

Emily Murrill  
Giffit Hill School  
St. John, USVI

Niger, Factor 2: Water Scarcity

### **Niger: The Use of the Niger River and Soil Conservation Techniques to Preserve Water and Soil Nutrients for Both Niger and Surrounding Countries**

In the country of Niger, located in North Africa, the potential for food scarcity is constantly a source of fear for all, from local farmers to high-up government officials. With constant climate change causing a risk of lowering rainfall and over nineteen million citizens, a population growing at almost a four percent rate per year, the realization of the true scarcity of food is plenty of reason for panic. Due to the growing scarcity of water due to climate change, food is beginning to become harder and harder for farmers to grow and maintain. A typical family in the country of Niger is made up of a father, approximately four to five children, and his wives. This means that there is a large amount of people to feed and grow food for, especially for people who rely on sustenance farming as their main source of crops. The average family's farm size in Niger is 4.16 hectares, and sustenance farmers grow sorghum, millet, rice and cassava on this land to feed their families. These farmers have livestock to tend to as well. These animals and crops all require lots of water, and the climate change is taking a toll on the yield of crops. Two million people are currently being directly affected by food insecurity with malnourishment and starvation, four million are at risk of it, and millions of others are affected by the food shortages in the lean season - the period between harvests that lasts from May to August. And along with the constant conflict of surrounding countries caused by the low amount of resources being forced across Niger's borders, the population has increased by five-hundred thousand. Eighty percent of Niger's citizens are working in the agricultural industry, which means that this water shortage that is limiting agriculture is bringing low income to farmers and their families. This leads to malnourishment and even to the inadequate income lowering a child's funding for education. As Gary Eilerts put in an article titled "Niger: Not a Famine but Something Much Worse" for "Humanitarian Practice Network", "Niger's deadly famine-like crisis is driven by decades of chronic, extreme poverty that has undermined the ability of individual households in the community to participate effectively in the economy that surrounds them." All lives in Niger are controlled and driven by the presence or absence of food, and Niger's food insecurity is near famine-level.

There are many causes for food scarcity in Niger, but the main source of this is the ever-growing problem of climate change, which brings irregular rainfall, desertification, and the rising and falling of temperatures. The rainy season only last from July to September, so it has always been short in Niger , but with climate change there is never a true and accurate estimate of how long it will last. Along with this, adequate soil for farming is limited. With desert sands and dunes taking up over eighty percent of the country's land along with hills in the north and planes in the south, this leaves only twelve percent of the entire country to land that is arable. This land accumulates mostly in the tropical climate region of the extreme south and surrounds the Niger River basin, and this area is what needs to be focused on. As Governor Jay Inslee of Washington state said, "We're the first generation to feel the impact of climate change – and the last generation that can actually do something about it." While there is always a way to affect climate change, irreversible damage will be done if there isn't action taken now. The uncertainty and irregularity that climate change is bringing is only going to increase in the future, and that is why

people must start fighting against it, especially the countries in Africa that are beginning to feel the weight of food and water scarcity. The reason for Niger's food insecurity is water scarcity, and the water of the Niger River is the key to beginning to win the country's battle with hunger.

The Niger River is a center of life, with one-hundred million people living around its basin. The Niger River is a crucial tool to the survival of Niger's people, as well as the other countries surrounding the river such as Mali, Benin, Nigeria, and Guinea. Due to extending over four thousand two hundred kilometers and measuring up to be the third longest river in all of Africa, it is the main source of water to the people of these five countries. Without this river, these countries would have little to no access to water other than rainfall in the short rainy season. The Niger River and its tributaries provide a lush and tropical climate for crops, grazing animals, and fish catfish, Nile perch, and carp. This region also experiences more rainfall than other areas of Niger – around six hundred millimeters during the rainy season. This area and climate is ideal for crop growth.

Crops that are capable of survival in Niger's harsh desert climate are few and far between, but there are still a few that farmers grow. Niger's principal crops are pearl millet ( yields seventy bushels per acre), sorghum (yields eighty-eight bushels per acre), and cassava (yields ten tonnes per hectare). The fast-growing varieties of millet and sorghum are crops that experts from The United States and the United Nations are urging farmers to produce. The crops grown for commercial export and sold by merchants and agribusinesses are cowpeas, onions, garlic, peppers, potatoes, and wheat. These are the crops that local farmers also grow to both sell and feed their families, but the dry environment makes the task of farming difficult. But, if the country begins to start growing these crops by the Niger River, yields would increase due to the better soil.

