

Technologic Change in Somalian Agriculture
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The developing world now faces a disaster that threatens to take more lives than all of the natural disasters, domestic crimes, and wars currently being fought combined. Lack of food is one of the major causes of malnutrition and death in third world countries. Hunger isn't exclusive to one geographical region; it shows no prejudice in its assault on people only trying to make it to the next day. This isn't the hunger of an American teen waking up in the night for a midnight snack. That hunger lasts only for a minute until making a short walk to the refrigerator or the pantry. This is a hunger that burns the stomach with its intensity. It consumes the minds of those caught in its grip and detracts from the overall fulfillment of their happiness. The outlook is not as bleak as it seems, though. Through technological advances, the education of rural farmers and their families, and a desire to improve the world, developing countries could improve their productivity in the fields by researching crop biology and agronomic technologies. As well as improving their farming techniques, this research could result in improvements in crop resistance to disease and drought conditions. The country where these techniques would see the most benefits is in the east African country of Somalia. Being located near an ocean and being in an arid climate makes it a perfect candidate for plant genetic modification and the implementation of a water purification and transport system.

A typical family in Somalia consists of a mother and father couple with five to seven children. The adult male in the family works as a subsistence farmer raising cattle on a several hundred acre grazing area. By producing as much livestock as possible on the limited land available, most families are able to make around five hundred dollars a year in United States currency. The work involved is frequently backbreaking and requires the help of all able-bodied members of the family. By using their children as labor in the development of their family's income, the parents are denying their offspring a chance for education and hindering their chances of productive and happy lives. This remains of little importance to the children in the fields. They understand that if they don't work, their family will not collect any money. The children receive only fifty-six percent of the nutrition needed by an average human being daily. In reality, that figure is impressive compared to the amount of money used to procure the food used for their nutrition. In a family of nine, each member must live on only fifteen cents per day. The mother of the household remains at home cooking the little food to be found, raises the infants in the family until they are able to work in the fields, and performs the basic, household day-to-day maintenance. Most rural families in Somalia have a diet consisting of simple ground flour baked into rudimentary bread. Other peripheral options that rarely occur are malnourished fruits and vegetables. The crop-growing methods in Somalia have not changed significantly from the methods used by our ancestors. So little land is capable of growing crops, and farmers have had little opportunity to explore new advances in genetics, crop-rotations, no-till. Many other practices now considered standard procedure for farmers working in the United States of America have not had the option to be implemented into Somalian farming practices. The current technique for growing crops in Somalia goes little beyond digging a small hole in the ground, placing the seed in the hole, and hoping for the best. Families in Somalia are betting their futures on a practice that leaves most of the work up to chance. The toughest hurdle Somalian farmers need to jump is the initial start up costs of initializing new farming practices and purchasing new equipment to increase productivity. These farmers face a vicious cycle. They do not make enough money to purchase new equipment; they cannot make enough money because they do not have the right equipment. Without the money and equipment, Somalian farmers are unable to initiate the practices and technological advances to help increase productivity.

Through instigating groundbreaking scientific research and implementing new agronomic technologies, it is possible to decrease the impact that the Somalian land composition and climate have on the productivity of the crops grown by subsistence farmers. The techniques used now by farmers in

Somalia do not situate well with the climate and land composition. With only a small portion of land capable of being used to produce edible and cash crops, researching new yield-increasing practices and technologies will make it possible for even the smallest scale farmer to produce more than enough food to feed a family plus extra to sell for a increased profit margin. In Somalia, these possible advances for yield improvement have been left largely untapped. Through United Nations encouragement, rural residents have looked into the possibility of implementing the results of new research and technology, but most of this has been extraordinarily speculative. Most of the rural farmers realize that their current financial status places them out of range of any of these ideas. This negative attitude towards implementing new procedures provides a major hurdle for the Somalian populace to clear. By improving the number of new technological practices and procedures, it would be possible to increase the land used for sustainable crop growth. Most of the land in Somalia is currently beyond any kind of use, so it would not be difficult to transform the arid, unused land into a great opportunity to lift Somalian farmers above the poverty line, increase the quality and amount of food for each family, and provide many new jobs for the Somalian masses. By implementing these new techniques into the farming techniques of Somalia, many of which were developed by women, it is also possible this might shift the paradigm of men to look at women in a more positive light. These new techniques could show that women are more than capable of just cooking and cleaning around the house. They could be used as a powerful tool to increase the productivity of the average farming family and even develop new, unorthodox techniques to revolutionize the world's view on current standard farming practices.

The potential for agricultural growth in Somalia is almost beyond measure. For starters, of the nearly six-hundred and fifty thousand square miles of land in Somalia, only about three hundred square kilometers of it is used for permanent crop growth. Under a proper education plan, it is possible to increase the amount of land used to nearly nine-thousand square kilometers. That is the current maximum amount of land currently possible to grow crops on sustainably. A modern technique for increasing the hardiness of crops is genetic incorporation, a process that extracts the traits desired from a certain plants, and then the traits are displayed in the crops. It is possible for scientists to remove genes from plants that live in an area of non-arable land and incorporate them into the crops grown for food. With only about two percent of the land in Somalia suitable for crops now, this process would make nearly twenty-five percent of Somalia's land now available for growing crops. With nearly one-hundred and fifty-seven thousand square kilometers available for permanent crop use, the amount of food produced would increase by nearly 2500%. With that one technological advance, nearly all of the people malnourished could receive the nutrition required for healthy development. The income of each family would also increase due to the fact that they would be growing excess crops to sell as well as feeding their own family sufficiently. The amount of labor placed on each family would also drastically decrease because they could afford to purchase new farming machines and implement more expensive practices into their operation. After planting the original crops, each family would be able to work less and further their education instead of working in the fields for long hours. This improvement in agricultural sciences implemented by these farmers will enhance the total yield of each Somalian harvest. With the increase in genetic diversity of the plant, it will be able to withstand soil nutrient insufficiencies, temperature extremes, and other climatic quandaries. While the yield per acre of land planted may not change significantly, the amount of crop produced will be immensely greater than any preceding years. With these new practices put into place, it is easily conceivable that an average subsistence farmer would be capable of increasing his possible productivity farther beyond previously thought possible by scientists and land experts.

