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Adaptation in Rwanda

Today 60% of countries in the world are classified as developing countries due to their low human development index and a weak economy (Third World Countries 2020). In many cases, this is caused by low yields resulting in the inability of the agriculture sector to support the populaces' food exigency at rates they can afford when most of the population has no money to afford more than a single meal per day. Outside of the capital Kigali, the vast majority of the country is poverty-stricken and this can be attested to a number of reasons such as problems in infrastructure and trade as well as a list of other issues that are plaguing the country. The country has received foreign aid through the years to improve the populace's situation but there may be a long term solution to fix some of the country's major problems. To reduce Rwanda's reliance on foreign aid and support a growing population, their existing agricultural resources need to be taken into account and altered to create a lasting impact on the nation's food production.

With one of the largest population densities (World Population Review, 2020) on the continent and little to no arable land, Rwanda is a landlocked country located south of the equator in Eastern Africa. The country is a presidential democracy reflecting the governments of Belgium and Germany after having gained its independence from Belgium in 1962 (The World Factbook Rwanda). "The land of a thousand hills" as it can be known has 26,338 km² of land and a population of 12.95 million.

The AIDS epidemic has been an ongoing challenge for the Rwandan government as it has caused high mortality rates in the country and; therefore, there is a low life expectancy for the population at 66 years for women and only 62 years for men (Index Mundi). Rwanda has only two main ethnicities in the country, the Tutsi and Hutu, as well as a third less prominent ethnicity, the Twa. There are two main religions in Rwanda, 49.5% of people are Protestant and 43.7% are Roman Catholics (The World Factbook Rwanda). Kinyarwanda is the language primarily spoken as well as the country's official language which happens to be unique to the region. Much of the agricultural product produced is from subsistence farming so more food needs to be imported into the country regularly. The top five imports include foodstuffs followed by machinery and equipment, steel, petroleum products, and cement and construction material. Top exports from Rwanda include coffee, tea, Wolframite, hides, and tin ore with coffee making up between 50% to 80% of the total exports (The World Factbook Rwanda). The country's currency is the Rwandan Franc which is worth 936.4950 RWF to 1 USD (Business Insider).

In terms of infrastructure, Rwanda has an adequate road system with about 4,700 km of roads as of 2012 (The World Factbook Rwanda). The main roads tend to be well maintained

and

the road system has since developed further. The secondary roads; however, have deteriorated over time which the World Bank is working to resolve. The nation is divided into five provinces and is landlocked; therefore, it has no ports as well as lacks its own railroad system. The majority of Rwandan international trade is transported by roads to the Ugandan-Kenya railroad system and, from there, through the Kenyan port of Mombasa. The country does have several airports. The primary one is the Kigali International Airport located in the capital city.

A normal day for a Rwandan family is vastly different than the average day of someone living in America. To someone living outside of the capital city, many challenges present themselves on a daily basis. The internet can be considered a luxury as it is both unreliable and expensive. Cell phone service is something that is only available in certain areas, and energy costs three to four times more than that of neighboring countries (The World Factbook Rwanda). Water comes from a community well or the nearest lake which may be polluted causing a high risk of cholera and typhoid (A Day in the Life of Cynthia). Each day trips need to be taken back and forth to the nearest water source in order to cook, drink, and wash.

The most substantial problem in Rwanda is the lack of food to feed its people. Many of its people can not afford more than one meal a day and often less than that. There isn't enough food to go around nor any more arable land to be utilized. The current solution is to import food, but this can be expensive hence why many households must go without minimal nourishment. Importation has been how the government has handled the lack of food for years as the population has grown and Rwandan farms have been unable to supply the demand as most of them exist as subsistence farms.

The situation is as such: more food is needed but more land is not available. Trade isn't a sustainable option so crops need to be grown within their domestic borders. This leaves only an option of changing farm practices to increase yields. Changing the way crops are grown or the machinery used requires investment in research and development for both equipment and alternative crop options making these costly and time-consuming methods that would pull valuable monetary resources currently used to import foods.

