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Food Security in Burundi

Nearly two billion bushels of corn will be crushed worldwide by the end of the year 2007 to produce ethanol. It is becoming clear that the need for biofuels will increasingly control crop production decisions into the future. Almost half of the United States' domestic corn supply will go directly to ethanol plants in the next few years, putting pressure on the global supply of edible crops, turning this surge of biofuels production into higher prices for processed and staple food alike around the world. Iowa pork farmers are looking at the possibility of going out of business because of competitive corn prices—where does this leave the impoverished portion of the world?

Over the past decades, many governmental and private agencies have made efforts to enhance agricultural production and lessen hunger in underdeveloped countries. For example, World Vision works to support malnourished children, the World Bank contributes million of dollars annually to the cause, and US AID has worked in cooperation with Tearfund to start agricultural extension to improve farming methods in many poor countries. Still, agricultural production cannot keep up with food needs, even at a subsistence level, let alone allow for any potential income through marketing crops. At the same time, ethanol has started requiring more starch than corn is capable of supplying and has also begun using sugar cane and cassava as a way to keep up with the demands of biofuels. This has posed a grave threat on those depending on these crops, especially cassava, which can account for nearly one-third of the calories intake of the impoverished in small African countries that are exceedingly poor and crowded. People that fall under these descriptions, for example, small family farmers in the Republic of Burundi, have a bleak outlook; this does not have to be the case. Through applied agricultural education and extension, cassava-based biofuels can have a positive impact on food security, income and land use in Burundian subsistence family farms. Let us explore a typical subsistence family farm in Burundi; the difficulties they face as well as factors that contribute to these troubles. The impact of biofuels on the farm family will also be viewed with a possible plan of action to improve the well-being of the family in question without long term outward dependency.

The basis of Burundi's economy is agriculture, most especially the crops grown on family farms. Of the three main ethnic groups that reside in Burundi, 85% are Hutus and they make-up the large majority of family farmers. The Tutsis control the government, raise cattle if they do not live in the urban areas and control most of the country's wealth, although they are only 14% of Burundi's population. The Twa make up the rest of the population and tended to roam and herd animals, but are not active in the national economy. Men in all ethnic groups are essentially in control of the female portion of the population; urban and rural women alike have suffered under discrimination for centuries. In January of 2007, laws were passed to eliminate any form of discrimination against women and different ethnic groups. Steps have been taken to admonish sex offenders, rapists and abusers of women and children. Burundians are customarily very sociable and forthcoming but human nature makes it difficult to break these discriminatory habits. Still, women are left with no rights in regards to divorce, marriage or property.

Nearly 77% of the 6.8 million people with insufficient access to food, basic social services and economic opportunities are Hutu. A typical family farm is under Hutu male control. The usual family composition is a male head of household, one wife and four to six children. Farm families are typically undernourished, extremely poor and face the constant struggle of raising enough food for just themselves. The soil is repeatedly used, worn and has lost large amounts of valuable mineral content. Farm families

depend almost entirely upon their own yield, which consists customarily of bananas, beans, cassava, corn, and sweet potatoes. A family may be able to support a small herd of cattle or other livestock, but it is unlikely that a Burundian Hutu farmer would have such luxury. Livestock and certain animal skins are signs of wealth and are possessed almost solely by the upper-class Tutsi.

Roughly one half of the country is literate, with nearly 60% amid the reading level of an American fifth grader. Most children only attend public school for five years, with the student to teacher ratio is 50:1. Of those that pursue secondary education, about 10% of the students, the student to teacher ratios and attendance duration improves. However most cannot even begin to afford education at a private school, as the per capita gross income currently is only \$700. The Tutsi assembly owns most of the wealth; this places a typical Hutu family farm with average earnings close to 130,000 francs, or 120 U.S. dollars. One of the leading factors for this low income is the exceedingly minute farming area available.

A basic farm size for a family of six is less than a hectare of land, which is equivalent to two acres. Even on this small size most subsistence family farms manage to produce a variety of products. These products include beans, cassava, corn, sorghum, sweet potatoes and bananas. Coffee, tea and cotton may be grown for export, while beef, milk and hides are produced by the wealthier Tutsi clans. Despite the exceptionally undersized amount of land a farm family has to work with, potential yield are much higher than the ones obtained in reality and countless farmers are not presented with any earning opportunities. Market access is hindered by destitute infrastructure and shortage of space to grow the products used for export.

