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Maximizing Land Efficiency in Madagascar

INTRODUCTION

Madagascar is a country afflicted by food insecurity. This problem is most concentrated in the agricultural population. It is imperative that changes are made to provide an adequate food supply and reduce poverty in this growing population in order to improve food security. The agriculturally based society of Madagascar depends on producing the most food or profit from their limited amount of arable land. Improved planting methods and usage of nonfood biomass or exported products to produce biofuel could be used to increase the total amount of food available to the population of Madagascar. These factors can provide food security to the agricultural sector where extreme poverty is most prevalent. By increasing the amount of product rendered from the land, Madagascar will benefit by an increase in food security and lower amount of poverty.

Madagascar, as an island country with a limited amount of arable land, would benefit from new technologies allowing more to be gained from the current amount of land without deteriorating it over time. Access to technologies and knowledge are necessary to implement changes to allow for a greater yield. (Giles, p24) By using more recent farming methods and technology, staple crop production could increase tremendously. With better infrastructure for irrigation and storage, high yield seed varieties, and fertilizer, food security problems would be reduced due to the higher yield of staple crops available to the Malagasy population.

The United States and other international organizations wishing to provide aid should direct their assistance to rural farmers. Providing teaching about efficient farming and making more productive crops available will increase yield. Also, building infrastructure to produce biofuels from sugarcane could allow for more money to be rendered by the land. Genetically modified seeds can be provided, which can produce a greater yield. Infrastructure for irrigation could be greatly improved. (Giles, p4-25) In order to effectively aid the Malagasy population it is important that these resources and technologies are in the hands of the people and not in foreign investments. This will help ensure that profit gains and are indeed benefiting the rural poor.

BACKGROUND INFORMATION

Madagascar is one of the most food insecure nations in the world, requiring large changes and aid in order to meet the Millennium Development Goals set by the United Nations. According to IFAD, 71.3% of the island lives below the poverty line and food scarcity is most common in the rural areas. Increasing food availability and income to farmers is key. 80% of the islands population lives in rural areas which supports the country's agriculturally based economy. These families live from subsistence farming and barely produce enough food to feed their families. (USAID, ¶1) In these rural areas, 76.7% of the population lives in poverty. (IFAD, ¶3) As income and crop yield to the agricultural sector of Madagascar increase, food security to the rural poor will also increase.

The need for a sustainable increase in production per hectare continues to increase in importance as the population booms. Madagascar, as with many developing countries, is sharply increasing their population. The population of Madagascar doubled between 1970 and 1995, which caused a 40% drop in income per capita. (IFAD, ¶1) Only 5.3% of the land of Madagascar is currently farmable, and this limits agricultural expansion. (FAO, table1) According to the Food and Agricultural Organization of the United

Nations, data from 1990-1992 showed that 35% of the population of Madagascar was undernourished. 10 years later, the percent of undernourished people increased to 37% due to the population increasing from 12.3 million to 16.4 million during this timeframe. This shows that population growth is outpacing growth in food production efficiency. This trend must be reversed to assure food security in Madagascar.

The people in the most need in Madagascar are the rural farmers. A study done by the World Bank showed that growth in the agricultural sector was better at reducing poverty than industrial growth. (FAO, p9) Most farmers own their own land, on average about 1.5 ha in size. (IFAD, ¶4) This small amount of land supports a large family; the average Malagasy woman has 5 children. Health care is insufficient and only available to a fraction of the population. Over half of all births in Madagascar are done without a doctor. (UNICEF, ¶2) This leads to an infant mortality rate of 5.7%, with 15% of children dying before the age of 5. (CIA, ¶3) (Hunger Project, ¶2) With such large families, most are dependant on a small plot of land to produce enough food to feed themselves. Income beyond the amount sufficient to feed the family is uncommon.

