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Ghana, Sustainable Agriculture

Ghana Sustainable Agriculture

Ghana is a country on the West coast of Africa. It is a country of dreams and hopes, an untapped wealth of potential. The means are there to catapult this country into developed status, someone just needs to use them. Ghana could fit into the United States 41 times, making it around the size of Oregon (Goldman). The quality of life depends on where you live, the urban South is comparable to living in developed Indian cities or even European and American cities. The north is more rural and lacks some of the necessities to live comfortably. In some places, there is even no running water and electricity. Ghana is a country that benefits from a mostly tropical climate, which is a contributing factor to the success of the over 3.4 million farms based in the country (Tait). These farms are the backbone of Ghana's economic success and well-being. At least fifty-six percent of the workforce in Ghana includes agriculture in some way. An estimated 90 percent of people in Northern Ghana rely on an agricultural livelihood, which is based on farms that are operating with outdated equipment, using practices harmful to the environment, and using inefficient farming methods (Ghana United).

Ghana is the thirteenth most populous country in Africa, with an estimated population of 30.5 million. The population has exploded in the past 20 years, increasing by half of its population since early 2000 (Ghana Population). This is a major contributing factor to Ghana's newfound economic strength. Ghana is at an exciting point in population history right now. It's experiencing a transition into a developed country by the standards of the Demographic Transition Model. Population growth is stabilizing around two percent but the total fertility rate has decreased every year since hitting a peak of 6.95 percent in 1970. Right now the total fertility rate is at 3.87 births per woman, but if the trend of development continues it is likely in the next couple of decades, Ghana's population growth and statistics will match most developed countries (Fertility Rate).

Another factor to Ghana's economic growth and development is its rich natural resources. Over 105 million carats of diamonds have been mined in Ghana since 1920 (Chirico). In 2007, oil and natural gas were discovered as well. Over five trillion cubic feet of natural gas and seven billion barrels of crude oil have been discovered in proven reserves. This means Ghana houses the sixth-largest proven petroleum reserves in Africa, and the twenty-fifth in the world (Aklorbortu). Ghana is also the largest producer of gold in Africa, mining between 120,000 to 130,000 metric tons annually. Ghana is the world's second-biggest producer of cacao beans, yielding between 800,000 to 950,000 tons of beans every two years. Other cash crops which are seasonally grown here are palm oil, citrus, and rubber. All of the above reasons contribute to Ghana's rapidly growing GDP which was 66.98 billion U.S dollars in 2019 with a GDP per capita of 2,202.12 in USD (Ghana Overview).

Historically, Ghana is a trailblazer in Africa. Ghana led the way in the twentieth century when Africa began to break away from European colonialism and now they are hoping to lead Africa into a new period of sustainable wealth and prosperity. Historians believe that Ghana has been inhabited for 10,000 years, making it one of the earliest places humans lived. Most of the people living there now migrated 1,000 to 700 years ago. The modern country gets the name Ghana from the medieval trading empire that occupied the same region as the country between the seventh and thirteenth centuries. Sea trade with Europe began in the fifteenth century, mainly with the Dutch, Portuguese, and British. They were mainly interested in the gold that was readily available in Ghana. In the seventeenth century, trade focused away from gold and towards the trans-Atlantic slave trade. This marked what some would call the beginning of European exploitation of Ghana. From this time onward, Ghana became shaped by imperialism. By the nineteenth

century, Ghana was a fully-fledged official British colony, named the Gold Coast. Ghana was exploited for its people and resources until March 6, 1957, when it became the first nation south of the Sahara desert to declare independence from Great Britain. Thirty African nations followed suit (Maier).