Topsoil protection methods are not practiced and most family farmers are unaware of the uses and benefits of terrace farming and buffer strips. This lack of knowledge has become one of the leading factors contributing to the poor yield of subsistence farms. Throughout Burundi less than 49% of the territory is usable for agricultural activities. Worse yet, only 27% of this land is in use, the rest depleted by the lack of education to reformulate soil or make it proficient for producing satisfactory yields. Poor farming methods have failed to prevent erosion and have stripped the soil of any nutrients, the yield from this land is barely enough to feed a family of six. There remains little forested area due to unrestrained tree cutting to clear new prospective land for poorer family farmers, leading to threats on the wildlife populace. The Albertine Rift, for example, is a biodiversity hotspot known to contain previously very fertile soil, but the current situation shows the chemicals and nutrients have been washed away over the years. Alongside overgrazing, soil erosion is the main reason for agricultural land being diminished into marginal areas. Cattle of Tutsi farmsteads grazing on already depleted earth contribute to the nearly three-fourths of functional land that no longer grows enough food to meet the necessities of subsistence Hutu farm families. The severity of this problem has become apparent: subsistence family farms struggle to produce enough food for themselves. Poor marketing together with limited access to food outside of a typical farm family yield results in the nearly 64% ravenous Burundians under the poverty line.

Lack of education to family farmers about results from agricultural yield and sustainability research, and little access to and support for implementing methods for better productivity limits the success of a typical family farm. One project has been put into action to intensify production in the Albertine Rift, where topsoil stability is the most lacking. Starting in 2003, USAID has been supporting food security in this area of Burundi, with assistance from FAO, by providing seeds, and less primitive tools such as hoes, watering cans and wheelbarrows to a selection of farmers. Tear Fund, a partner with USAID, has formed a local association for communal support and education, led by extension workers that can pass on sustainable farming methods. These methods include fertilization, sowing in lines, intercropping, weeding, and selecting in conjunction with storing seeds. This project has helped increase farm yields by 40% and has spread improved agricultural techniques towards hesitant farming families.

In the past 40 years, two or three projects directed towards farming methods have taken place, but none with as positive and initially successful results as the Tearfund/US AID developmental project.

Agricultural extension efforts have been made in recent years; however, education on globalization issues has not been addressed in any of these past programs, although it is becoming an increasingly important agricultural issue. In North Africa and Asia, success of these extension trends can be measured in increased farm family income across the field and new participation from these subsistence farming families. Though the situation is changing in some areas, most programs are not located in Burundi and as a result of little agricultural education or research outreach, potential change is very gradual and will not reach the families with the most need. The Burundian food security situation remains the same with some areas continually worsened by field depletion and overgrazing habits.

Educating family farmers about protecting topsoil, fertilizing and earth restoration would bring this land exhaustion to rest. As education is spread, soil rejuvenation will be able to take place on the two-thirds of the land that has been deemed unsuitable for farming on account of unfertile earth. This will vastly increase the amount of potential farmland, and combined with a reforestation initiative, will rapidly decrease the threat of deforestation, directly helping biodiversity. Farm families should have access to the results of good agricultural yields, affected by developed research and provided with access and support to help implement methods from this research. A typical subsistence family farm would reap long coveted benefits of higher yields, leading to larger, more nutritious meals from improved soil and more land. This would lead to more goods to be exported for income for a farm family. With higher income comes the ability to produce higher quality crops more abundantly as the technology and farming education becomes easier to grasp. Small family farms would be able to expand and the developing economy will be able to further its maturity, increasing trade. This education factor has many guaranteed benefits. However, the biofuel aspect and influence in food security must be taken into account.

Currently, ethanol is a main focus for biofuels, whether or not it is the most efficient source of energy. Approximately 12 billion U.S. gallons of ethanol are going to be used in the year 2008, raising the price of corn to over \$5 a bushel. Though this is good news for farmers, more and more of the United States agriculture is going to cornfields and roughly half of corn produced nationally goes directly to ethanol plants. To be able to compete with biofuel plants for corn, producers of pork, cattle and poultry raise their prices, passing off the expense to the consumers. Biofuels may have even more devastating effects on the prices of basic foods in poorer countries, like Burundi, which are vulnerable to price hikes. If prices raise even 1% globally, the caloric intake of a family (particularly families that don't grow their own food) is cut in half as they rely on cheaper means to nourish themselves, habitually opting for a smaller amount of calories and fewer meals. This means biofuels have an indirect effect on progress made agriculturally in impoverished areas; raising prices of basic foods and staples cause family farmers to struggle to produce enough food to survive and sell. Corn prices have gone up in compensation, but this only really assists the larger manufacturers who can export and sell corn at a lower price for biofuel manufacture. Burundi does not even take part in this trade, so there are no possible benefits to be gained.

