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Madagascar, Factor 17
Madagascar: Food Security in the Face of Disaster

"Living things have been doing just that for a long, long time. Through every kind of disaster and setback and catastrophe. We are survivors," said Robert Fulghum. This quote directly relates to Madagascar; the nation has survived numerous catastrophes, but the citizens still survive and continue to live on the diverse island. Madagascar has enormous agricultural potential with over two-thirds of the population involved in subsistence farming. For years many Malagasy have survived on their land and the surrounding waters, however, the low agricultural productivity limits food availability for both consumption and for generating income. The most vulnerable populations are affected by many reoccurring natural disasters, which affect all aspects of food security: infrastructure, integrity of land, crops, and the livelihood of the population. As Fulghum said, disasters will continue in Madagascar, but the Malagasy are survivors.

The man who has saved over a billion people, Norman Borlaug, believed, *"The destiny of world civilization depends upon providing a decent standard of living for all mankind."* Poverty is one of the major causes of food insecurity in Madagascar. Over three quarters of the twenty million Malagasy live below the national poverty line of less than one U.S. dollar per day. Poverty remains overwhelming in rural areas where eighty percent of the population lives and depends on sustainable agriculture. Malnutrition remains a major problem in Madagascar. The World Food Program (WFP) reports over fifty percent of children under the age of three suffer retarded growth due to a chronically inadequate diet. Child malnutrition is much worse in disaster prone areas because so many families are dependent on the crops they grow, consequently when disasters strike, there isn't a way to obtain food. Disasters affect many Malagasy, around fifty percent of the population experiences transitional food insecurity, particularly during the lean season.

Madagascar is a land of farmers, agricultural products accounts for eighty percent of exports. The Malagasy usually work as a family to farm their land because the average family size is fairly large, around seven people. The primary crops are not that which a family can eat, exports, like coffee, vanilla, sugarcane, and cloves. Yet many people live off their land by producing staple food like rice or maize. A day without rice is impossible in Madagascar. On average each Malagasy eats 350 pounds of rice yearly. As the population grows the demand for rice increases by as much as 30,000 tons a year. Sometimes this demand cannot be met and rice must be imported. Many people who are too poor to buy imported rice and resort to eating other starches like maize and cassava. Malagasy also raise cattle, in the 1990s the total cattle equaled the number of people in Madagascar, however, in 2005 the FAO Livestock Sector Brief showed a significant drop in a variety of livestock due to drought. Despite this, many Malagasy still raise Zebu cattle, sheep, goats, pigs, and poultry. It is also common for the Côtiers, or people who live on the coast, to fish in the coastal lagoons. The typical life in Madagascar is that of religious subsistence farmers who spend time with their families.

The impoverished are particularly vulnerable to weather-induced risks because they have little with which to rebuild. In times of scarcity, it is impossible for the impoverished to avoid food insecurity. Madagascar's geographic location makes the nation susceptible to many yearly natural disasters. These disasters strike all regions of the country, and affect food security by affecting crop yields, destroying infrastructure, and causing farmers to resort to destroying the land to produce crops. The natural disasters that have already affected Madagascar include: cyclones, drought, floods, and locust infestations. In the past thirty-five years, over fifty natural disasters have been reported; in total they have caused damage estimated at 1.6 billion US dollars and affected more than eleven million people.

Cyclones have regularly hit Madagascar for quite some time. In February of 2011 the Tropical Cyclone Bingiza hit many regions of the nation. Two days after the storm, the Madagascar National Bureau of Risk and Disaster Management (BNGRC) reported that the cyclone killed fourteen, affected over 80,000 people, displaced 19,000, and damaged or destroyed 18,000 houses and 9,000 hectares of rice fields. A more destructive storm affected Madagascar in March 2010. Tropical Cyclone Hubert affected more than 97,000 people and flooded 50,000 hectares of farmland. These factors led to mass food insecurity. When cyclones hit, the majority of the nation is affected because many crops are lost, hence the population must buy more expensive imported food. It is extremely difficult for the impoverished to rebuild because they do not have the money or resources to do so. The infrastructure of roadways, homes, and educational facilities are damaged during cyclones; everyday aspects of life disappear. Post disaster, Madagascar must ask for relief from international organizations because it does not have the supplies or money necessary to handle rebuilding independently.