The initial form of government after declaring independence was a democratic republic, however, the country suffered many coups and revolutions and had many dictators until 1989 when power was finally given back to the people. In 1992 the country's parliament was formed. There are two main political parties, the NPP (New Patriotic Party) and the NDC (National Democratic Congress). While Ghana has more than two parties, it is very challenging to find political success under them, similar to the United States. The NDC was formed shortly after Jerry Rawlings, who used to be a military dictator, changed the country's government in the '80s. He was elected as the first president of Ghana. The NPP was formed around the same time as the NDC and is a more conservative-leaning party. The current president is Nana Akufo-Addo of the NPP. He has made many bold promises, including free education for all children in Ghana. He was reelected in the 2020 election and will serve a second term (Ghana Constitution).

The typical farming family in Ghana is made up of five people. The average family composition would look something like a mother, father, children, and possibly grandparents or other close relatives. The literacy rate in Ghana for adults is 79 percent, up by 17 percent in the last year. However, in rural areas, the literacy rate drops to 74 percent for males and 51 percent for females. Children are overall more literate than their parents, most families try to send their children to school. Nevertheless, dropout rates for primary education remain around 30 percent for females and 20 percent for males (Education in Ghana). Healthcare is also inconsistent in rural areas, only 17 percent of families have access to some type of healthcare, and there are only 250 doctors for every 100,000 people. Most farmers have to travel an average of nine miles to reach a hospital (Yaya). There are no government programs to help provide access to healthcare to small farmers, although they provide the bulk of the food consumed in Ghana. Most rural farmers also supply food for themselves. Almost three-fourths of their dietary energy comes from starchy roots (cassava), cereals (millet), and fruits (plantain). However, the average amount of proteins and lipids consumed are under the recommended limit. Proteins and lipids that are consumed are likely to come from poultry and beef, specifically chicken and cattle (Ghana Nutrition).

Farmland availability in Ghana is not an issue. Twenty-one percent of the land is arable when calculated as a share of land area and 69.88 percent of the land area is agricultural land. The problem is the lack of efficiency in each farm. The reason for this is because the average farm size in Ghana is 1.6 hectares which translates to 3.95 acres. The average size of a farm in the United States is 444 acres for comparison's sake. These farms are mostly subsistence farms, meaning the farmers are producing for themselves and then selling their leftover yields. Additionally, their agriculture is seasonally based because almost no land is irrigated. Less than 0.1 percent of Ghanaian farmland is irrigated. Major food crops grown are maize(corn), yam, plantain, cocoyam, cassava, sorghum, millet, and rice. Cash crops include cacao, oil palm, and rubber. Fruits are by far the most popular produce grown in Ghana, they are in the top eleven in the world for pineapple production and in the top 19 for orange production. The poultry market is a major part of Ghana's domestic food supply, as is the beef market. Both of which account for 99 percent of meat eaten domestically (Kimboldt). Most farms are smallholder farms. Types of agriculture practiced in Ghana include subsistence agriculture, plantation agriculture, dryland farming, crop rotation, shifting cultivation, and mixed agriculture. Slash and burn agriculture is the go-to method for preparing plots, though no-till farming is gaining popularity. Subsistence agriculture is the most common type of farming. Most of the actual labor is done with hand tools, and seeds are bought then harvested from the crop. Most work is done by hand on these farms, as machines are too expensive for farmers to afford. Some farmers use methods such as crop rotation and crop residue retention to increase soil nutrients but not all farmers utilize these practices. Fertilizers are used by the farmers that can afford them (Ghana Ministry).

There are many barriers to the typical farmer in Ghana. There are two types of rural farmers, the survival farmer, and the entrepreneurial farmer. The main goal should be to turn every survival farmer into an entrepreneurial farmer. Your average farmer is working with hand tools and barely scraping by. Farmers are just trying to feed their family, village, and cover their monthly expenses, which most can't. The average monthly income of a farming family of five is 3,050 Ghanaian Cedi, 531.27 in USD. Average monthly expenses add up to 1888.79 Cedi or 329 USD. This statistic makes the main barrier to these farmer's increasing agricultural productivity apparent. They lack the capital to expand their operations. Modern farm equipment is extremely expensive. What would be considered a cheap tractor in America is still 45 months of an average Ghanaian farmer's saved income (Cost of Living). Similarly, engineered seeds, fertilizers, pesticides, and other farming commodities are simply more expensive than the amount of capital the average farmer can get their hands on. A significant portion of rural farmers are illiterate, which means they have no paper trail to show to a bank to get approved for a loan.