As mentioned previously, only twelve percent of Niger's land is arable. This means that the soil must be conserved as much as possible. But due to the small quantity, Niger's soil has been overworked, stripped of the nutrients and the little water that has been absorbed from rainfall. If this continues to happen, all of Niger's arable soil will be completely stripped of its nutrients, and the problem of the country's hunger will cause extreme damage to its population. Niger's River basin and banks are filled with alluvial soil during the drier months when the lack of rain has lessened the size of the river. This soil is filled with nutrients and moisture and wonderful for crop growth. However, while growing crops on the Niger River is a great place to start producing more crops, this needs to be done with caution. The soil must be preserved and taken care of, and it cannot be overworked. This can be done by using soil conservation techniques that could be introduced to the farmers by those that have already been using these methods on their own land. These techniques will aid in reducing soil erosion, making the most of the amount of soil, preserving nutrients, and conserving water.

One of these soil conservation techniques is known as no-till farming. This is a technique that grows crops without the use of tillage, which exposes the soil to the air and promotes evaporative loss. With no-till agriculture, remaining crops are not plowed down at the end of the season, but instead are left as they are. This prevents the soil from being tossed around and exposed to the elements. This also adds to the amount of water that seeps into the soil, which would be extremely helpful for Niger's agriculture. This soil conservation technique also cycles nutrients in soil, prevents erosion, reduces the use of fossil fuels, and increases the variety of life on and below its surface. This will increase the profit of crops as well.

Another method that can be used for the conservation of soil is the practice of terrace farming, or “terracing”. Terracing uses the topography of land to slow water flow through a series of terraces. It also prevents water from gathering speed and washing away soil, keeping the soil in place while letting the water run through the terraces through channels and openings. The terraces are formed by carving flat areas into a hillside, and blocking the runoff of water and soil by surrounding them with mud. This is another wonderful way to reduce erosion and conserve water. And due to these advantages, this method of farming would be a great method to use in the Niger River valley.

Another great soil conservation technique that is very similar to terrace farming is known as contour farming, or contour plowing. This method plows grooves into the farmland, then plants the crop furrows in the grooves that follow the contour and shape of the land. It is a very effective and efficient way for farmland on slopes to prevent runoff, and increase the number of crops while at it. So, rather than planting in straight, vertical lines along the contour of the landscape, this method plants up and down hillsides to create pathways for water to flow. This way, the maximum amount of rainfall can be distributed to the crops. With Niger’s unpredictable and scarce rains during the lean season, this method would help farmers make the most of the sparse rainfall.

Another method is known as crop rotation. This method is done by growing different types of crops in sequenced seasons, and is done so that soil is not used for only one set of nutrients. The use of crop rotation is vital because it reduces erosion, preserves soil nutrients, and increases the yield of crops. Growing crops in the same place over long periods of time will deplete the nutrients in the soil. With rotation, a crop that soaks up a lot of nutrients can be followed with a crop that restores nutrients in the next harvest.

These soil techniques would be extremely helpful for preserving the nutrients of the alluvial soil that is especially prevalent when the river isn’t as large during the drier seasons. But when the river is larger, the alluvial soil is mostly covered by the river as its size increases. And if there wasn’t enough rain during these periods, it could be the worst times for crop growth. This is a time when farmers should be careful in choosing which crops to grow so that they can produce the highest yields. One of the types of crops that could be used are crops that are known for growing in particularly harsh environments. Women in Niger are usually given poor plots of land to garden from their husbands and have begun to develop crops that can be grown in poor soil conditions. In addition to pearl millet, sorghum and cassava, two of the main crops that are currently being grown for this purpose are okra and malahiya. There is also the option of drought-resistant crops, or “resurrection crops”. This area of agriculture consists of plants that can sense a drought coming, will shrivel up, and rainfall will then be able to revive them in a matter of hours. As Lucas Laursen wrote in his “TED Ideas” article “Grow Plants Without Water”, “They lack water-storing structures, and their niche on rock faces prevents them from tapping groundwater, so they have instead developed the ability to change their metabolism.” These crops can grow in unideal conditions, and it is becoming a well known fact that these crops are an asset to struggling farms. For example, the International Maize and Wheat Improvement Center, the Monsanto and the African Agricultural Technology Foundation, and others have worked together to come up with fifteen water-efficient maize varieties. These organizations have stated that they will soon distribute them to small farmers. The use of these varieties of drought-resistant wheat could potentially increase crop production by thirty-two to thirty-six percent by the year 2050. These types of crops could be used as a precaution when farmers know that conditions might not be the best, and would still keep the production of crops stable.