Drought is another reoccurring natural disaster. In the past, drought has caused famers to use a method of farming the Malagasy call Tavy, or slash-and-burn. Tavy is an agricultural technique, which involves smaller trees and brush being cut down and left to dry, then burned just before the rainy season. Rice requires large amounts of water to cultivate, consequently it is difficult to produce rice during the dry season. The only way to ensure a safe crop during times of drought is to use Tavy because the crop cycle for slash-and-burn is shorter than for irrigated rice; so the rice is harvested before the dry season begins. Tavy can be useful, but in the long run it has harmed Madagascar in many ways. The land cultivated must rest for ten to twenty years to regain the nutrients that were used up by the previous crop. In the past, farmers allowed the land time to rest, but as the population increased more farmland was needed. As a result, the farmers were not able to give the land the time it needed, and land that was once rich with nutrients is farmable. This caused farmers to resort to using Tavy for planting. Using slash-and-burn makes the nutrient rich soil loose or tilled, so every flood washes the precious topsoil away into the Indian Ocean. Farmers have used the Tavy method to ensure a crop of rice during times of drought, but they have made it impossible to continue cultivating the land until it restores itself. The Malagasy know they are using up the only land they have, but Tavy is the main way they grow food. There is a Malagasy saying, *"Without the forest, there will be no more water, without water, there will be no more rice."* In order to sustain the Malagasy need for rice, a new drought resistant method of farming rice must be found to save the farmlands nutrients.

Drought also affects the quality of farmland and the food security in Madagascar by causing groundwater overdrafting. Overdrafting is the process of extracting groundwater beyond the safe yield of the aquifer. Overdrafting can cause land subsidence, or a loss of support below ground. When water is taken out of the soil, it collapses and drops, which makes it impossible to continue using the soil. It is extremely important to stop overdrafting groundwater in Madagascar because according to the Central Intelligence Agency (CIA) World Factbook only six percent of the land is arable. Natural disasters like drought cannot be prevented but people can learn to cope with them.

Madagascar experiences major flooding every rainy season, especially when cyclones hit. These disasters affect the infrastructure vital to food production and transportation; roadways fail under extreme conditions. It is difficult to transport food during the rainy season in Madagascar because the roadway system hardly exists. Over ninety percent of the total roadway system is unpaved and can turn into mud when it encounters rain. Importing staple foods and exporting many of the primary crops is essential to balanced food security, however, the infrastructure must be improved to transport these goods in a timely manner. Roadways are important in achieving food security, and rebuilding them every year becomes too costly. In addition, floods have destroyed approximately 90,000 hectares of agricultural land. Using the slash and burn method of farming has made it possible for floods to wash away valuable nutrients within

the soil, causing the land to be non-arable. Disasters like floods make it impossible for an impoverished nation to obtain self-sufficiency.

Many subsistence farmers residing in drought-prone and food insecure areas of Madagascar could lose their entire livelihood if locusts were to destroy their crops. Most locusts will damage green plants, usually cereal plants, when they are still seedlings. Locusts attack seedling rice mostly during the summer months. In the past, swarms have eaten crops down to the water line, even at later growth stages. When locusts attack crops of rice, they eat around 100 kg/ha/day. In June 2011, the Food and Agriculture Organization (FAO) reported a buildup of locust populations in southwestern Madagascar will endanger the livelihoods of thirteen million people unless proper actions are taken. Estimates state around 300,000 hectares of locust-infested territory must be treated between November 2011 and May 2012 at a cost of $7.6 million to secure Madagascar crops. The FAO Locust Officer, Annie Monard said, *"We must break the locust population dynamics to prevent further developments that could affect the island for years."* Locust infested fields take many years to recover before the land is arable again. The last large-scale locust infestation of Madagascar was in 1996 when over twelve million hectares of crops were lost. Measures must be taken to prevent a similar catastrophe from happening once again; the citizens cannot afford to lose their only source of food or income.