To piece together all of the above factors into the bigger picture, Ghana has a rapidly growing economy heavily based on natural resources which will deplete. Fifty-nine percent of the workforce is reliant on agriculture yet agriculture only accounts for Twenty-eight percent of the country's growth in domestic product. Ghana's population is booming with the current urbanization, but while this is happening the rural farmers are being left behind. Smallholder farmers provide Fifty-Four percent of the food in Africa, but they're still working with hand tools, living in uncertainty, and not practicing efficient or sustainable farming (Agriculture Food). The problem here is many-fold, the average small-hold farmer needs to be able to produce enough food to feed themselves and their family. They also need to be able to do this sustainably. Lastly, they need a fair market for any excess crops and cash crops they sell.

So what is sustainable agriculture? It essentially boils down to being able to meet society's need for food in a way that does not compromise the future generation's ability to meet their natural resource needs. This is a very broad definition that can be applied to a lot of different perspectives depending on what is classified as the needs of future generations. One could argue that a stable climate is a need of the future generation, which would make any farming that emits carbon dioxide unsustainable. Others might say a clean planet is a need of the future generation and any agriculture runoff is unsustainable. Both of these views are correct but in Ghana, the most important aspect of sustainable agriculture is food security. Thirteen percent of people in Ghana live under the national poverty line and Six and a half percent are undernourished. (Ghana Hunger). The main concern is ensuring the prosperity of Ghana's farmers and the environment

To guarantee economic and environmental prosperity for Ghana, as well as the food security of the people of Ghana, new farming methods must be implemented. Most importantly, a shift away from slash and burn agriculture is needed to protect the environment and the economic well-being of farmers. This can be replaced with a variety of methods, including no-till-agriculture or crop rotation. Additionally, to maintain food security, linking small-hold farms to larger manufacturing and distribution entities, either private or government-funded, would not only guarantee farmers access to local markets but also pave the way for private investment into the agricultural sector.

The above goals can be accomplished in several ways. However, the most direct way would be to improve agricultural productivity. Farmers need a system to be educated about alternative agricultural practices, be able to implement them and once they've harvested, be able to sell them at a fair price.

The first barrier to agricultural productivity is a lack of education amongst farmers. Farming is a way of life amongst most of Ghana's people. It is their trade and history. Generations of farmers have practiced the same methods on the same land for hundreds of years. Asking someone to change the way they live and in their view abandon their history is no simple task. Additionally, standard education may not be

realistic for some rural farmers. Literacy rates are low in rural areas and farmers may not be able to attend classes while working on the farm. To counter these issues, a government organization should be created that can help educate farmers about sustainable farming. This organization would firstly provide free online classes in a simple video format. These videos would be easy to understand and have comprehensive descriptions and visual examples of how to no-till farm and rotate crops. However, this doesn't guarantee that the videos would be available to all farmers. Ghana has the highest mobile penetration in West Africa, with an estimated fifty-five percent of the population having access to a registered plan (Omondi). This means that online courses are an effective way to reach a majority of the population, but not all farmers. To supplement the classes, this organization should also hire individuals who either have a college education in agriculture or have extensive experience using sustainable farming practices. Because courses may not be enough to convince farmers to change their practices these agents could be assigned to a state or county. They then could host presentations, classes, and meetings and invite local farmers to them. This can help to begin a relationship with farmers, which would be necessary for most to switch methods. Asking a farmer to switch their methods is even more than asking them to change their way of life, it is also asking them to bet their livelihood and families livelihood. Having a successful and educated individual present while farmers make these changes would greatly improve the chances that the farmers switch methods and do so effectively.

