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The Republic of Mali, Factor 2

The Republic of Mali: Increasing Food Security by managing water scarcity through a combination of improved farming techniques and water conservation methods

“From here to Timbuktu” is a common saying, but what exactly is “Timbuktu”? “Timbuktu”, or actually Tombouctou, is a town on the edge of the Sahara in Mali. Tombouctou was originally a French colony. With the French Foreign Legion it became the practice that if you happened to not be well-liked or if you had happened to upset one of your superiors you would be stationed in Tombouctou. (The place was considered boring because there were no exciting wars going on there at the time.) From 1894 to 1960 Tombouctou was under the reign of France, but finally in 1960, Tombouctou has become part of *The New Republic of Mali*. Even after Mali had struggled and fought to gain independence for the country from Europeans, in the 1960s there were still short skirmishes where Mali struggled with internal civil war and border skirmishes. This was until the Tuareg coalition and Mali both signed a peace agreement. Mali was and is still one of the largest countries of the Western Africa region, but also one of the poorest (Brook, 55). Mali is poor because almost two-thirds of it is the Sahara desert, and outside of the river valleys, there is little food that can be produced in Mali. Mali is primarily an agricultural country, producing grains like sorghum, rice and millet, as well as a little cotton for export, and some livestock including chickens, goats, cattle, and camels. (USAid). While salt and gold have been traded for industry, many mineral resources are untapped, and more agricultural products and small businesses are used to help stimulate the economy and increase food security (Brook, 18). Mali has had several crop failures and human and livestock famines, especially in the middle third of the country (the Sahel region) due to drought (Di Piazza, 2007) Because of this, Mali faces a water scarcity problem that needs to be addressed through a combination of improved farming techniques and water conservation methods.

I first learned of Mali and the problems that the country has faced when a Peace Corps volunteer named Tara Powell told me her experiences in Mali. Tara worked for two years in the Sahel, or middle third of Mali, in 2003 and 2004. She told me stories of the struggle to have enough food and water, malnutrition, what the people were like, how she felt, and how the people reacted to her differences and her reactions to theirs. One of my favorite stories from Tara is when she first visited the village to which she was assigned. When she was presented as a volunteer to the village, a goat was slaughtered for a feast. How wealthy you are coincides with how often you have meat; because she was assigned to a poor village, Tara could not refuse such a high honor. Tara took the plate of goat meat offered to her, even though at the time she was a vegetarian, because it would have been culturally rude to refuse such a feast! Right there is an example of the culture and learning that mutually the villagers and Tara had to learn about over the next two years. Tara helped to change some of the crop raising ideas, including introducing alternative crops such as squash and tomatoes, and introducing a community chicken coop. In return, the people of the village helped change her perspectives on diet, including the grain of choice, millet, spread with a fermented onion sauce on top, and showing her the value of meat. Change is hard for everyone “...but everyone seemed ready to try something new.” It is this mutual trust and respect that we must build on as new people step into the job of helping the Mali people grow or improve crops. (Powell)

A typical family in Mali is Muslim (90%), with a life expectancy in the mid-fifties. The average woman will have between five and six children in her lifetime. (CIA, 2010) The women are usually married between the ages of 14 to twenty and a dowry is paid to the woman's family. Though you do need to have a registered marriage license there is no specific way to get married. Since religions in Mali are a mixture of Muslim, tribal and Christian traditions, the way that people get married can vary from ceremony to ceremony. Children help their parents with everything, including watching the younger children so

parents can tend crops. Because of this children may not always get the finest of educations, and only about 46% of the population can read and write (Di Piazza, 47). Still, people everywhere in Mali understand that education is important and things are beginning to change. The people in The Republic of Mali are hard-working people as most of the people work in agricultural businesses from mining and ranching, to fishing, and crop farming. Subsistence farming, or growing just enough to feed your family, is practiced by almost 80% of the population. Everyone in Mali helps each other out no matter what is happening as a matter of culture. If there is enough food they will try to share, if there is enough water they will share. (Brook, 49)

The landscape of the terrain in Mali affects the way that resources are used in Mali. For example in the Sahel, or middle third of Mali, crops can be grown and cultivated because of the water and seed resources that are close by. Mali's landscape has three parts: the northern top third is called the *Sahara*, which is in fact in the Sahara Desert. No crops are grown in the Sahara. We then have the *Sahel*, which is Arabic for "shore", so it is not a coincidence that the Sahel is all along the shore of the Niger River. It is a semi-desert area that forms a belt separating the Sahara desert from the southern third, and the landscape allows crops to be grown along its shores, and as far out as water can be carried.. Generally the southern third of Mali is referred to as *The South* by the visitors to Mali. (Di Piazza, 10) The South is a fertile savannah, so it has the least problems when it comes to farming and water. This makes the population in the southern third of the country more dense than in the Sahara, but in the Sahel the land is more fertile after the floods in the rainy season. Both of these areas have periods where malaria, transmitted by mosquitoes, causes problems. In particular, young children often get sick from malaria, and when combined with malnutrition, it can be fatal. Since almost half of the population is under 14, Mali has one of the highest child death rates in the world (CIA)

The soil near the the Sahara is sand, and unworkable. In fact, over 60% of the land in Mali is desert or semi-desert, and much of the other is a sandy silt, left behind by flooding. (WFP) Cultivating land is sometimes done by slash-and-burn methods, which takes land covered by grass and burns it, and the stubble that is left and turns it into the soil as a type of fertilizer. In times of droughts, this method can make the soil worse. (N'dJim and Bakary) Because farmers grow food by hand, without large amounts of chemicals, locusts and other insects can destroy crops and grazing lands. (Di Piazza, 60) Too much water in a rainy season can cause diseases and fungi that can grow on plants and infect livestock. These problems on a large scale would be a threat to the whole of Mali.