Natural disasters occur worldwide, but typically a nation's government can alleviate problems these disasters cause. This is not the case in Madagascar. There has been political instability in Madagascar since its independence from France in 1960. An article from the Cable News Network (CNN) stated in 2009 a power struggle between the President, Marc Ravalomanana, and the opposition leader, Andry Rajoelina, resulted in violence killing over 150 and injuring around 1,000 others. The political crisis also affected vulnerable urban populations through increased unemployment, rising food prices, and limited government support for public sanitation and social services. United States Agency for International Development (USAID) noted households in affected areas were employing coping strategies, including selling livestock or other assets to purchase food. The instability of the government makes it impossible to deal with disasters when they strike. In Madagascar natural disasters are expected, so the government must find a way to handle each disaster, and they must have a stable government to do so.

There is no way to prevent cyclones, floods, drought, and locust infestation, but there are better coping strategies. In order to help Madagascar establish food security, United Nations (UN) agencies and Non-governmental Organizations (NGOs) must prepare specific plans to overcome the effects of these disasters quickly. There are many strategies that have been used in the past or that are currently becoming available to aid with reoccurring disasters in Madagascar. Employing these strategies will also help the UN achieve many of the Millennium Development Goals: to end poverty and hunger, to improve child and maternal health, to achieve environmental sustainability, and to achieve universal education. Madagascar must develop a global partnership with many relief organizations and other countries to face the disasters to come their way.

Knowing disaster will occur makes planning relief easier. Cyclones cause food insecurity in Madagascar yearly; cyclones are predicted to occur at least once a year between December and April. The World Food Program (WFP) should have stocks of food aid, preferably stocks of rice and canned vegetables, positioned in Madagascar for the next hurricane season. Planning relief is necessary due to the poor condition of the road network during the rainy season. Having pre-positioned stocks will ensure a timely response to protect the most vulnerable populations from falling into further poverty. In order to better cope after disasters, there should be general food distributions, food for work, and nutritional rehabilitation programs for malnourished children and pregnant women. Targeting women and children for rehabilitation will help with the Millennium Development Goals to reduce child mortality and to improve maternal heath. In the midst of disaster, organizations like the WFP and NGOs can help with the development goals; preparing supplies for disasters will help to eradicate extreme poverty and hunger.

The programs mentioned will be a temporary process called 'food for recovery' which is food provided for people while they rebuild damaged infrastructure and replant the ruined crops. Damaged schools will be rebuilt to educate the Malagasy, which will help to raise the nation's seventy percent literacy rate and move toward the UN's goal of achieving universal primary education. Organizations like the WFP and other NGOs will be very helpful in the aftermath of disaster, but Madagascar must find a way to begin dealing with these situations independently because the disasters will continue. Until the Madagascar's government becomes stable, the population affected by disasters should continue receiving international aid.

To further guarantee sustained food security during drought alternate ways to make crops prosper besides Tavy must be used. Tavy was deemed illegal by the government, but many farmers still practice this method of farming despite penalties, including imprisonment. In order to stop the harsh affects of Tavy Madagascar must work with the local police to imprison those who continue to practice Tavy. The farmers who practice irrigated rice cultivating or other less harmful farming methods should receive government stipends until Tavy is eradicated in the nation. The stipend these farmers should receive is a new drought resistant strain of rice. In 2009 this new variety of rice called Sahbhagi dhan was used in India. This rice showed very positive results in the test field by tolerating up to twelve days without rain. Sahbhagi took researchers fifteen years to develop; it is designed to survive the dry spells that occur during rice cultivation. The success of the strain lies in its ability to take moisture from the deeper layers of the soil, its resistance to pests and diseases, and a sturdier stem that doesn't bend. In a British Broadcasting Corporation (BBC) article farmer Gulab Mahato of Lupung, India says, *"There's no water even in the village pond this year. So how do we sow our crops? But with Sahbhagi, we can wait for another 15 days. Even if it rains a little bit, we will be able to get some rice."* Producing this strain of rice in Madagascar will make it possible for famers to cultivate rice during the dry season without practicing Tavy. The government should enable the use of Sahbhagi by providing free seeds for a season. After witnessing the effectiveness farmers will continue purchasing the strain of rice, and crop yields nationwide will rise.

