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### **Fighting Water and Sanitation Issues in Sudan**

According to the World Food Bank, “Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Oshaug 2). Food security means that all food is nutritious, and holds all the vital items needed to maintain a healthy body. Located where the White and the Blue Nile converge, Sudan sits as Africa’s largest country, consisting of 600 million acres, 200 of which are arable. Farming makes up 50 percent of the country’s gross domestic product (GDP). Sudan’s use of the Nile is tremendous, as this powerful river decides the fate of the large agricultural sector of the country. Water use has affected the farmers, since it keeps the farms alive. These rural families depend on irrigation to have enough food to survive another year, and more, so that they can drink. The Saharan landscape keeps the land dry, and the trenches off the Nile, the irrigation systems, keep most off their agriculture alive. This water though life bringing, is not clean. Traveling through the country, a person sees small families; father, mother, children, and the grandparents. Families surviving for centuries, try to keep the family together. Families have been devastated by war, and put out on the streets, homeless. The war in Darfur spread many Sudanese out, as they fled the area where a factor known as the “Sudanese Genocide” occurred (“War in Darfur”). Peace talks seem to be doing nothing, as the battles still happen, and resources are still limited. This war between the people seems to never end, but is slowing (“War in Darfur”).

For many, a rural family in Sudan consists of the father, mother, children, and grandparents. The family works together in harmony on the farm to get food for each other (“Sudan”). The father figure works on the farm all day, and it is his job to take some of the crops to the market to trade for items the family needs. During the day, the mother figure stays in the house, doing daily chores. She cleans the house, cooks the meals, and takes care of the children, when they are not in school. The children attend school only sporadically, as the education system in Sudan is not exponential (“Sudan”). This small system of education compares nothing to the education that is available in the United States (“Sudan”). In some areas, educational institutions are not even available Sudanese children. Even with the lack of the high quality education, many of these subsistence farmers have a literacy rate of about 60 percent (“Sudan”). When the children are not attending school, they have chores of their own. Children tend to the livestock and are responsible for going out and getting water for the family.

The family has to be careful about sickness and disease. For the most part, many of the country’s physicians are concentrated in more urban areas, as with many of the major hospitals (Central Bureau of Statistics). Surveys indicate that roughly half of all Sudanese have access to the proper health services needed. The accessibility of these services is dependent on where the family lives. Relief organizations, such as the Red Cross, have supplied medical services, as well as hospital services to areas not close to Sudan’s medical facilities (Africa). Medicines are not readily available to the citizens either. These agencies are the life-givers to the Sudanese. Their support and help saves many people from the ravishing effects of Measles and Rubella (Red Cross of the United States).

Typically, a farm grows two major products for the Sudanese culture. Sorghum, a grass type plant, is one of the major crops produced in the country. The uses for sorghum consist of flour, sugar etc. (Central Bureau of Statistics). A cereal grain, it makes most of the crop grown on the fertile soil of Sudan. The ease to cultivate is one of the reasons this grain is grown. The second major crop grown in Sudan is another grass known as millet. Millet, by definition, is a cereal grass, *Setaria italica*, extensively

cultivated in the East and in southern Europe for its small seed, or grain, used as food for humans and fowls. Millet is one of the main items grown for food for the Sudanese. Their growth of millet makes up another large part of the crops grown on their fertile soils. These crops are the main use in sale and bartering for the family and earn most of the income for the family.