Rice, as the main staple crop on the island, is a primary source of calories for many of the Malagasy population. The crops most commonly grown in Madagascar are rice, sugarcane, vanilla, and coffee. (CIA) Rice, which is 45% of the agricultural output, is usually consumed on the island, whereas sugarcane, vanilla, and coffee are usually exported. (CIA) Improvements in crop yield, especially rice, would lead to greater food security directly or through more export potential. Also, exporting cash crops and trading for food and capital goods is a factor in feeding the Malagasy population. Major export partners include France, who controlled Madagascar as a colony up until 1960, and the United States. Import partners include France, China, and Iran. (CIA)

Land to grow these crops is usually obtained from slash and burn agriculture, which quickly destroys the large and biologically diverse rainforests of Madagascar. (Butler, 20) Rice is grown on the newly exposed land until the soil is depleted, when corn or manioc are then planted instead. This method of production has been outlawed in Madagascar, which led to assistance from the Millennium Challenge Account, a program of US Aid. (Butler, ¶21) Although this helps offset the interruption in farming methods, the rural farmers must reestablish farming methods where soil can be reused continually for crop production.

CROP YIELD EXPANSION

The inability to obtain more land is currently an issue among Malagasy farmers. Large families must sustain themselves from about 1.5 ha of land, and new laws prevent them from using slash and burn agriculture, a method that was previously used commonly. New planting methods must be established along with other improvements through technology and education which allow for more crops to be produced from the available land to sustain these families.

The climate of Madagascar only allows certain crops to be grown well, which determines the direction of progress made in increasing land efficiency. The main crop produced on the island is rice, followed by sugarcane. The rice is consumed on the island for food while much of the sugarcane is exported.

Rice, which comprises around 45% of the crop production in Madagascar, is currently being produced at about 2 tons per hectare using current farming methods. In trials, up to 9 tons per hectare of rice have been produced using more modern methods including fertilizer, genetically modified seeds, and control over irrigation. (Giles, 24) This can also be contrasted by China, who produced approximately 6.28 tons per hectare of rice in 2005, over three times the current production of rice by Madagascar. (Sandene, 1) By improving irrigation systems and giving access to new crop varieties, land can be used

more efficiently. This will benefit the rural poor of Madagascar who have a limited amount of land due to competition. (Giles, p29)

Other methods of increasing crop production are using fertilizers and improving irrigation. Soil fertility and access to irrigation water are major issues in Madagascar. Solutions include education on composting, use of fertilizer, and improving irrigation infrastructure. Current groups have educated farmers on composting and irrigation techniques with the goal of improved yield. IFAD has also done work to repair and improve irrigation systems, a step that will help improved crop output. (IFAD, ¶2-4) Fertilizers are rarely used due to the lack of animal waste. Crop cycles and other planting methods could be used to maintain nutrient levels in the soil without dependence on fertilizers. Irrigation is a key factor to increase food production. When rains come later in the season, burning is more common. (AHI, ¶3) With better irrigation systems, this would assist the farmers in dealing with new laws that stop slash and burn agriculture.

Soil conservation is an important part of insuring a continual crop cycle. Currently, as labor increases without a significant increase in land, hillsides are being used more frequently. Erosion is commonly seen in these areas due to outdated planting techniques. (AHI, ¶2-4) This is another opportunity for planting education to improve crop longevity and yield. Tilling methods can be taught, leading to less erosion and more longevity in hillside land for crop production.

USAID currently assists Madagascar by supplying better quality seeds to farmers. This has helped farmers by allowing them to produce a greater crop without harming the environment. (USAID, ¶3-7) Improved seed distribution is an effective way of allowing a continual increase in yield. Currently, many farmers use older seed varieties which are less effective. Unfortunately, newer varieties are expensive. (AHI, ¶12) Assistance in obtaining more efficient seeds either financially or by supplying seeds will assist food security for those families.

BIOFUEL IMPLEMENTATION

Implementing biofuel production in Madagascar could reduce food insecurity by allowing the farmers to gain more use of the land. This would be accomplished by either making a product that is more expensive on world markets or by using the nonfood biomass left after crop production. Because many Malagasy farmers live from subsistence farming, producing biofuels from staple crops could lead to price inflation and increased food insecurity. Care must be taken to not interfere with current food supplies if biofuel production were to be implemented.