Cassava is an excellent source of ethanol, due to the high-starch content. A posing threat on food security in many smaller counties, Burundi included, results from the cassava-based ethanol production boom. An increasing number of family farms will struggle even more to feed themselves because cassava is the food turned to when there is nothing else to eat. It has the capability to grow in poor soil and dry conditions, can be harvested as needed and provides one-third of caloric needs to subsistence family farmers. To end the competition between for nourishment and energy production, agricultural extension must be applied in a widespread way that brings direct benefits to the families and their community. The most effective way to do this is by starting with the bottom and working up. Steps should be taken to enhance primary public education to provide children with a wide array of knowledge and skills related to

land, soil, water management and positive attitudes towards sustainable agriculture and rural life. These children will be able to pass these skills on to their families, making schools capable of acting as multi-functional learning centers and directly developing farming methods for high productivity without risk of severe dependence on an outside donor.

Primary education should contain literacy and arithmetic, basic decision making and problem solving skills, critical thinking, improved farming methods including soil restoration and protection methods, food preservation, processing and marketing skills and leadership skills. By working through children of subsistence family farmers, a firm foundation for continual growth and improvement is created. Over time the educated children become adults and have the knowledge to maintain production of adequate yields. This guarantees that better agricultural knowledge and applied research will keep on being used in the future as opposed to a sudden stop after an aid organization leaves the area or when the agriculturally educated population becomes too old to farm any longer. Additional skills and farming methods can be put in place by agricultural extension to the older, adult population. Through funding from the nearly \$150 million in ongoing support given for agriculture in Burundi, protection of topsoil from erosion and renewal of once fertile soil can begin. Crops and other staples will be grown in abundance and food accessibility will no longer be as pressing of an issue; subsistence farmers and their families can turn their focus from surviving to thriving.

With diminished dependency on cassava, the plant becomes more available for export and sale and the price of cassava will automatically increase as the plant is readily used to produce better and more efficient ethanol. Cassava production can be put into action on depleted ground immediately as opposed to waiting several years for soil to be rejuvenated, giving the solution immediate and long term results. Nonetheless, as arable land is fertilized, restored and comes into use once again, individual or communal plots should be set up for the strict growth of cassava plants, mainly for export as a biofuels, for profit to the family farms. This gives subsistence farm families a steady source of income and profit, making it possible to provide themselves with tools, fertilizer and quality seeds, thus further boosting personal agricultural success.

Another personal success and an indirect benefit from this plan results from the tradition female domination of cassava plant production. This leads to advantages never before appreciated as income producers. Very little nutritional value is lost to family farms because cassava is not rich in vitamins, minerals or proteins, being enormously starchy, and potentially dangerous eaten raw.

As the national income per capita rate increases, so will national spending and the ability to pay taxes. This will help provide public primary schools with better funds, and more reasonable student to teacher ratios. This will lead to better education opportunities, including greater attendance and the better agriculture extension through youth previously discussed. This strategy will take time to be put into action and will need carefully monitored for a while. Soon an ongoing circle will be formed and be made self sufficient by the continued use of improved farming methods, primary education alterations and cassava production and exporting sales for biofuels.

To conclude, Burundi is an example of an impoverished African nation, with less than 60% literacy rate, limited quality farmland, inadequate yields and unproductive agricultural practices. To improve agricultural production in this area, family farmers need to be educated about agricultural successes and research and have support for applying those methods to their own fields. At this time, little agricultural extension or education programs have been put into place in Burundi, although A Tearfund/US AID program has had tremendous success, including greater food security and better land protection. Not enough work has been done to make much difference nationwide in regards to improving food production, potential income or restoring the 70% of worn farmland back to productiveness. As biofuels worldwide begin to require more and more plants of high starch content, a threat brews for Africa's poor family farmers. They are looking towards hunger in their future as cassava is beginning to be used to make ethanol. Fortunately, with the correct plan of action, Burundian subsistence family farmers, as well as other nations, will be able to reap benefits from these demands.

Through applied agricultural education and extension, cassava-based biofuels can have a positive impact on food security, income and land use in Burundian subsistence family farms. By teaching school children better agricultural practices, families are directly influenced with the means to have better yields and start soil restoration. With this addition farmland and adequate food supplies, more cassava is able to be grown, allowing it to be exported for sale to ethanol plants and create a steady source of income to subsistence family farms. This income enables the family farms to finance better crop productions and help develop the economy, assisted by agricultural extension funded by the \$150 million given to the country for this purpose. This action helps increase income earned and taxes paid allowing for enhancements in the school systems. This gives more children opportunities to be educated and continue the trend of agricultural extension into a self-sufficient ongoing circle, and in this way, providing much needed food security in Burundi.

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