Another possible procedure for increasing yields and augmenting the arable land used for permanent crop production is water purification and irrigation. Irrigation is a popular agronomic technology where water is piped from an area of high concentration to an area where drought conditions are prevalent. Somalia has nearly three thousand kilometers of coastline as well as sixteen cubic kilometers of renewable water in underground aquifers. A new technique that should be further

researched is saltwater purification to be used for irrigation. In this prospective technology, water pumped in from the Gulf of Aden and the Indian Sea is purged of sodium chloride and transported by pipe to fields where water is scarce. The pipes used in this product would be placed on stilts in a similar manner to the oil pipeline in Alaska. This raising of the pipes allows for animals and humans alike to pass uninhibited by the essential transport of this life liquid. At first this technology would likely be expensive, but the lives it would save would make it worthwhile.

The first practice that would need to be implemented first is the water irrigation plan. Its initial start up cost would be well beyond the capabilities of any single Somalian farmer to pay for and put into operation on his own. It would require a group effort by many local volunteers and world organizations. It would be easiest for the irrigation pipeline to be built in a pattern of a tree. The widest and longest part of the pipeline would run nearly across the span of Somalia. It would serve essentially as the "trunk" of the water passageway. From this main duct smaller pipelines will branch off and form the branches. Each individual field will then serve as leaves. At the roots of this water passageway tree, a water purification plant will be needed to remove all of the sodium chloride, fish wastes, and industrial wastes from the water being transported to the fields. Most of the costs associated with this new water distribution system are one-time start up expenditures. After the initial large price tag, the only cost then associated with the project will be maintenance, and hopefully the local farmer will deal with most of the minor problems themselves. With their help, the pipelines managing body will spend less money. The genetic integration of different plant genes will prove to be a more difficult task. This process will take more than just brute force to initiate. It will take the collaboration of scientists, distributors, and the Somalian farmers to get the ball rolling. For starters, the farmers will most likely be unwilling to pay for the more expensive genetically engineered seed. With help from the seed distributors, lowering the price of the genetic seed for first time buyers may increase their incentive to purchase the superior plant seed. After the initial price break, the farmers will see the benefits of the new crops and clamor to purchase more at the more economical price for the seed distributors. Once the genetically engineered has found its place in Somalian agriculture, it will be difficult to find a producer who does not want to use the superior seed.

The Somalian government does not have sufficient funds to start up this program on its own reserves. It will need the help of volunteer organizations and the support of the United Nations. The local help needed to make sure these projects are executed properly are locally founded organizations of farmers to assist in the construction of the water duct and the distribution of the genetically engineered seed. These small, local groups will be much more qualified to handle the more intricate workings of local farming transaction. Their efficiency at this level will far outperform the ability of a larger organization, such as the United Nation, because they will be more emotionally invested in this pursuit. Unfortunately, these small organizations will not have the funding for a project of this scale. Most of the funding will have to come from larger organizations such as the United Nations. Much of this money will need to be raised through donations from the common population of most developed countries. If each household could donate ten dollars or five Euros, there would be more than enough funds to begin construction on the water purification plant, the water distribution system, and the development and distribution of genetically engineered seed. With the help of generous donations from large corporations across the planet to supplement the donations of individuals, the majority of the cost will be removed from local farmers. The United Nations will prove essential in governing and distributing the funds necessary for the project. They will essentially serve as an accountant for the duration of the construction and implementation of this plan. With luck, the inefficient bureaucracy of large organization will not inhibit this exploit.

Hunger has been the biggest threat to human life as long as people have inhabited this planet. The human race now faces a situation so unique that no other species has ever been able to make this claim. Its technologies and ingenuity have increased the life span of the average human, meaning that

there are now more people on the planet than food. By researching into genetic incorporation and sea water purification, it is possible to completely eliminate hunger in Somalia. Through future research and implementation of crop biology and agronomic technologies, the people of Somalia have an opportunity to eliminate hunger in their nation. With the help of the United Nation and donations from individual citizens and corporations, the costs of this immense project can be spread over a much large demographic. With a worldwide organization like the United Nation controlling the intricacies of a large-scale operation, this project has an increased chance to be implemented successfully. While these technologies and practices could be implemented in almost any place on the planet, the best results would be produced through implementation in Somalia. These technologies are one of many possible solutions to the food shortage in Somalia. Somalia's arable land can be increased to a size far greater than previously expected. With this arable land increase and increased crop hardiness, the overall production of edible and cash crops in Somalia will increase to a point where each family will have sufficient food and additional crops to sell as a profit. This increase in spare food and profit will result in a higher quality of life for Somalian farmers.

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