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### **Guinea: Developing and implementing sustainable agricultural practices**

Guinea is a country brimming with potential. It is richly endowed with minerals, and its diamond and gold deposits are among the rarest and most valuable in the world. Along with the determined surplus of diamonds and gold, the country of Guinea has undetermined quantities of uranium along with more than four billion tons of high-grade iron ore. Yet another aspect of the economy of Guinea that is extremely unfulfilled is the field of agriculture. The climatic conditions as well as the land and soil of Guinea provide opportunities for large-scale irrigation practices and the agricultural industry in general. As of 2012, the outlook for Guinea is unfavorable. However, increasing food security by providing more teacher training and academic institutions for the country of Guinea can turn the outlook from inopportune to advantageous.

Subsistence farms make up 76% of the land of Guinea. This arises a complication for the field of agriculture seeing as only 11.6% of the land is arable as of 2010. Furthermore, only 2.6% of Guinea's arable land is cultivated. This lack of quality farmland is in part due to the contamination of Guinea's soil. The farmers of Guinea are uneducated in the proper use and disposal of chemicals that are sometimes used in their fields. In fact, the practices of farming for the Guinean people are often passed down from one generation to the next. The typical rural farm families of Guinea consist of a father and his children, typically five per household with one child dying in infancy and an occasional nephew or younger brother living in the back quarters of the house until they establish a home of their own. Polygamy is not uncommon for women in the country of Guinea. The head male of the household often controls the women, who typically spend their lives in polygamy. The first or head wife will mediate conflicts and oversee the division of labor in the household. Men typically work in the fields with their sons, while the women and their female children will weed the fields, plant garden plots, cook and clean, and the mothers looking after the children.

The meal, which is served once a day due to the lack of money in most Guinean households, is very low in protein, so malnourishment is not uncommon. Studies and survey results from the Helen Keller International Institute show that 70% of the population per community experience malnourishment, and 75% of children under the age of 5 are malnourished. Insufficient amounts of protein in food along with the lack of clean water and improper sanitation account for many diseases in Guinea. Malnourishment as well as anemia are results of the lacking protein in the diets of Guineans. Diseases such as yaws, schistosomiasis, diarrhea, hepatitis A, typhoid fever, as well as parasitic and other endemic diseases are the results of lack of sanitation and potable drinking water. HIV, AIDS, malaria, leprosy, and yaws are other common diseases in Guinea. For the children and adults affected by these diseases, there is little to no hope due to the lack of accessible health care in Guinea. There are 0.1 physicians per 1,000 population. Furthermore, health care in Guinea accounts for only 6.1% of the G.D.P. The hope for future generations is fading, as the maternal mortality rate is an alarming 680 deaths per 1000 live births, making Guinea the country with the 15th highest maternal mortality rate in the world. The looming cloud of food insecurity rains down onto the land of Guinea as the present as well as future of Guinea is enveloped with sickness and poverty, leaving less able workers and therefore less capital per person.

The potential for the field of agriculture is brimming to the top in Guinea, if only in the land aspect. The climatic and soil conditions as well as the soil (when not polluted by unaware and unknowing farmers) provide great potential for large-scale irrigation and agricultural practices. The principal subsistence crops of Guinea include rice, sweet potatoes, yams, corn, and manioc. Cash crops of Guinea include peanuts,

palm kernels, bananas, pineapples, coffee, coconuts, sugar cane, and citrus fruits. Guinea is also considered by the UN to be a net importer, seeing as it imports 30% of its food needs. 11.6% of Guinea's land is arable, while only 2.64% of the arable land is cultivated and used for permanent crops. This is blamed on the lack of biodiversity in the fields of Guinea. Guinean farmers do not change their crops from year to year, and once the micro-biotic activity is reduced and the soil is not sustainable, the farmers leave the lacking soil and move on to their next plot of land. The average farm size in Guinea is 32 hectares. This farm size is extremely small, and while studies conducted by the Universities of York and Toronto indicate that smaller farms produce a significantly lower amount of labor productivity than larger farms, the outdated farming practices as well as the dampening effect of price controls. Many Guinean farmers still plow their fields with oxen, their wives and daughters following behind and tending to the crops. Also, a vast majority of crops are harvested by hand. The food security of Guinea is greatly affected by these factors, as the insignificant amount of efficiency as well as the price controls help to ensure that the Guinean farmers make as little profit as possible while the input of their work is at its maximum.