With these different soil conservation techniques and special types of crops growing and taking place around the banks of the Niger River, there will be a high number of crops being produced. This means that the farming around the river would offer jobs to the citizens of Niger that are living in the basin. They could make a profit and receive either currency or a percentage of the crops that they produce. This would create an economy for the country's people, and this economy could grow to become steadier for the workers in the future if it continues as a success. This would add to the agricultural industry, so Niger's citizens would not be reliant only on small, local farmers and merchants for their crops. The workers would be provided with a job that could help in supporting their families, making them secure and helping to pay for other things that are needed, such as funding for a child's education. This method of using the Niger River and soil conservation techniques is not just helping preserve water and soil, but is helping the citizens as well.

The Niger River valley is located in the extreme south of the country, and there are still villages in the northern areas. This means that the produce must be transported from the river to the people using vehicles. Trucks would be given to the farmers, and would be driven to the villages up north. This would be especially vital for regions that experience irregular rainfall and bad soil. This would also provide jobs for the drivers. Niger is considered one of the least developed countries in the world. Using vehicles would mean having to build better roads for the truck drivers, and this is a step towards more economic development in the country. In addition, it would help the government as well.

In Niger, the country's government is struggling with its power and influence amongst its people. Local tribes, mainly the Ijaw and Ogoni, are desperate to gain more power, and the government is suffering because of it. But, with this new addition to the economy, it gives the government something that they are able to control. Besides the large uranium industry, there are only a few other industries that are sustainable enough for the government can gain profit from. With this step in the agricultural industry, this could provide funding to the government, which can be used to give back to the communities as well. The crops produced would aid both the government and its people. But, this program is not something that should be done locally. It should be done regionally with the countries surrounding the Niger River basin.

By using the Niger River to grow crops, this could create an additional profit for the country and populace. But, the opportunity does not end here. The Niger River does not only run through the country of Niger. It also passes through four other countries – Guinea, Mali, Benin and Nigeria. These four countries also experience their own droughts, desertification, and irregular rainfall. Niger could take this as an opportunity to spread this method of using the river as a source of arable land for agriculture to the other countries. Niger could turn their method into a program. The countries could work together to profit from this river's resources. The organization known as "The World Bank" states that the countries surrounding the river's basin are even "...seeking solutions to clean, renewable energy for electricity." So in conjunction with the other countries along the river, Niger could even begin to build dams to regulate the flow of water and harness hydroelectric power. These five countries could begin to form an alliance, as well as trade with each other and build a stable economy. As Major General Collins Ihekire, Executive Secretary of the Niger Basin Authority, stated, the countries could "...pool their resources to develop the watercourse and the resources of the basin, which individually they would not have been able to do."

In conclusion, Niger is a country that has faced many challenges due to climate change, and the Nigerien people are seeking solutions. As for Niger's food scarcity, it is all a matter of its water scarcity. The people of this country simply cannot count on the irregular rainfall caused by climate change, and most of the country is made up of harsh desert. By only surviving on the rainy seasons, farmers can simply never know when the next rains will come and how long they will last. With the Niger River, there is a solution for this. This river is the country's *only* real and consistent source of fresh water and fertile soil. This means that it is the most ideal place in the country to produce crops, and these crops can be grown on a large scale. Using the Niger River, however, is not the only way this country can steady its agricultural economy. The river basin's rich soil must be preserved and taken care of to make sure the nutrients are not lost. By using soil conservation techniques such as no-till, terrace, crop rotation and contour farming, the soil can be protected from loss of nutrients. This will increase job opportunities, income for farmers, and food for Niger's people. The country's small and struggling agricultural industry will begin to expand and stabilize, creating a sense of security and relief. Niger's government will gain control, and they will have a connection and common sense of responsibility to share with the citizens. The country's economic and social development could increase as well with using vehicles to transport goods and possibly building dams for harnessing hydroelectric power. The advantages to this method do not just apply to inside of the country's borders. This could open doors for connecting and building relationships with other countries that also sit along the banks of the Niger River. This could be a vital source of agriculture and income to not just Niger, but for other countries as well. And, Niger would be known as a country that is a pioneer of discovering ways to stabilize West Africa's agricultural industry.

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