shade also keeps the field “cooler and more moist” while providing livestock the opportunity to cool off in the shade (Robbins). This technique also increases water efficiency in the soil. The trees also help prevent wind erosion of the soil as leaves could help capture the wind and prevent some of the nutrients from leaving the farms. The leaves will also increase nutrients in the soil.

New research has also uncovered that the traditional turning of the soil before planting leads to erosion of the soil from wind and water (Huggins and Reganold). If Malawian people integrate no-till farming, they would seek to “protect the soil from erosion and foster soil productivity” (Huggins and Reganold). This method would lead to a more environmentally friendly way to farm while providing sustainable agriculture to families that live crop to crop to survive. Many small farm holders in Malawi are unaware of the negative consequences their farming techniques have on soil and yields.

Evelin Msgwa was unaware the impacts of her techniques. After planting nitrogen-fixing crops like legumes, Evelin Msgwa was able to replenish some of the nutrients to the soil that had been lost after years of planting maize (Stevenson). This made her less susceptible to the economic detriments of crop failure as she offered the market a variety of crops (Stevenson). As a result, farmers, when they face a meager harvest, were able to provide for the economic wellbeing of their families and support themselves. By raising awareness in just a few small villages, people have become more interested in creating a variety in their crops that will provide more nutrients into their soil. This will in turn help many of these people, like Evelin Msgwa, get out of poverty and support their families with sustainable food supply.

Non-profit organizations [NGOs] are also making a big difference in Malawi. For example, The Gates Foundation and Purdue University found a solution to a cowpea-weevil problem. Malawian saw 50% their cowpea harvest lost due to infestation (“Profiles of Progress”). The NGOs found that when cowpeas were stored in an airtight container, the weevil larvae did not develop. This preserved the crop for years. Since 2007, Purdue University has sold over one million bags to farmers in Africa helping farmers increase their income and reduce pesticide use (“Profiles of Progress”). The beans can now be sold when the prices are high instead of immediately after the harvest. This project like many others implemented in the community was successful in increasing farmers’ income levels and ensuring food supply.

Additionally, Community Markets for Conservation, a joint initiative of the Wildlife Conservation Society and the World Food Programme [COMACO], trained smallholder farmers in sustainable farming technologies and improved land use practices (“The COMACO”). The initiatives showed the farmers how to diversify their crop production, trained them in zero-tillage farming, and showed them how to apply homemade fertilizers. The homemade fertilizers, when applied individually to each plant, reduced the cost needed to support the crop. COMACO also showed the farmers how to plant the current year’s product between the previous year’s residue, suppressing weed growth and increasing soil moisture. The organization also looked at planting groundnuts which were used as a source of food, income, and nitrogen-fixer for the damaged soil. These techniques, combined with demonstrations of honey production, provided an access to new markets and new sources of income. The results from the 2006 food survey showed that the households that practiced the sustainable farming techniques had 84.6% food security compared to a 70.1% for non-practicing households (“The COMACO”). This experiment shows that using sustainable agricultural practices can solve many of the current farming issues.

Programs face a barrier in insufficient seed supply when they promote agricultural sustainability. This problem results from crops dying too early to give off any seeds for planting. Many of these plants, susceptible to viruses spread by insects, die and can damage entire fields of crops leaving unlucky farmers crop-less. Scientists are working diligently to help develop virus resistant crops for cassava, maize, and sweet potatoes (“What Is Agriculture Biotechnology?”). These scientists are also attempting to increase the nutritional values of food and delay the ripening of the fruit through biotechnology. When these seeds are sold, the delayed ripening of the fruit will allow many farmers to ship their products without the crop rotting. This would also help provide more of the vitamins and nutritional diversity that many of the people lack in Malawi. However, as these are not widespread, a short-term solution is to diversify the plant varieties. Thus, if one plant crop dies, the farmer is still left with multiple other crops to feed on. Having a variety in the diet will also mitigate “micronutrient deficiencies, including lack of Vitamin A, iron, and iodine” (Tenkouano). As a further result, this could lead to better developments in children and keep children full longer if they get the appropriate amounts of nutritional values. Using agroforestry would help this development in that it allows the farmer to have multiple crops with increased yields.