The education systems in Guinea are the most upsetting aspects of life. As of 2011, only 29.5% of Guinea's population is literate. Legally, education is free and compulsory for children ages 7-13; however, this is very rarely enforced. Many children do not even attend school for multiple reasons. The main reasons include lack of educational infrastructures as well as the lack of opportunities caused by gender bias and lack of financial stability. Regarding gender bias, women in Guinea are mistreated and disrespected by men. This is especially true when it comes to education. Only 18.1% of females in Guinea are literate, while the men's literacy rate is a substantially higher 42.6%. Many girls are denied the right to education because the education of the boys is considered to be more valuable. In some situations, the girls are required to stay home to help in the fields or in the home. It is quite frequent that families in Guinea lack financial stability due to sickness, lack of health care, and lack of knowledge, and in that situation both the boy and girl children are required to stay home to help the family. As far as lack of educational infrastructure, there are two known universities in Guinea, Conkry and Kankan, with 21 other post-secondary institutions. The current need for universities in Guinea is minimal, seeing as only 15% of children in Guinea enroll in secondary schooling. This is due to the lack of infrastructure as well. Some children have to walk 15 miles per per day in order to attend both primary and secondary school. Due to the lack of infrastructure, those who do make it are tightly compacted in a small classroom taught by someone with a very low literacy rate as well. The average student to teacher ratio is 49 to 1. In some cases, children who can not go to federal or private schools attend Islamic schools to learn the Koran.

Lack of accessible health care along with lack of knowledge on modern-age and proper farming and waste disposal techniques are the main barriers to achieving food security in Guinea. These two factors combine to make the areas of agricultural productivity, employment, financial stability, along with adequate nutrition very difficult for Guineans. In terms of health care, Guineans have very little access to health care due to the lack of infrastructure and well-trained physicians. This directly affects food security. While a vast majority of the rural farming population is unable to work in the fields due to sickness and lack of treatment, the results of the crops are going to be significantly lower, which places a dampening effect on the food market. Also, countries that have control of the Guinean food market recognize the Guinean farmers unfamiliarity of food prices, which in turn decreases the amount of money earned per the amount of labor exerted. This directly affects the adequate nutrition by creating a lack thereof. If the foods can not be distributed, families and communities will continue to go without the proper amounts of protein in foods produced by the farmers, creating a severe epidemic of malnutrition. Another problem arises if a willful farmer who was been diagnosed with a sickness decides to work in the fields. Diseases carried by the farmer could be transmitted into the food, affecting all who may come in contact. Over time, this may decrease the value of the food and the reliability of the farmer. This also affects the health of those who may come in contact with the food. As far as lack of proper farming techniques, the Guinean farming techniques that are currently used are extremely outdated. The input of

labor into the crops is significantly lower than the output. This decreases food security because the farmers in turn lose financial stability regarding their crops, causing them to refrain from supporting their families or their farms, which leads to lack of employment. Regarding proper waste disposal techniques, the farmers of Guinea are uneducated in the proper disposal of chemicals as well as human waste. This has degrading effects on the environment as well as the health of the population, creating the vicious cycle one more.

The development and implementation of sustainable agricultural practices such as crop rotation, integrated pest management, and modern farming techniques to combat erosion, desertification, and soil depletion and modified pesticide use has a significantly large impact on Guinea. As previously mentioned, the farming practices of Guinea are extremely dated; so dated that the input of labor into a crop is significantly less than the economic output. These outdated techniques along with price controls damped the income of the Guinean farmers and markets. The lack of knowledgeable farmers leads to detrimental crops that are of poor quality. Given the small farm size, this leaves barely enough food for the large Guinean families to combat hunger. These less than satisfactory crops and inadequate farming techniques have a crippling effect on receiving adequate nutrition. The farmers of Guinea rarely practice biodiversity in their crops. The result is not only one of poor soil, but of malnutrition. Seeing as 84% of Guineans are subsistence farmers, they typically grow crops of citrus fruit, basic carbohydrates, and coffee year by year, therefore the meals of the farm families, the majority of the population, do not differ year by year. The diets of these families typically lacks protein and vitamin A, causing a severe malnutrition epidemic. The families can not purchase food elsewhere due to the dampening economic effect of the poor agricultural practices.

