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Biofuels: Promises and Implications for Food Security in Ethiopia

Introduction

Twenty-three years ago in 1984, a desperate situation was revealed to the world. Images of starving Ethiopian children put a face on poverty for the world and drew awareness to the devastation of famine. To this day there have been few, if any, lasting results. Even though people were deeply affected when they saw these images and tried to help through donations, not enough has changed for Ethiopia. In fact since these images were shown, Ethiopia has continued to experience famine conditions with little outside world awareness. Although the government quietly tried different ways to tackle their problems of poverty and food insecurity, they have had little success. The government is often criticized for neglecting its country, and spending too much on the civil war.

Several organizations have attempted to help solve the problems, although with little success. A very visible attempt to raise funds and awareness was created by rock musician and activist, Bob Geldof. He organized Band Aid after seeing some of the horrific images taken in Ethiopia. Band Aid happened on November 25, 1984 when a group of very well known artists got together and recorded the song, "Do They Know It's Christmas." In the first week the song was released, it was the UK's fastest seller, and raised over eight million pounds. Bob Geldof soon realized that one song was not going to be enough. He then organized Live Aid which consisted of two epic concerts held in London and Philadelphia. On July 13th, 1985 some of the biggest names in the music industry performed music for sixteen hours straight, and 1.5 billion tuned in. They raised a total of \$100 million dollars. These concerts did wonders for Ethiopia, but years after it was all said and done, the country was still in dire need of help.

At the heart of the Band Aid concert was one girl who came to be the face of famine. A Canadian reporter named Brian Stewart was in Ethiopia during the 1984 famine. He came across and filmed a father preparing to bury his three year old daughter who was suffering from starvation and on her death bed. Everyone was sure that she was not going to make it. This little girl, Birhan Woldu, had a different plan in mind and fought for her life. She was considered a miracle child. Birhan Woldu is now twenty-six, and has graduated with a degree in agricultural science with hopes of helping her father who is a farmer. When Brian saw Birhan in 1984 he said; "Until that moment, I had not seen in all my time in Ethiopia one good story. One story that gave any hope whatsoever and suddenly, looking at this face, I thought if she can make it, maybe Ethiopia can make it. And maybe the world will respond." That quote gives us hope because that little girl that was once fighting for her life is now a strong and beautiful woman. That makes one think about what is stopping Ethiopia from doing the same regarding their continued battle with famine, poverty and food insecurity. The answers to many of Ethiopia's struggles can be found in the story of this girl, if only once again the world could be reminded of the devastation in this country.

Family Farm

Ethiopia has rolling hills, fertile highlands, savannahs, mountainous regions, deserts, canyons, gorges, and amazing waterfalls. There is every kind of land form imaginable. This beautiful country covers 435,186 square miles and is landlocked by Somalia, Kenya, Djibouti, Eritrea, and Sudan. Ethiopia has a population of 76,511,887 people, and these people are what make this country so strong.

A typical family in Ethiopia is composed of about six people. Traditionally the men in the family are the providers and have the most authority. Generally a person makes under \$200 a year, and about 80% of the population makes below \$2 a day. The woman's role is to be the caretaker of the home. Many

children must stay at home to help their families during the day, but some have an opportunity to go to school in the evening when they are done with chores. In Ethiopia education is not compulsory. About 57% of the children have an elementary education and about 43% are literate. This makes it hard to continue their studies to the college level, where they could be educated about improving their agricultural practices.

The diet and nutrition of these families varies from area to area in Ethiopia. In the central, northern, and eastern highlands the main food is injera, which is bread made of teff in a pancake like form. The people in southern and western parts of Ethiopia eat a food called qocho, which is a fermented stem of a false banana made into bread. The people in the lowlands mainly eat sorghum bread, porridge, or rolls. Each part of the country depends on the agricultural systems in that certain area and this influences their particular diet and nutrition.

Among Ethiopia's agricultural activity the subsistence smallholder farming sector is the most important. The farm usually covers 3 to 6 acres and provides the staple foods for a family. In the cooler plateaus they grow teff, wheat, barley, and oats, whereas in the warmer areas they grow sorghum, maize, and millet. Another type of agriculture is cash cropping, which is growing crops for sale rather than for the family's use. Coffee is the most important export for Ethiopia, but other products such as beeswax and sugarcane are also produced. The last component of agricultural activity is subsistence livestock. This is seen most commonly in the outlying lowlands. A family keeps large herds of livestock and has to migrate from season to season to feed and water their herds.

Several major barriers stand in the way of improving agricultural productivity and farm income in Ethiopia. The country has been plagued by periodic drought throughout the years, making it impossible to grow enough crops to feed families and sell for family income. Agricultural practices of the past have damaged some of the best land through soil degradation and stripped the country of land suitable to grow crops. Only 17% percent of the land is currently cultivated. Their natural water sources are very scarce, and only 1% of the land is irrigated. At this present time other water sources remain undeveloped. Families that also herd livestock have had to deal with deteriorating land because of overgrazing by animals.