A potential model for the above organization is the Ghanaian non-profit CNTA. The CNTA or Center for No-Till agriculture was founded by native Ghanaian Dr. Kofi Boa when he returned home after studying agronomy at the University of Nebraska. He's made it his goal to teach as many farmers in Ghana as possible about regenerative farming methods. His hands-on methods of teaching farmers and results-driven persuasion have been a great means to reach Ghana's farmers. (Boa). Individuals such as Boa are the ideal agent for the theoretical organization. A Ghanaian farmer who has had a lot of success and has a lot in common with current farmers would be suited to fulfill the role of a mentor and friend.

Now that farmers know how to farm sustainably, what are the actual methods and how can they be implemented? The agricultural cycle consists of seven steps: crop planning, purchase of crop inputs, soil preparation, planting, monitoring, harvesting, processing, and sale. The following methods will address the crop planning and soil preparation stages of the cycle, which is where there is the most short-term potential for improvement in Ghana.

The first step for any farmer is to clear land. Whether this is with advanced expensive machinery like a bulldozer or by hand using a machete it is the same first step. The current prevalent method of clearing land in Ghana is known as slash and burn agriculture. Farmers will burn an area of foliage, which will create an area to farm in that is now nutrient-rich thanks to all of the dead plant matter in the soil. It is then easy to till this land and start planting. However, because no vegetation is left, no nutrients are left to nourish the now barren soil. Yields reduce in number every harvest until nothing grows on the land anymore. Farmers then burn a new area and the cycle restarts. This is not a sustainable practice from a productivity or environmental standpoint. There are a few reasons farmers like to use this method. The main one is that it is a traditional method. Farmers burn their land every year, it is almost a part of the culture to do so. Another is the fact that it does work very well for the first few harvests. It serves as a substitute for fertilizer which Ghanaians mostly lack. Though this doesn't last long as it leaves the land unusable for several years and hurts the environment by decreasing plant life and habitable land for wildlife. In addition, other practices used by farmers such as monocropping and tilling the soil erode nutrients and leave land barren similar to slash and burn. Multiple methods need to be revamped to fix these issues

What should farmers switch to instead then? Well, there are multiple methods which when combined can make farming in Ghana much more sustainable and efficient. Moreover, most of these methods require the purchase of no additional equipment, only the knowledge of how they work.

To begin, farmers should simply clear land by hand. It's tedious and it takes longer, but the benefits outweigh the negatives. No CO₂ is released into the atmosphere due to the fires, the land remains fertile over a long period because plants are still present to continue the nitrogen cycle, and there is no chance of the fire spiraling out of control and damaging natural habitat or private property. It's all in all a safer way of clearing land.

Next, crop planning, the first step in the cycle. Another unsustainable habit practiced by some farmers in Ghana is monocropping. Monocropping is when farmers plant the same crop on the same plot of land every season, because the crop is the same every year the same nutrients are being stripped from the soil and the same nutrients are given to it, which the crop doesn't benefit from. Because of this, yields reduce every season. To combat this farmers should introduce crop rotation. Crop rotation is planting different crops in the same plot sequentially each season. When the right crops are paired, they create nutrients that the other plant thrives off of. This not only produces better yields for the farmer, but it also saves them land. Instead of planting two crops separately, they can be rotated every year to produce more. A popular example of crop rotation in Iowa is soybeans and corn. Farmers will rotate which ones are planted on certain plots each year so the nutrients they produce help the other grow.

After planning out the crops farmers must prepare the soil. The method most farmers use is tilling with a plow. This is a well-known method that doesn't have well-known drawbacks. But modern agricultural research has revealed that tilling the soil has some negative effects. Tilling the ground is essentially upsetting the natural order of the soil. The ground is normally like a sponge, all of the water and nutrients are sucked underneath the surface and everything is held together firmly. When tilled, all of the good stuff on the bottom is exposed, which is beneficial for the current plant but makes the best part of the soil very susceptible to erosion by wind, rain, or runoff. Consequentially, after a few years of tilling all of the rich nutrient-heavy soil has eroded and farmers switch to a different plot, which is not a sustainable practice.

