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Botswana, Sustainable Agriculture

Botswana: A Sustainable Solution to Malnutrition

Botswana has an ongoing population of 2.352 million people (datacommons 1). Around 26% of the population is suffering from malnutrition (Muni 1). That means 588,000 people in Botswana currently suffer from malnutrition. This is caused by families not having the resources to purchase healthy/nutritious food. Using sustainable agriculture practices would help solve many issues for the people of Botswana.

Around 70% of Botswana's total land area is desert (the globaleconomy 1). The major crops that they produce are corn and wheat (fao 1). Droughts are very common and happen frequently in Botswana. These droughts make it very difficult for the crops to grow. It was three years ago that Botswana experienced a severe drought. In an article titled, "Botswana Drought Makes Wasteland of Harvest, Livestock" it stated, "Southern Africa is experiencing one of the worst droughts in years, with more than 40 million people expected to face food insecurity because of livestock and crop losses. Botswana, Lesotho, Namibia and Zimbabwe have declared it an emergency." World weather events, such as these types of droughts, bring great concern to many people. The average farm size in Botswana is about five hectares (land-links 1). Five hectares is comparable to five whole soccer fields. Nearly half of the land is used for agricultural purposes. The climate ranges from dry temperate weather in winter to humid subtropical weather in summer (Ham 1). The land is mostly flat with a few hills (goway 1). Around 20% of Botswana's total land area are forests (mongabay 1).

Family sizes average three people per household (arcgis 1). Typically, homes are made out of local materials including mud, dung, and wood (yourbotswana 1). Their meals consist of meat, cereals, nuts, fruit, and seafood. Most of the food is grown locally, and the rest is imported from neighboring countries (worldbank 1). Some common jobs are miners, farmers, tour guides, and financial service employees (careersinafrica 1). The average wage per year is about \$29,623 (take-profit 1). A total of 60% of Botswanans are living in poverty (macro trends). This is partially due to the amount of land used for agricultural purposes. Public, private, and home-schooling options are available for children. Private and public healthcare is available and very affordable (Muni 1). I found it very interesting and important that 95% of the population has access to clean water, toilets, electricity, telephones, and roads. Families rarely have access to food markets making it difficult to get any sort of nutritious food. The major barrier most families face is not having access to healthy or nutritious food.

The status of malnutrition in Botswana is very severe. According to United Nations International Children's Emergency Fund (UNICEF), one in three children under five are stunted. Children are suffering from anemia, stunting, wasting, and other nutritional deficiencies. It's shocking to learn that 64.5% of the population is unable to afford a healthy diet, and trends have only been worsening since the beginning of the pandemic. The main source of this issue is families earning a low income. Unemployment levels have remained high because of the pandemic, and income inequality is growing. Only 12% of households are food secure (hungrycities). Using sustainable agriculture could help solve both problems.

With the existing malnutrition challenges there is a program in place titled, *The Vulnerable Groups Feeding Programme (VGFP)*. This programme is described as having

"Its roots in drought relief efforts initiated around the time of Botswana's independence in 1966. It is now a blanket supplementary feeding scheme, administered through health facilities (HFs) across the country, to improve the nutrition of children aged under five years (or six, if they have

not yet entered school and started to benefit from the national school feeding programme). The VGFP also provides supplementary feeding for medically selected pregnant and lactating women (PLW) and tuberculosis outpatients.”

This serves as a strong sign of hope. However, there are additional actions being taken to assist in the overall efforts.

With so many people suffering from malnutrition, and trends only getting worse, ‘climate smart’ farming could be a great solution. Climate smart farming is “an approach that helps guide actions to transform agri-food systems towards green and climate resilient practices” (fao 1). ‘Climate smart’ farming increases sustainable productivity, strengthens farmers’ resilience, reduces greenhouse gas emissions, and increases carbon sequestration(ucsusa 1). One of the disadvantages of this solution is how much money it costs. Implementing ‘climate smart’ farming into everyday lives can cost billions of dollars. Thankfully, the United Nations Development Programme (UNDP) has already started investing in ‘climate smart’ farming in Botswana(borgenmagezine 1).