Everything in Mali depends on water. The Niger and Senegal rivers provide surface water for irrigation and crops, but only 12% of the surface water is being used for irrigation. While there are lots of water holes in the country, these often have silt from agricultural runoff and the water is murky and unsafe for human beings to drink. Cholera, river blindness, malaria, and diarrhea are all problems that occur as a result of this situation, and can cause high death rates among vulnerable children and older adults. There are only about 3000 wells that have been dug in ways that could be called 'potable', even though there is a lot of water that could be drilled. Only about .2% of the surface water is tapped in this way. (N'djim and Bakary).

Cotton, millet, rice, corn, vegetables, and peanuts are all crops that are grown in the country. They need what every plant needs; air or more accurately, carbon dioxide), light, nutrients, and water. The varieties that are grown in Mali are different than those grown in North America, and many would benefit from being adapted to be fortified with nutrients like Vitamin A or to need less water, but it is still important for the crops to have a suitable amount of water so that they may grow well. (Birmer et al) Having the plants grow to full maturity can be essential to the families that then sell the crops so that they will have enough to live on for the rainy season after the harvest. This is why water is very important whether it is during the rainy season(mid-May to October) or the dry season (November to June). Water amounts can vary

from year to year because of uncertain weather (USAID) Few Mali farmers are able to afford machinery, or irrigation equipment to do their farming, so instead the farmers use hand tools and buckets , including hoes, rakes, buckets and shovels. During Tara's time in Mali, she lived on the north side of the Sahel, and could see the Sahara desert. When she was not working on the Poultry Project or one of the other education projects around the village, Tara would watch and help the people in her village. They would gather water in buckets and hand water each of their plants in the field (millet and onion) whenever the plants' soil around it became too dry. Without the efforts of all the people who live in the area, the harsh environment of Mali would not allow people to survive. (Powell) Mali, with one-third of its land composed of Sahara , struggles yearly with food security due to droughts. This, added to a lack of materials for export, a local economy, and a three percent population growth rate, can make survival difficult (CIA). Even people who have food may not have sufficient nourishment, as almost 49% of Mali children suffer from stunted growth or muscle wasting (Birner et al, 192) In a drought, people try to survive using what they have around them, even if it has no nutrition..

Almost everyone, or at least 80% of the people in the rural parts of Mali farm , as they have to farm for their families to survive. (Di Piazza, 60) The World Food Programme of the United Nations (WFP) and the Famine Early Warning System Network, or FEWSNet (USAid) work in Mali. Since many of the years are bad years, and the droughts add uncertainty to some factors such as the economy, water, and food, these organizations and other charities work to help people grow food sustainably and provide a safety net of sorts.

That is why there is malnutrition in the country of Mali, for many of the years are bad years. The droughts add to some different factors; the economy, water, and food. The food that the people of Mali eat is mainly cassava root (which has little nutrition value) millet, rice, onions and other vegetables, peanuts, fruit like melons, papayas or mangoes (fresh in the South or dried fruit in the Sahel and Sahara), whatever meat they could have, including fish, chicken, or goat meat (Di Piazza, 60). Tara told stories of how her mom would send a food package each week, and how every three weeks the Peace Corps would pick her up and take her to the nearest city, Tombouctou, to make certain she didn't become ill or lose too much weight. Both the climate and seeing the food the people of the village survived on changed her attitude about food, and a vegetarian diet—she ate, like the Mali, what was available.. Then when Tara tried to share some food from home the people of the village surprised her, for they rarely liked it. "Who wouldn't like macaroni and cheese?" Tara exclaimed when she told me about sharing her food. And yet we in North America take food for granted. (Powell)

How can we make Mali less vulnerable to water scarcity? Since we cannot control the weather, we need to control access of water to people. We need to create drinkable water wells and use current watering holes for potential irrigation. (N'dJim and Bakary) This simple step could help eliminate much of the water-borne cholera and diarrhea that makes up a major health problem. We also must look at the irrigation itself.