Subsistence farming is highly popular in the sub-African country of Sudan. Most of all rural farmers participate in this subsistence farming (“Sudan”). These farms range in size from one acre to five acres. Farmers use two types of farming. One type is Irrigation Agriculture. The typical irrigation farm uses pumps to transfer water many miles from the White or Blue Nile River, as well as gravity flow. In fact, the irrigation sector of Sudan totals more than two million hectares out of about eighty-four million hectares that are potentially arable (“Agriculture in Sudan”). The waters of the Nile River have served the Sudanese people for centuries. The annual flood of the Nile caused the nourishing effects of the river to fertilize and water the land for use in the coming growing seasons. The historic way of getting these waters to the field included the Shaduf, a device used for raising water, and waterwheels, which lifted the water to the fields (“Agriculture in Sudan”). These methods are being replaced by other means of transport, such as the pump, and gravity flow. The main mechanism of getting these irrigation systems to work is by the flow of water. It is the law of nature that water flows downward, and with the use of gravity, these irrigation systems harness that natural fall of the land to transport the water. It is still known that though most water uses gravity flow, still about one-third of the irrigated area is serviced by pumps (“Agriculture in Sudan”). Irrigation systems have taken a big hit over time, and still are trying to recover. The drought that affected Sudan in the 1980s, cause a crushing loss of water and made supplies for the irrigation systems obsolete (“Agriculture in Sudan”). Though dams have been built, and water transit systems have been put in place, the country’s water resources have never fully recovered, but are climbing. The second farming practice helps irrigation systems as well as the farmer. Natural rainwater fed system harnesses the rains to grow the crops. This form of rain-fed agriculture is common to most of the rural Sudan farmers. This rain crop not only saves the farmer time on carrying and getting water to the crops, but in this Saharan landscape, it saves spending money the farmer doesn’t have to water the crops.

In recent years, crop yields in Sudan have dropped due to extended droughts and other environmental issues. While most crops grown in Sudan are naturally adapted to arid climates, the country would benefit from research investigating crop varieties with high drought resistance, and implementing these crops throughout the country in smaller farm communities where irrigation is rare (Agriculture in Sudan). Few crops are capable of being grown by subsistence farmers in Sudan, so biological and nutritional diversity is limited, leaving farmers subject to crop failure in the event of drought, disease, or pests that target one of their crops. Without access to improved crop varieties, the farm communities that are common in Sudan suffer from poor productivity. Currently, several organizations are attempting to remedy the issue of poor resistance in crops to drought and disease, with some organizations implementing improved farming techniques that trap water and others aiding in research and implementation of improved or genetically modified (GM) crop varieties suited to Sudanese agriculture (Agriculture in Sudan).

With poor water amounts, the major focus today is the quality of water, as well as the sanitary conditions that the family lives in. Officially, 30% of Sudan’s population doesn’t have access to clean water (“Water & Sanitation”). Mostly, the people who suffer from these inequalities live in rural areas, like our farm family. The inability to clean and safe drinking water can cause Sudanese people to suffer great diseases, some ending in death. Sudan is home to 70% of the world’s cases of guinea worms (“Water & Sanitation”). These guinea worms, scientifically known as *Dracunculiasis*, move their way down into the leg a foot area and then cause blisters that have a burning sensation. It is believed that when a person puts their foot in cool water to relieve the pain, the worm senses the temperature change and emerges to release larvae into the water. There is another disease that affects the Sudanese happens in children. Studies have shown that approximately 34% of Sudanese children under the age of five experience severe forms of diarrhea, which can lead to death (“Water & Sanitation”). This deadly disease causes the person

not to be able to get the nutrients into the body, as well as liquids, and causes dehydration and ultimately death.

In recent years, the situation in Sudan has improved. Statistics from UNICEF (United Nations International Children's Emergency Fund) show that in the year 2012, Sudan has hit many major goals in the process of helping to develop a supply of clean water and a proper way of disposing of waste (UNICEF). These major goals consist of supplying clean water to 2.5 million people for the first time; ensure access to sanitation facilities to eight-hundred and sixty thousand people, and to reach ten million people with information about personal hygiene (UNICEF). These new improvements show the rest of the world that Sudan can help their citizens in fighting diseases, and poor living conditions.