The Malagasy also need to find a solution to avert groundwater overdrafting. The simplest way to prevent this dilemma is to stop growing crops during the dry season so the groundwater can restore itself, but this is not a probable solution in Madagascar. The population is too large to omit a growing season. Another possible solution to prevent overdrafting is called 'groundwater recharge'. This process involves capturing rainwater run-off and using it to refill aquifers. In order to achieve recharge, dug-wells have to be built to capture the water during the rainy season. The water will be used on crops during the dry season so the plants will not overdraft the groundwater. The groundwater overdrafting in Madagascar is not nearly as complex as it could be in the future, therefore starting the recharge now could prevent problems that overdrafting would cause in Madagascar. By eliminating the use of Tavy and recharging the groundwater, Madagascar will be on track with the Millennium Development Goal to ensure environmental sustainability. From past seasons it is predicted that Madagascar will have horrific drought every three years, therefore the Malagasy must prepare for ways to overcome the future disasters. \

Floods affect food security in many ways, but the most significant way is the affect on the roadway system. The superlative, and most expensive, way to help improve this issue is to build better, paved roadways. Communities in Madagascar rallied for roads and USAID responded. The program USAID initiated has already helped to rehabilitate 460 km of secondary roads by working with road-user associations who manage and maintain the new roads. The rehabilitated roads have made transportation costs drop, which has helped farmers increase their incomes and overall farm production. The first completed project estimates that the famers affected by the roads have marketed 1.2 million US dollars of produce more than before rehabilitation. The roads have also opened up access to health and educational services. These efforts will help address the nation's food insecurity and bring at least a twenty percent rate of return. Continuing similar projects is imperative to Madagascar's food security. Another solution

is to find a new way to store crops until after the rainy season has passed, or to only cultivate crops with a long shelf life. If the crops stay fresh for longer periods of time, they could be transported and exported to other nations later in the year. Farmers should plan to plant crops that grow in water during the rainy season. Planting other crops can be harmful because the floods ruin many varieties of crops, which ruin the farmers' livelihood and food security for that season. There should be pre-positioned food aid for the rainy season in case crops are destroyed, similar to preparing for cyclone relief. Floods can cause as much damage as cyclones so there must be a relief system to help the Malagasy recover and rebuild without worrying about food security.

Locusts can severely alter the balance of food security in a small amount of time. In order to avert this, locusts must be monitored to plan attacks against swarms and save crops. The best way to monitor the locusts is through the FAO's Desert Locust Information Service (DLIS) in Rome, Italy. This organization monitors the weather, ecological conditions, and the locust situation daily. DLIS receives results of survey and control operations carried out by national teams in affected countries. They combine this information with satellite data, rainfall estimates and seasonal temperature to assess the current situation and forecast the timing, scale and location of breeding and migration, up to six weeks in advance. The situation assessments and forecasts are published in monthly locust bulletins. These are supplemented by warnings and alerts to affected countries and the international community. FAO also provides information and training to affected countries and coordinates funding from donor agencies in case of major upsurges and plagues. When the DLIS spots a build up of locusts, many steps must be taken to rid the area of these pests. National teams are formed and trained by the FAO to spray insecticides, or a new biopesticide that is based on fungus, over the infected area by helicopter. The teams usually act during periods of time that correspond with the rainy season because that is when locusts primarily breed. A new biological control product has been under development for over ten years. This product, called Green Muscle, is based on a naturally occurring insect-infecting fungus. This fungus is widespread throughout the world, and it is applied the same way chemical insecticides are applied. It can infect many groups of insects without harming humans or other mammals and birds. This fungus cannot kill the locusts as quickly as chemical insecticides. It can take up to two weeks, therefore, it is mainly used against locusts that are wingless and at the early stage of their lives. The best part of this biopesticide is that it does not affect other vital species in Madagascar. The campaigns against locusts are extremely costly. One campaign lasting seven months runs around $7.6 million, but this cost is minimal compared to the damage locusts could cause. Preventive control is the best and most cost-effective way of dealing with locusts in a sustainable manner.

All of these ideal scenarios will hopefully become a reality in Madagascar. Having the ability to handle disasters like cyclones will make it possible for people to rebuild what they lost and create a stronger nation, insuring food security during times of turmoil. Building better roadways will make it possible to transport food throughout the nation all year, even during times of flooding. Reestablishing a system of irrigated rice over Tavy and recharging the groundwater will improve the quality of the land the Malagasy constantly use. Using different methods to prevent locusts infestations will ensure the security of thousands of acres of crops. All of these solutions are costly, but with global partnerships and a stable government it is possible. Helping Madagascar fight the catastrophes in the future will make the U. N. Millennium Development Goals come true in one more deserving country.

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