Very seldom is it that modern agricultural equipment are found in the fields of Guinea. Many Guineans still use oxen to plow their small fields, and almost always are the crops harvested by hand. Due to the lack of knowledge regarding modern farm practices, the farmers of Guinea are lessening not only their financial stability, but the environment of the country. The amount of labor exerted into the fields is an immense quantity. The lack of education and implementation of safe and modern agricultural techniques is a severe setback in Guinea. The situation is so severe that the United Nations has listed lack of biodiversity, desertification, hazardous wastes, deforestation, soil contamination, erosion of soil, and poor mining practices that have resulted in environmental damage along with many others have been ranked as the top current environmental issues. The practices of the Guineans in fields and mines alike have proven to be unsafe for the very environment that provides the country with 76% of its labor force. Women particularly are at a disadvantage concerning the implementation and development of sustainable agricultural practices. This is because women are denied education in order to better educate the men, who are said to be more significant in Guinea culture. Therefore women would be denied access to the training that Guinea would have to undergo in order to create sustainable and efficient agricultural practices.

The trends in poor agricultural practices have continued to remain at a constant low. Little improvement has been made to develop the necessary infrastructure and implement the proper educational training that is needed in order to obtain progress. However, slight progress has been made in the last 5 years. These fairly constant inferior practices are measured by production growth rate, which increased only 3% from 2009-2010, but has not increased since. The amount of progress can also be measured by the amount of yearly exports, which had remained around an approximate \$1.78 billion since 2009. These measurements indicate that the situation may be changing over a slow span consisting of many years. The measurements, although they show increase in 2005, have failed to improve in the past three years. The potential for change, however, is one of great proportions. The potential for change helps to indicate that with proper education and teacher training as well as the implementation of accessible academic infrastructure, the agricultural practices of Guinea could improve from their current state of substandard

to standard or even superior. The capacity for the field of agriculture in Guinea is unlimited so long as the proper courses of action are pursued.

By improving the amount of sustainable agricultural practices and appropriate use of pesticides, the people of Guinea could help to remove the gender bias, benefit subsistence and smallholder farmers, reduce poverty, aid in economic development, as well as the promotion of the preserving the environment. Implementing sustainable agricultural practices can assist the removal of gender bias in Guinea. With modern-day farm equipment, the girl children and women in Guinea will spend less time in the fields as tilling by hand will no longer be necessary. This opens up the girls unoccupied time and makes room for education. When the males of Guinea perceive the girls as classmates and equals, the walls of gender bias will slowly and surely disintegrate. The improvement of sustainable and modern agricultural practices will benefit the smallholder and subsistence farmers of Guinea as well. By acquiring modern agricultural tools and ideals, the farmers of Guinea will be able to work much more efficiently than with their dated agricultural practices. This not only will increase the quality of the crops, but it will allow them to make more of a profit, which may allow them to purchase more land in order to run a successful farm, seeing as studies by the University of York and Toronto indicate that larger farms tend to be more successful than farms of smaller proportions. The improved practices in agriculture will also help to reduce poverty and increase economic development. As the input of labor lessens and the output, being abundant crops of quality, increases, the economy will follow suit. Farmers and miners will export more quality crops, and as the demand for these crops grow, the economy will as well. Perhaps the most important benefit of sustainable agricultural practices is the preservation of the environment in Guinea. The potential for Guinea's environment is unmatched by many countries. From the soils to the forests to the mines, the natural resources of Guinea are superb, but due to harsh agricultural practices, the environment is being severely degraded. Deforestation, desertification, soil contamination, erosion, poor mining practices along with many others are the results of environmental negligence and neglect that contributed to the deterioration of Guinea's environment. However, with proper agricultural practices and modified pesticide use, the people and the environment of Guinea will form a peace with each other.