Sugarcane is a commonly grown cash crop in Madagascar and is commonly used in other countries for the production of biofuel. In many cases, the biofuel produced can be much more profitable than selling the raw product of the sugarcane. Because most of the sugarcane is sold as an export, competition between exporting and consumption will not raise food prices. On the contrary, increased agricultural export profits will lead to an increase in food security due to the increased spending on food imports to gain access to crops less easily grown in the hot climate of Madagascar. Kara Laney explains the possibilities of increasing food security by producing biofuels:

If biofuel feedstock prices follow the upward trend of oil prices, farmers in developing countries could see increased returns for their energy crops. As nearly one-half of the labor force in developing countries is employed in agriculture, this boost in income could have a significant effect on the purchasing power of rural people. Even those farmers not selling feedstock directly to the biofuels market would benefit from the lift to commodity prices. In this scenario, biofuels could address some of the poverty in developing countries. (Laney, p12)

The production of fuel from biomass could serve as a useful expansion to the economy by either increasing the worth of exports or producing profit from biomass that is currently unusable. With improved access to technology Madagascar could use raw materials, such as sugar, that are currently exported and convert them to biofuel to increase profit.

Biofuels offer risk diversification and can be produced when more profit would be made from the ethanol product than the basic sugarcane produced in Madagascar. (Laney, p7) Depending on the market, sugarcane or ethanol could be more profitable to produce and sell. With the proper facilities and road infrastructure for transportation in place, farmers could choose to sell their export products for the most profit, either directly as sugar or to a biorefinery, whichever offers the highest price due to market demand.

The climate and crops grown by Madagascar are suitable for a system of biofuel production. Rice, the main staple crop, is less efficient than sugarcane, which is currently used in Brazil. (Xavier, p1) Sugarcane is an efficient source of biofuel, producing 6500 Kg of oil per ha or 7225 liters per ha. (UN Dept. of Economic and Social Affairs, p37) This makes it an ideal crop for biofuel production. It is also an export crop, so food security in Madagascar is dependant on the amount of money made from the export, unlike rice where it is directly consumed.

The United States currently maintains a large obstacle to ethanol production for export. As the largest market for these fuels, they currently have a 54 cent tariff to protect its industries. (Laney, 10) This is harmful to the ethanol industry because it limits profit in ethanol countries. If these tariffs were to be lowered, the ethanol industry could more easily expand, benefiting many countries with the capabilities to produce ethanol or biofuel crops for profit. This is relevant because the United States and France are by far the largest consumers of Malagasy export products. With the ability to export more freely to these developed countries, biofuels could be used to increase export profit.

Major imports include capital and consumer goods, petroleum, and food. (CIA) By increasing the amount made from export products, more capital and consumer goods could be purchased, along with more food. Both of these would help improve food security by allowing access to more farming tools and having more food for families to consume. Many Malagasy produce only enough food to feed their family, so if it increased land efficiency led to surplus and capital, the benefits would be numerous. Better access to technology and capital products, savings, and a better lifestyle with less food insecurity would result.

Similarly, because petroleum is currently imported in large quantities, there is a possibility for a fuel production market to flourish in Madagascar. According to the World Bank, developing countries will require more energy as living style increases. If biofuel were used to provide energy, money spent on energy imports could be reallocated to food or capital goods. The national market would likely increase due to the nature of growing countries using more energy.

CONCLUSION

Madagascar stands as one of the most food insecure nations in the world and has insufficient resources to feed its rapidly growing population. With a limited amount of land, improving production is a logical step to solving food security. While educating the population about planting methods and implementing plant based fuel production may aid to solve some food insecurity in Madagascar, the acute nature of the problem suggests that a culmination of many factors over an extended period of time will be necessary in order to truly remove poverty from Madagascar. By using these methods to improve the amount of total food produced on the farmable amount of land in Madagascar, the ability for rural farmers to feed themselves and their families will be strengthened.

If biofuel production is implemented, the rural farmer should be the chief beneficiary of the increased export potential, allowing them to purchase materials and food in order to increase their income and food security. In order to minimize increases in food cost, non food biomass or export crops should be used in order to produce the biofuel instead of the staple crop, rice, or other direct food sources. Using the stalks and other biomass is a viable option because it increases profit without taking away from any food source. Also, goods such as coffee and sugarcane that are sold to food secure nations could also be sold for higher prices to these same countries in biofuel form. In order to increase food security in the struggling nation of Madagascar, aid must be focused on giving the rural population the ability to feed and provide for themselves continually.

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