Scientific Research

Conducting scientific research into crop biology and agronomic technologies will improve yields, disease and drought resistance, and sustainable agricultural systems. Ethiopia has faced serious drought conditions in recent years. During the years of 1984-2003 the country was devastated by ten successive droughts, and in 2006 the south was hit with especially harsh conditions. Work has already been done in Ethiopia to help develop tolerant, drought resistant seeds. According to Pioneer Hybrid International of Des Moines, Iowa, modifying even a single gene in the seed can improve yields and improve tolerance to drought. The first drought resistant seeds of maize and wheat were introduced in 1999 to the southern and eastern parts of Africa. Some Ethiopian farmers have received this new seed, in hopes of increasing crop yield and boosting food security. The governmental institution, the Ethiopian Science And Technology (ESTA), is working hard to coordinate, promote, and develop science and technology in agricultural research.

Current Situation

Scientific research into crop biology and agronomic technologies will lead to improving crop yield. Currently there is not enough to feed the people of Ethiopia, and certainly not crops to be used for feeding livestock, fuel, or even for sale to increase family income. The country has so much working against them with droughts, soil degradation, and overgrazing, which make growing a crop very difficult. Without improvements for crops and their seeds, the small family farmer will not be able to grow the essential things they need to live. The living situation in Ethiopia is very desperate and severe. According

to the World Health Organization figures for 2006, 38 % of the population is moderately to severely underweight. Over 50% of the population is living in insecurity, according to the World Bank Figures for 2005. This is an extremely severe situation in Ethiopia, and needs to have the world's attention now.

Deforestation and soil degradation have caused crop failures during the past few decades. Small scale farmers are some of the poorest people in Ethiopia. Women are especially vulnerable because they are less likely to have an education, health benefits, or a voice in decision making for their lives. Poverty for them means a high rate of infant mortality, households without food, and lack of education for their children. As the primary care givers of children, it is essential for women to care for their own health and nutrition, so that in turn they can provide better care for their children. Despite the many efforts to reduce poverty, the small scale farmer and rural people remain poor. The population living beneath the national poverty line has increased from 45.5% in 2000 to 50% in 2007. Improving the situation by increasing crop yield through scientific research, would mean everything to this country. Ethiopia would be a healthier country because the people would have better nutrition and money for medical care. Also, some of the crops could be used to support family income by selling them to people in Ethiopia and to other countries. A greater effort must be made to preserve the environment, so that the condition of crop soil will lead to a higher yield. Scientific research has the potential to affect agricultural productivity and farm income in a very positive way for the people. Without progress in this area little change will be made for the future.

Biofuels

Biofuel production has the potential to improve food security, and incomes for Ethiopian families. Biofuels are fuels that come from biomass or organic plant material. Currently there are not enough crops to feed the families, let alone make crops available for biofuels. If scientific research can lead to higher crop yield then biofuels will help the current situation. Crops not used for food can also be considered for biofuel production. The jatropha curcas tree has been shown to be very promising as a biofuel, with its hardiness and stress handling abilities. New research could even develop ways to use only the non-food portion of the crop, such as the stalks or the leaves. This allows the entire food portion on the crop to be used to feed families, as food always has to be a priority in such a desperate situation. Also by saving the food portion of the crop, the families could either use the food for eating or making it available for sale. If farmers were involved in producing biofuels it would mean additional jobs, cheaper fuel for themselves and help meet the demand for fuel worldwide. But as of now, fuel imports continue to drain the country's funds with an estimated cost of 11 billion birr in the 2007-2008 fiscal year. In contrast, just one decade ago, 1.5 billion birr was spent on fuel.

In spite of what appears to be slow progress in Ethiopia, exciting things have been happening within the last couple of months in the area of biofuels. A "High Level African Biofuel Seminar" was held at the end of July in which the Minister of Mines and Energy spoke of the country's biofuel strategy based on the jatropha curcas for biodiesel production, followed by the use of the castor bean. Sugarcane is the top choice for ethanol production. Currently 3 local and 3 foreign companies have started plans for biofuel operations in Ethiopia which is a big step in the right direction. This fuel can either be used by the families for their personal use, or sold to increase income.

Recommendations

Since my initial research of Ethiopia much progress has been made in the area of biofuel, by using crops that are not critical crops for food security. There needs to be continued progress by identifying additional plants that can be used for biofuels, such as millet, teff, and wheat. As additional foreign investors show interest in biofuel production in Ethiopia every promising opportunity should be examined.

With so much focus on the area of biofuel production my concern is that food security will be not be improved. In most cases the additional crops being harvested for biofuels such as the jatropha curcas tree, are not potential food sources. In an emergency famine situation this crop could not be used to feed people dying of starvation because it is not a food source. This is a country that is already suffering from extreme food insecurity. I believe that developing a hardier food seed that can be used also as a biofuel has to take top priority. Ethiopia as a whole will benefit from biofuel production as they are non-oil producing country, but not at the cost of the health of the poorest Ethiopian people.