Improvements in the availability to clean water, as well as improvements to sanitation systems, have helped Sudan in many ways. One way it has helped is with the situation of the guinea worm (UNICEF). UNICEF projects that complete eradication of guinea worm cases will happen by the end of 2013 (UNICEF). The total eradication of these parasites puts a new light on living in Sudan. People will not be as sick because of proper precautions given out to stop these infestations. Another way that improving these water situations has helped the people is the carrying of water to the house. Women have to haul water from long distances each day for the family (Culture in Sudan). As one gallon of water weights 8.34lbs, this can be a lot of weight that the woman has to carry for miles back to the house. She carries her water on her head, balancing the 5.2 gallon jug perfectly (Culture in Sudan).

There are other issues that play into the problems in Sudan. The main problem is a change in climate. Sudan has been affected by major drought. This lack of water has caused the adequate supply of groundwater to almost become extinct (Water & Sanitation). The villagers, who depend on wells to water their family, have had to start making the long trip back to dirty river water so that they can survive. Wells are the main source of clean, easily accessible water to the people, and without groundwater to supply these wells, they run dry, and the people aren't able to reap the benefits of the well (Water & Sanitation).

There are many different projects out in the world that try to help these types of situation. The main focus is on getting these people clean and safe water. One important program that I have found, and believe can be grown upon easily, is PUR water purification packets. These little packets, called PNG water purifiers, take a crystalized substance and cause dirt and other foreign substances to fall to the bottom of the container, where the clean water can be drained off and served to the community (CSDW). This project can be scaled up by just getting the packets out to the people. I think that handing out these water purification packets would be easy enough, and training the people to do it would not be hard either. Overall, these purification packets seem to be the most logical and most inexpensive way to help get clean water to the people of Sudan.

The challenge to this method is getting the PUR packets to the citizens in Sudan. Many organizations have partnered with PUR and their project Children's Safe Drinking Water (CSDW). These organizations assist with donating and collecting financial capital to support the PUR packets. There are also organizations that help with the implementation of PUR packets (CSDW). Service organizations such as the Samaritan's Purse and Africare, go out into the world and distribute the packets. The CSDW announced that there are approximately thirty organizations that have partnered directly with PUR, and many more that are distributing within those organizations (CSDW).

Along with the challenge of getting the packets to Sudan, people have the struggle of getting the packets directly to the people. One way that is being used to get the packets to the citizens, is going out to different villages and giving out the packets. A more efficient way could be to deliver the packets to one area where many villagers filling their water containers. Water could be cleaned in bulk so that many

villages have clean water and service workers don't have to track villages down to get their packets. This could also help with distribution costs, and could be easier to distribute clean, safe drinking water.

Back to our family, who has made great strive in their day. This family could use these packets easily, and they are readily available. The typical family could bind with others in their community and use the packets to make large amounts of clean water that the whole community could survive. The family will survive, and they will live because they use these packets. Easily and readily available, the traditions of the family will go on, generation after generation, all due to this simple little item, clean water.

Water and Sanitation are a major problem in Sudan. Their people suffer, as well as their economic stature. The country starves to bring good, but with war ravishing the rural setting, they have to find ways to survive. Their clean water supply, as well as ability to remove waste should spark a fire in every nation in the world. This country in the middle of the Sahara still manages to live on. I think that with the projects present in the world, Sudan should have no hunger, no death to unclean water, and proper sanitation. The purification packets, new sewer systems, and well programs that are supported all over the world help to bring hope to the Sudanese, but hope is not enough. There are new technologies, and people that need to go out and help to stop these ravishing events. Children dying, people crying, the harm goes on and on. The family's farm barely produces anything, but the family still survives. The family works hard to get things done, but it isn't enough. People from every sustainable country need to go out and help to build a better future for those who can't help themselves to build a better civilization. Overall, all people could help to stop hunger and death in Sudan. Peace to Sudan, and help from the rest of the world. Norman Borlaug said, "The destiny of world civilization depends upon providing a decent standard of living for all mankind." Let's help the world, and save Sudan.

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