As I look at the situation concerning this issue in Botswana I recommend the following solutions. I believe they should adopt agro-forestry practices which is simply growing additional trees in as many locations as possible. In addition, make sure crops are rotated through recommended practices of crop rotation and making sure that organic manure can be mixed in with soil. Hydroponics, which is growing plants without soil is another practice that can be used to contribute to climate smart farming. All of these can be achieved through educating the people of Botswana, promoting small successes through the media, and celebrating the accomplishments connected to ‘climate smart’ farming.

‘Climate smart’ farming would not only help with lowering malnutrition rates, but it would also be creating more jobs for families. By starting off small, with first implementing something like organic manure, a person, family, or business could slowly work up to adding more strategies of ‘climate smart’ farming. Once enough money is provided, bigger steps of ‘climate smart’ farming could be incorporated. As those bigger steps in ‘climate smart’ farming are implemented, they could achieve a higher level of food security throughout Botswana.

‘Climate smart’ farming increases the level of food security in many ways. Things such as increasing productivity and incomes, reducing greenhouse gas emissions from the atmosphere, and enhancing the resilience of ecosystems are all different contributions to protecting food security. Increasing productivity and incomes makes more nutritional food available for more of the population. Reducing greenhouse gas emissions from the atmosphere provides a larger variety of healthy and nutritious food. Enhancing the resilience of ecosystems gives us a wider scale of nutritious food to choose from. There are a couple of ways that they are able to increase the level of food security in Botswana through ‘climate smart’ farming for these different contributions.

Policies would have to be put in place for ‘climate smart’ farming to be successful. Having proactive dialogue with farmers is key to this project. An example of these conversations could look like talking about how/if they have already incorporated sustainable agriculture practices into their own farms. If they have not, holding conversations about the next steps they would need to take to implement these practices into everyday life would be useful. The UNDP has been working diligently with the local government of Botswana to strengthen and increase the socioeconomic status of farmers, and promote eco-friendly agriculture practices(borgenmagezine 1). As of right now the United Nations Development Programme is training and mentoring nineteen farmers in Botswana(borgenmagezine 1). They have provided them with shade nets and water tanks. This will help them use less water and land without reducing the crop yield.

‘Climate smart’ farming can cost billions of dollars. Budgeting plans would need to be discussed

beforehand, and thoroughly within the process. The UNDP has already started investing time and money into a 'climate smart' program in Botswana (Borgenmaginezine 1). Acquiring help from neighboring countries and local organizations has been a huge help to the 'climate smart' program in Botswana. Providing incentives has made more and more people want to help and volunteer for this program. Some incentives include providing more jobs for unemployed families, farmers receiving more recognition, and encouraging the farmers to feel empowered. One of the biggest incentives of 'climate smart' farming is the sustainability aspect of it. Being able to produce more crops with less equipment saves a lot of money in the long run. They are able to produce more, without taking up as much farm space, which creates more room for other crops.

'Climate smart' farming not only helps the climate, but also helps the many people in Botswana suffering from malnutrition. With more crops being produced at a faster and more efficient rate, they become cheaper and easily accessible. This would make it easier for families with low income, or living in poverty, to be able to access these foods. The families would then be eating a lot healthier, and gaining more nutrition into their bodies causing the disease of malnutrition to have a lower rate.

'Climate smart' farming is a wonderful solution to malnutrition, unemployed families, families living in poverty, and a tool to help stop climate change. With 25% of the population being malnourished, and 60% of Botswanans living in poverty, 'climate smart' farming is definitely a step in the right direction (Muni 1, macro trends).

Another core element that needs to be in place if Botswana is going to be at a better level in education is instructing how sustainable agriculture is a positive contribution to help solve malnutrition. Education needs to happen at every level including with the very young to those who are in older generations to help all understand the benefits of a sustainable production system.

I would recommend a study unit for every grade level on sustainable agriculture. Because 'climate smart' farming can be done using very little resources, it will be easy to teach to any level of student. As a sequence to education on sustainable agriculture, I believe it would be beneficial in providing photographs of "plate meals" and proper proportions very similar to what the United States uses in their "myplate.gov" website.