Major issues such as climate change, population growth, water scarcity, and pollution have a detrimental affect on the implementation of sustainable agricultural practices as well as the well-being of agricultural families and communities both present and in years to come. Climate change could destroy the potential for a successful agricultural field in Guinea, seeing as the climate in Guinea is ideal for many crops grown there. A change in climate could seriously damage the horticulture in Guinea, affecting the quality of the crops, the access and need for sustainable agricultural practice, and the financial stability of communities and families alike. With a lack of potable water as is, further insufficiency of water could damage the likeliness for sustainable agricultural techniques, as water is a key element in the growth of the crops of Guinea. The pollution in Guinea's soil and air could have damaging effects on the availability to sustainable agricultural practices. By polluting the environment of Guinea, the soil that the crops are grown in as well as the air inhaled by the people are damaged. By polluting the soil further, the quality of crops decreases, as do the prices. This increases poverty and therefore decreases financial stability for the people and communities of Guinea. By polluting the air of Guinea, less machinery and modern farm equipment will be advised. Air pollution could affect the health of many community members and farmers alike, and with the lack of accessible health care, this leaves less farmers to tend to the fields, affecting the economy of communities along with the country.

The implementation of sustainable agricultural practices will be an unfulfilled opportunity so long as the necessary measures are not taken into effect. By increasing the amount of accessible educational infrastructure and by implementing proper training for teachers, the status of the food security of Guinea will improve greatly. The increased number of educational institutions will allow more children, particularly girls, to attend schooling. This could help to end the gender bias as boys and men will see girls as equal classmates and colleagues. By attending school, children will go on to develop potential

careers in agriculture, as they will have learned proper and sustainable agricultural techniques, or potentially the medical field, improving the lives of many Guineans and allow more farmers to spend time in their fields due to the increase in quality health care. By better preparing teachers for student encounters as well as educating the teachers with accurate and applicable information, the students will learn accurate and applicable practices. A main focus for teacher training would have to be agriculture, seeing as that field employs 76% of the labor force. The teachers as well as the students will learn safe and sustainable agricultural practices and proper use of pesticides that will be passed down through generations of the close-knit Guinea family structure. Millennium development goals (MDGs) such as capacity constraints in the overpopulated forest regions of Guinea could help to implement sustainable agricultural practices by allowing farmers to increase their farm size; which, as previously mentioned, leads to more successful farms; as well as decrease the amount of pollution and contamination of soil as runoff and harmful pesticides will runoff into the fields of nearby farmers. Incorporating the practice of the MDG's goal of universal education, I find that by increasing the enforcement of the compulsory education law, which requires children ages 7-13 to attend primary schooling, an increased amount of children will attend schooling and observe and learn sustainable agricultural practices; they too will apply those practices to their farms both in the present and future.

An organization that does a particularly well job of portraying safe and maintainable agricultural practices is the Farm Lands of Africa (FLA). The goal of this organization is to bring into production substantial areas of abused farmland in areas of Africa rich in agricultural resources, particularly Guinea, with the use of modern, large-scale farming technology. By increasing the awareness of this program both in Guinea and globally, the farmers of Guinea, both present and forthcoming, will learn the important and sustainable technique of no-till farming, which minimizes the use of water and retains soil nutrients, and the production of hybrid seeds. As well as providing environmental benefits, this organization and its practices complies with the government regulations on the use of genetically modified seeds. By increasing the awareness of this program, the food security of Guinea is also bettered.

Without the aid of communities, the national government, and other organizations such as FLA and UNICEF, along with USAID that currently do and hopefully continue to help and support the implementation of these modified and proper agricultural techniques, the potential for progress in Guinea will be unfulfilled. Starting at the community level, parents and family members must encourage the attendance of schooling, which will benefit the farm along with the equity of their children. By supporting the children, the children will show desire and for schooling, which in turn allows organizations to see the need for schooling and therefore become more willing to exert funds into a project. Agencies such as UNICEF and USAID can help to provide awareness for the sustainable agricultural uses that organizations such as FLA are implementing in Guinean communities. By providing financial aid that will allow the country of Guinea to begin executing and building the necessary infrastructure and provide proper teacher training, the country of Guinea will be able to develop the infrastructure and training needed to make an impact. This positive impact continues not only in the communities of Guinea, but globally. Guinea has potential to become an agricultural superpower if only the necessary steps are taken in order to ensure this is so. The world must stop the exoneration of Guinea and instead begin giving, whether it be aid to help the country, or even more simply giving Guinea an opportunity. In order for Guinea to reach its full potential, the world must stop forgiving and begin the simple act of giving.

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