No-till farming is farming without using a plow to till the soil. The benefits are that it creates healthier soil which will produce more crops and grow fewer weeds. This is done by creating a mulch cover in the desired planting area using other organic plants and materials. This mulch protects the soil from direct sunlight and keeps the soil moist, which in turn ensures crops grow even through droughts. Most farmers see a massive increase in yields and profits after the first two years of no-till, which can be used to reinvest into the farm (Boa).

Farmers are now able to grow crops sustainably and more efficiently. The final step of the agricultural cycle is the sale of the product. This seems like a simple task but it is quite complicated. With any large financial market comes problems. Buyers and sellers need to agree on a price, goods need to be transported, quality needs to be assured. Farmers often get the short end of the stick in transactions, volatility can make their harvest worth much less than it actually is. Middlemen are allowed to cheat farmers with no consequence because they are the only people farmers can sell their crops to. Farmers' crops can go bad without secure storage and guaranteed transportation, resulting in post-harvest losses. Also, infrastructure in Ghana is poor in rural areas. Farmers can't always transport their crops to buyers, which means more food goes to waste. These problems are being addressed by these groups currently, but there is room for improvement. Ghana is a mixed economy, meaning the government controls some aspects but certain private entities still control parts of the market. One government entity that works in agriculture is the Ghana cocoa board. This is a public organization that sets the price of the cocoa, coffee, and shea nuts commodities in Ghana. This is done to protect farmers from volatility, most farms rely on these products to survive, it is often the women's responsibility on farms to cultivate these plants. Another organization is the GCX or Ghana Commodities Exchange. It was established on November 6th, 2018, so it is fairly new to the scene. It started only trading maize but has since added soya bean, sorghum, sesame, and rice. The commodities exchange connects sellers with buyers, grades crops to

ensure quality, and provides safe storage to farmers. It does not currently handle transportation. The point of mentioning these two organizations is to examine where they can improve and what can be done to help sell crops fairly in Ghana. The Ghana cocoa board is functioning well and has been functioning well since 1947. The best way to proceed would be to place more commodities under the organization's supervision. Fruits such as pineapples and oranges would be a starting point, as many farms grow fruit trees in addition to standard food crops. This would guarantee the sale of fruits fairly. Additionally, there should be subsidized loans granted to the GCX to boost its growth. The bigger the commodities market the better it is for Ghana. With this money, the GCX can continue to provide storage to farmers, guaranteed payments, and guaranteed quality. They could expand their listings by adding more popular crops such as plantain, millet, cassava, and more. Potentially, they could start to provide transportation services between buyers and sellers too.

Lastly, there is the question of funding. Creating government organizations, hiring employees, and subsidizing companies all require government funding. Ghana has had a problem with excessive government spending over the past decade and these reforms should not add to that. To accomplish this a tax should be implemented on slash and burn agriculture. This would not only fund reforms and plans to make agriculture in Ghana more sustainable, but also incentivize a shift in agriculture towards the direction they are trying to promote. A certain amount of money for every hectare of land burned for example. A ban would be unreasonable, as it is a part of the culture and tradition.

To ensure sustainable agriculture in Ghana, agricultural practices must change to be more efficient and do less harm to the environment. Educational services should be made accessible to farmers to teach them different farming practices. A shift from slash and burn agriculture to more efficient as well as environmentally friendly practices would result in not only better crop yields but also better land use and a healthier environment. Additionally, to guarantee the economic prosperity of the average farmer, expanding current government organizations and subsidizing private ones would ensure farmers don't lose money on post-harvest transactions and boost the growth of agriculture in Ghana. To accomplish these reforms and plans a tax can be implemented on slash and burn agriculture.

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