Additionally, portable sustainable gardens could be designed on mobile garden structures (similar to a wheelbarrow or a small wagon). In this way, young children could develop and work with a hands-on project about sustainable gardening for their backyards. It would be an advantage of the sustainable garden structure to be mobile to catch rainwater off of rooftops as a way to utilize this precious resource.

In my research I found that a few students from Southern Methodist University in Dallas, Texas have come up with an innovative way to mobility and sustainably grow plants. The students were not able to obtain permits for a community garden, so they decided to create a transient concept to grow healthy and nutritious food. These students used a trailer to be able to grow these plants mobility. This reinforces the idea of portable sustainable gardens built in a fashion that utilizes limited resources which contributes to sustainability.

Educational centers could organize youth groups that concentrate on methods to grow food crops sustainably while working to eliminate malnutrition.

It is important to promote the new ideas of sustainability in Botswana to help with the challenges of malnutrition. An avenue to accomplish this would be to hold actual *Botswana Sustainability Tour Days*. It would be important to bring key leaders to this event along with community members who could be sustainable block leaders within their communities. I use the term "block leader" because it is really like

building the foundation to a building representative of sustainable agriculture. During this *Botswana Sustainability Tour Day* the following activities could happen:

Music could be used as a way to celebrate the community coming together and promoting sustainable agriculture practices; the “block leaders” could learn and lead mini-instructional units related to sustainable practices; fresh produce samples could be provided in order that community members can not only see, but taste, the by-product of this style of ‘smart farming’; education on sustainable agriculture cannot be limited to a *Botswana Sustainability Tour Day*; reminders need to be placed throughout communities and throughout the country accomplished through the use of road signs and billboards, much like what we do here in the United States when an organization or company promotes a certain product.

A greater emphasis needs to be promoted to emphasize hydroponics. In one of my articles of research, “*The Urban Vertical Farming Project*”, I found a success story with hydroponics titled where the question was posed, “*Could you describe your hydroponic system for me? For example is it ebb and flow, do you have specific sections for different stages of growth?*”

They provided the following answer to this question.

Sure. We’re currently using the NFT (Nutrient Film Technique) Hydroponic system. The nutrient film is referring to a thin flow of nutrient-infused water. This water is pumped from an underground reservoir up into PVC trays, then gravity fed back into the reservoir. A result of recycling the nutrients is a 90% reduction in water use when compared to traditional farming. The sustainable aspect of this technology was very appealing early on in our research.

We have two separate sections/zones for different stages of growth. The nursery is located in the northern, warmer section of the greenhouse and the nutrient film travels at a slower pace to allow the smaller, more vulnerable root systems to absorb nutrients without risk of damaging root tips. We’ll take the plants from the nursery and transplant each, individual plant into the field, which occupies the large majority of the greenhouse. This is a tedious process, but expected in any farming operation.

There is an initial set-up cost but the outcomes for a food production system would be worth it. Hydroponics does contribute to ‘climate smart’ farming.

Grocery stores in Botswana could provide educational learning pods about sustainable agriculture and how it can help confront the challenges of malnutrition. Within these learning pods, written information could be provided along with colorful visuals that serve as a strong advertisement for sustainable agriculture and smart farming.

Local Botswana restaurants could promote their own “fresh leafy greens” which have been sustainably grown and perhaps even served in an outdoor setting promoting healthy environments. Community trails could be developed with plots of sustainable gardens along the way. Medical centers are another form of a public hub that can promote sustainable agriculture with emphasis on smart nutrition. It could serve as another avenue in the healing process.

To keep costs low there would need to be a promotion of the value there is in volunteering in a manageable way. As I look back on my possible solutions it really is important to build a foundation of knowledge and then work to stir others to action at many different levels.

In conclusion, it is recognizable that Botswana is a country that is not void of malnutrition. However, it is

a country where hope grows through programs that have been previously started. Botswana is a country that can serve as a model to others by growing new ideas that work within a system to overcome malnutrition. I have offered my ideas of how to meet the nutritional problems that exist. These ideas include 'climate smart' farming, using education as a resource to learn and teach about sustainable agriculture, using hydroponics, and creating mobile gardens. With all of these solutions and the help of the communities in Botswana, everyone can work together to solve the issue of malnutrition.

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