Understanding that changes in their agricultural sector can likely make the biggest impact in how the Rwandan government is able to meet the allocation needed to feed its people, they have created a National Strategy for Climate Change and Low Carbon Development to ensure prosperity and stability in a changing climate (Rwanda Green Growth Strategy). This strategy recommends various actions which Rwanda is taking in order to sustainably improve the soil fertility and reduce the country's dependency on imported foods. To strengthen their agricultural ecosystem, irrigation and terracing are being implemented (New Agriculturalist). These implementations conserve water, reduce runoff, and are helpful with weather concerns due to Rwanda's extreme heat as droughts can often occur during the growing season.

Changing the crop to one that is more adaptable to withstanding the climate and produces higher yields will positively impact not only the ability to feed Rwanda's people but increase its potential to have a stored surplus of commodities as well as reduce its reliance on foreign aid.

There are two suitable ways to go about this, you can implement a genetically modified crop or simply change to a new better suited crop such as millet. Either of these options allows for a shorter growing period ensuring a harvest even after any weather that destroys crops as it still allows time to replant (Mapping Millet Genetics). The switch in crops would require the education of farmers on the new crop. However, millet is similar to many other crops already grown there, making the task of advising farmers of any changes an incredibly simple, straightforward alteration. The education aspect could be done by the Rwanda Institute for Conservation Agriculture as well as the Rwandan Ministry of Agriculture and Animal Resources who have both already been involved in changes in farm practice throughout the country.

In America, there has been a resistance to GMO crops that has sparked controversy over their use. The same resistance actually holds true in European and African nations. Despite all the benefits of GMOs, the premise of them is still incredibly controversial as many people dispute whether or not they are harmful to not only human life but the environment as well (Africa Still Wary of GMOs). Due to the controversy, switching to a better suited crop would be more advantageous and cause less problems than switching to a GMO. The importance of that detail is that the simpler it is, the more likely the plan would be to receive government support from the Ministry of Agriculture and Animal Resources which is key for outreach to farmers.

Regardless, a GMO could have more advantages in terms of growing as it continues to produce higher yields and is resistant to a wider variety of external factors. Yet for that opportunity to be plausible, steps need to be taken to improve GMO acceptance by the consumer in order to allow the struggling country to more easily combat their food shortage. A little bit of knowledge about the issue can make a huge impact if you look at the assorted benefits of GMOs. This solution also requires access to the GMO seeds though which could be more costly than generic seeds. Aid for this may possibly be received through various organizations and foreign aid programs. One of them, the Gates Foundation (Gates Foundation), has already supplied this sort of aid before in other areas of Africa including Kenya and Tanzania.

Rwanda's food crisis has been an ongoing issue for years so the likelihood of everything being fixed with no problems down the road has a slim chance of ever seeing the light of day. There is a need for different benchmarks in place as precautions to prevent the problem from coming back. For example, if there was a bad weather year causing the crop to die, there should be a seed bank in place to help the farmers recover and still have seed to plant the next year and protect food security. As the population grows; however, more food will be required, so there is a need for them to stay up to date on GMOs with the highest yields to feed a growing population.

The Rwandan Ministry of Agriculture could do this as well as distribute seeds and manage a seed bank.

This one problem may have an impact on other issues in the country as it will change the demographic of the country's imports. That could change where money is spent. It could be spent elsewhere such as on the country's infrastructure as well as its issues with water scarcity and sanitation. Solving the issue in Rwanda could influence other nearby countries also experiencing these difficulties to take similar actions. All of Rwanda's border countries are also third world countries with some of the same issues who would likely be able to benefit from the same sort of measures.

To reduce Rwanda's reliance on foreign aid and support a growing population, their existing agricultural resources need to be taken into account and altered to create a lasting impact on the nation's food production. Using different techniques such as terracing and irrigation has already helped boost food production in Rwanda. With the greatest population density in Africa, steps need to be taken to protect future food security and help those who are already struggling. Changing the seeds and the crop grown will allow farmers' yields to increase to provide for the growing nation.

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