My recommendation is to prioritize food crops over non-food crops for biofuels. Further research in producing drought resistant or tolerant seeds that can be used for both food and fuel must be a priority. At the root of my recommendation is my belief that biofuel production is only a possibility for farmers if there is a guarantee that food security will be improved. More fuel does not necessarily mean better food security. The focus needs to be on growing a food crop first and then use the excess for fuel. To grow a consistent crop in the toughest of conditions and to improve crop yield, a better seed must be developed. This seed needs to meet the challenges of drought and crop disease that threaten the leaves, and be able to fight the striga weed which is a parasite plant that destroys the food crops. Genetic research is being developed in this area to produce stronger plants and this will result in a larger crop yield. A larger crop yield means more food for the families and food security, and the excess crop can be used for biofuels which means increased income.

One crop that has the potential to make a difference in Ethiopia is sorghum. Sorghum is a very critical crop, and plays a major role in food security for the Ethiopian people. In some parts of the world, sorghum is also being used as a biofuel. If enough sorghum can be grown in Ethiopia to meet beyond the food needs it could also serve as a potential biofuel. Ethanol can be produced from the sweet sorghum variety. My recommendation is to start with food crops that have already been proven successful as biofuels and then continue research with other crops native to Ethiopia, such as teff and millet, to serve as future biofuels. Coffee is the most important export for Ethiopia, and if enough coffee could be grown it could also be used as a biofuel. In Brazil engineers have developed a way to make a biodiesel fuel from the coffee beans, that is similar to ethanol.

Another option for implementing biofuel production is to focus on the parts of the food crop which are not used for food. Examples of this would be using the roots, the leaves, the stocks, or cobs. These biomass sources have the potential to be made into fuel without touching the food supply for humans and animals of Ethiopia. This saves money for the family in terms of fuel usage, and it could be used as a source of income for the impoverished farmers, by selling it to other countries in need of biofuel.

Suggestions For Help From The Outside World

The Ethiopian government has for years tried on its own to fix the problem within their country regarding food security, but has not succeeded. Organizations such as the World Bank and the United Nations will need to better distribute their research concerning food insecurity, to groups who have the financial resources and the people knowledgeable about helping the Ethiopian families. Privileged governments can offer money and resources to educate farmers on newer agricultural practices, such as how to plant genetically stronger seeds or methods of better caring for farm land. In addition corporations who have the resources to develop new seeds should provide this information to the farmers, along with free donations of the newly developed seeds. As new possibilities arise for potential biofuels made from crops native to Ethiopia, this research should be shared with the people who live and work with the crops.

On a broader level perhaps another Band Aid or Live Aid, focused solely on helping impoverished farmers in Ethiopia, by educating the world on this country. This time the focus needs to be providing long term assistance, with the goal of producing a better seed which will have a greater impact

for improvement in the future use of biofuels. Clearly the better educated our world is about Ethiopia's unique problems, the better we can help even on the lowest of levels. Education and organizations could start in schools and communities, to increase the local awareness. High school students could get together after school or have classes available for them to take, to learn and discuss the ongoing problems dealing with food insecurity. As an example at my high school my homeroom gives the opportunity to study and learn about certain topics. This year our topic is on the Civil war, and as soon as people found out about it they wanted to join our homeroom. If students could get that excited about learning and discussing what happened in the past, think about how they will feel when they can talk and learn about biofuels improving our world today. After all high school students are our future leaders in the area of agricultural technologies, biofuels, and new super crops.

Conclusion

Biofuels hold much promise for the future of Ethiopia to improve food security, and increase the income for the average family farm. The production of biofuels has already been successful in United States, and here in Iowa people are already very aware of the use of corn for ethanol. Ethanol is an alcohol used in gasoline, which gives a cleaner burning fuel. About 46% percent of our nation's fuel supply contains ethanol. This biofuel has been important in reducing out country's dependence on imported oil, and has increased America's oil supply while lowering the cost of fuel. This has been very good for our economy as a whole. Also Iowa has benefited in that ethanol has added value to our corn harvest. Iowa farmers have experienced tough times in the past and have had to rely on federal farm programs. With the current greater demand for the corn crop the cost of these farm programs will be reduced. This is an example of what one state has done to meet food and fuel needs using different varieties of the same food crop.

The hope is that biofuel produced in Ethiopia will begin by reducing the country's dependence on imported oil, and in turn saving money for the impoverished farmer. With the greater demand for crops both for food and fuel there will be an increase in the value of their crops. This is exactly what Ethiopia needs to begin to make visible progress in improving life for those living in poverty. Due to the overwhelming challenges from drought, land degradation, and the current devastating effects of poverty, Ethiopia cannot solve its problems on its own. In 1985 a world wide attempt was made to increase awareness and improve the situation for Ethiopia, but was short lived. It is time for the next generation to come together to put their ideas into action, with the goal of having long term success. With such a desperate situation even small step by step progress will make a difference. Just as one person, Birhan Woldu, gave hope to such dismal circumstances, the same promises holds true for the country of Ethiopia with the new possibilities of biofuels.

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