Another issue that has prevented Malawian farmers from implementing legumes is their inability to achieve the high-value markets. Despite the availability of new technologies, farmers have remained cautious to implement new varieties because a failure could be catastrophic to their livelihood. This has led to low productivity and lack of competitiveness in the market. To address many of these issues, institutional arrangements should help to improve local availability of improved technologies and “effective market linkages that offer stable and better prices to producers” (Asfaw et al.). The high transportation costs due to lack of infrastructure have also caused barriers to implementing legumes (Sachs). Organizations in combination with the Malawian government should promote and develop infrastructure leading from villages to overcome some of these obstacles.

With growing consumption of dairy products, Malawi also needs to consider how to promote sustainable livestock. The Malawian Department of Animal Health and Livestock Development reports that the

livestock industry “provides food, income, manure, animal traction and social security.” This accounts for 36% of the value of total agricultural products and 8% of the GDP (“Policy Document”). Nearly 85% of the owners of livestock are subsistence farmers who rely on animals to transform crop residues into food and money (“Policy Document”). However, despite the rising demand for livestock, lack of improved breeds, lack of cheap feed, and weak livestock veterinary services constitute major pressures for farmers. High costs of feed often result in farmers using legumes from their farms to help support the livestock. This creates demand for legumes as animal feed and requires that the agricultural sector is stable.

If dairy was introduced as a staple in the Malawian diet, many of the people would face lasting impacts. As a high protein source and vitamin-induced product, dairy would help many of the people in Malawi have more energy and be more balanced in their diets. This would therefore reduce the amount of malnourished children in this country. The manure from the cows or goats would provide additional nutrients to the soil, increasing the yields and providing for a healthier, more fertile soil. As this fertility increases, farmers do not have to use as much water to help support their crops which would lead to less strain on the limited water. As the demand for dairy products continues to grow, Malawi has looked into expanding breeding programs, especially for the heifer and goat population. Garfield and Mizeki’s, two local Malawians, suddenly faced hope after receiving a heifer cow from Heifer International. They were only able to save \$14 dollars a year until their cow came (“Heifer Gives a Bright”). Today, their cow gives them about \$100 per month from milk sales in combination with its invaluable manure (“Heifer Gives a Bright”). Garfield and Mizeki no longer have to live hand to mouth.

When the dairy industry spreads, many of the women, who care for the populations, will experience more gender equality in labor (“Strategic Review”). Beatrice Biira’s life was changed when she received a goat (Edwards). The goat eventually helped to pay for her college. She is only one among many success stories. The dairy industry would provide women with a significant advancement in getting accepted within their communities economically. If more livestock are integrated in Malawi, the people would not only have the social security that the animal provides, they would also improve their livelihoods.

Malawi is a complex country full of problems. Securing ample food is a primary issue, so the Malawian population relies heavily on imports and aid to support its families. It attempts to secure food by farming staple and cash crops, but poor soil due to years of tillage and excess fertilizer use has left the soil unworkable. Nevertheless, Malawi has the potential to dramatically improve its situation through the implementation of sustainable agriculture. Without the appropriate tools to change the situation, Malawi needs help. Malawi does not have sustainable agricultural practices or livestock to support its growing population. This has led to increased dependence on foreign countries. This short-term aid will not solve the food crisis in Malawi. The primary long-term solution will be to ensure sustainability and educate its people about how to maximize yields. By increasing diversity in the crops planted, the Malawian farmers will make themselves less susceptible to crop failures while increasing the nutrients in the soil. A more sustainable livestock sector will increase the social security and dietary diversity of its people. Collectively, Malawi will lower its malnourished and hungry population. In order to enhance the wellbeing of its population, Malawi needs a convergence of factors. These include coordinated government and humanitarian actions as well as changes in individual and community behaviors. Increased community and individual efforts in these projects will promote a better environment with sustainable agriculture for the community. A grass roots speaking tour would teach the people how to apply a stable agricultural practice. In this way, the Malawian people can integrate their knowledge of the land and teach what they have learned to the villages. The millennium development goal measurement provides a focus for countries to help facilitate these important activities. While reporting is sometimes conflicting, the Malawi government has set goals to help eradicate extreme poverty and hunger. Developing and implementing sustainable agriculture practices can make a difference and is making a difference. With one step at a time, Malawi will be on its way to sustaining a healthy, happy population, ready to eradicate hunger.

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