SRI, or System of Rice Intensification, was developed by Cornell University in New York. SRI is a way that the Republic of Mali could become more self sufficient, but what is SRI and what makes it different? SRI is a method of farming rice that increases rice production and raises the productivity of land, of labor, water and capital all by using a planting methodology. The method uses less seed, less water, and produces more rice than traditional methods. The SRI system has been tested all around the globe, and as long as you follow the production strategy correctly, any variety of rice will work, including those that may be fortified with nutrients. It is the process of how you go about growing the rice that changes. How it works is quite simple, and can be used with the hand tools that most of the people of Mali have available. In most places that people grow rice, they first till the ground then spread the seed, but seed is expensive and the way that they spread seed (by hand) is not always the most effective land use. This is because when you simply scatter the seeds there can be many plants all together with not enough growing

space, as well as spaces with almost no seed on it that are bare. This is a waste of space and when there is not always enough food for everyone this can also be a terrible waste of edible seed. (SRI)

SRI is a way of growing rice that uses less water, less seed and increases production. This method has been tested globally but has not been put into the mainstream practice in very many places. Instead of using the traditional way of growing rice, the method has people growing seedlings instead of actually spreading the rice seed into tilled ground. When the rice plant is transplanted it is very, very young--somewhere between eight to twelve days old. The farmers create a hill to put the seedling in. Only one seedling is placed in each hill. This is to avoid root competition that can lead to weaker plants. By planting the seedlings in a grid pattern, the plants have plenty of room to fully develop to create the best harvest. The spacing of each square at a minimum should be 25 centimeters by 25 centimeters. With SRI the most important thing is the soil, which needs to be nice and aerated, and at the same time kept well-drained and moist. Plants get most of their nutrients from the soil, so when you put fertilizer or manure on the soil, nutrients are given back to the soil that previous plants may have utilized. While using the SRI method it is best to use natural fertilizer; manure and compost are both very good all natural fertilizers. Since the fertilizer is putting in extra nitrogen and organic matter, the yields are usually higher in the crop production and the fertility rate of the soil goes up. When there is a high production yield of crops, of course, weed management will be an issue, as weeds will tend to come to where the best nutrients are. Since this strategy does not use the flooded method to keep down weeds, it is important to watch for them, and this is what the farmers must do. Keeping down weeds in a normal arrangement of crops may be a problem, but with SRI it can be much simpler. According to the SRI instructions it is a good idea to have a rotary hoe, or individual hoeing to aerate the soil on the sides of the planting grid. There are two main options that can take care of the weeds. There is of course the traditional way of keeping down weeds which is to pull them up by the roots, or there is a rotary hoe. A rotary hoe that could be hand-pushed and kept by each village would be an improvement in the Mali agricultural fields. A rotary hoe chops up the weed, then pushes the weed back in the soil so that the weed will be used for compost. The SRI method uses 50% less water than traditional rice growing, and was first introduced in Mali in 1999. In 2007, it began to be adapted to wheat growing in the Timbuktu (Tombouktu) region. (SRI, 2010) By 2005, rice began to overcome millet as the primary grain of choice. (USAid)

In conclusion, the future of Mali depends on effectively using the resources that Mali has. Mali has used its water for a small amount of hydroelectric power, but has not concentrated on getting drinkable water into the rural infrastructure (N'dJim and Hakary). A typical family would not have electricity, and is unlikely to have clean water. This needs to change, but because Mali is one of the poorest countries in the world and struggles with debt (Di Piazza, 59), it will take a concentrated effort and non-governmental partners, including religious charities, the Peace Corps, the United Nations, and USAID, among others.

Since Mali's birth rate is so high, at a rate of 2.5%, the Mali government and its partners must provide access to clean water and nutritious grains in the long run to make Mali's infant mortality rate go down. This rate is one of the highest in the world, and a typical family will live below the poverty level, and the children born will have a 12% chance of dying before their fifth birthday. Additionally, the family members have a life expectancy only in the fifties, which makes it one of the lowest in the world because of lack of nutrition and medical care and water-borne illnesses (CIA 2010). The only good news in this statistic is that this is up from an average of 41 in the mid-1950s (Brook, 51). Additionally, we must continue to look for sustainable ways to grow crops, including utilizing surface water that is not drinkable, and choosing crops that have been enhanced through convention breeding and/or genetic breeding to meet the dietary needs of the people of Mali (Birner, et al, 193).

Until the Mali people know to move from slash-and-burn agriculture to more sustainable agricultural practices, desertification will continue to spread. This process of change has already begun to happen, specifically using the SRI method first developed by Cornell University and adapted across the globe.

The SRI method of growing crops and education about the dangers of slash-and-burn desertification are improving life for the typical Mali family. Now the method is being adapted for other crops across Mali. (SRI) Water scarcity will continue to be a potential threat for livestock, especially those animals far from a waterhole or a river tributary, but this has been a threat that is long-standing from the 1970s onward (Di Piazza, 60) As people in Mali move into urban centers, drinkable water supplies for them will also be necessary, as well as a good sanitation system that doesn't drop sewage back into streets or the water supply. Over 30% of Mali's people now live in urban centers, making their living in markets, clothing, music, industry, or the arts. (CIA, 2010) This economy is fragile, and without a stable food supply coming in from the country, it could easily collapse. As of August 2010, there was adequate food security for Mali for the year to come; it is the goal of people interested in Mali's future to change that from a year-to-year struggle to a constant reality. Water management is crucial to this goal.

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