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Nicaragua, Factor 2: Water Scarcity

Nicaragua: Finding a way to bypass devastation to agriculture through El Niño periods

In the early spring of 2012 I walked into my kitchen like every other day after school. This particular day, I was startled to find an unfamiliar face sitting in my kitchen and chatting with my father. He had darker skin, dark hair, and deep brown eyes. He was much shorter and thinner than I, and held a cane. After an exchange of hands, he began to describe his life to me. He lived in an overcrowded, one room house-like-structure with a dirt floor in the hills of Nicaragua. He had seven brothers and sisters, which only worsened his food security in his family. I asked him how old he was, and he replied with fourteen. I was surprised because at the time I was the same age. I wondered why he was so small, and had broken teeth. My father later explained to me that malnourishment had caused these imperfections.

My father made trips to Nicaragua every year to reach out to less-fortunate glaucoma patients. This trip was different from the rest; my dad brought home a 14-year-old boy named Demis. This young boy needed extra treatment that required greater technology from the U.S. Demis left the only environment he knew, all the family he had, and the only people he's met, to trust my father and his practice to have his vision. By spending just hours with Demis, I was able to learn about the Nicaraguan way of life, culture, and environment. Demis opened my mind to a region of our world that, admittedly, I had never given much thought.

Nicaragua is a large coastal country between Costa Rica and Honduras, "bordering both the Caribbean Sea and North Pacific Ocean"(Nicaragua). Nicaragua is the largest country in Central America at 1,231 km. This country has the largest freshwater source in Central America, Lagi de Nicaragua, which helps towards the 196.6 cu km total amount of renewable water resources. The climate at this location is tropical in lowlands but can get cool in the highlands. This country has a variety of land types. Near the Atlantic coast there are miles of plains. On the contrary, the center of the country is home to mountains that reach up to 2,438 m. The pacific coast has volcanoes with some plains as well. Some of these volcanoes are currently active. This is the cause of significant damage to agricultural fields. The country has dry periods and wet periods. In the months of December, January, February, March, and April there is little to no rain. The dry period has the least amount of precipitation in March and April. During this time, the plants dry and lakes dry. In the months of May, June, July, August, September and October, the country goes into its wet period. During this time, rains come daily. This wet season peaks between late June and end of late July. The average rainfall varies from 40 in- 45 in annually. On average, winter months receive 105 mm to 144 mm of precipitation. In spring, Nicaragua tends to have 35 to 45 mm of rainfall. In the summer, Nicaraguan precipitation reaches to 300 to 350 mm. In the fall, Nicaragua receives 300 mm to 190 mm of rainfall (Nicaragua).

Nicaragua is the second poorest country in Central America with 42.5% of the countries people below the poverty line. Almost half of the population lives in rural parts of the country. About two thirds of these rural people strive to survive on 1 American dollar a day. Most of the people living in poverty live in rural areas, dependent on farms. There are pockets of poverty in Managua, Nicaragua's capital. Poverty is collectively going down in this country. 50.3% of the population was living in poverty in 1993 (Nicaragua). In 2001 the poverty percentage went down to 45.8%. This does not include the international market. Due to the coffee prices going down, coffee-dependent central regions increased poverty levels by 5.7% (Cheng).

Nicas depend on corn, for this crop is a staple in their diet and key crop in their fields. Fruit, beans, and rice are also very common in Nicaraguan diets (Nicaragua). Many Nicas do not have enough money for meats. Nicaraguans try to fill this protein absence with beans. A traditional dish, Gallo Pinto, is a dish of beans and rice mixed together. Many personal family farms grow coffee beans (Silva).

Desperately poor Nicaraguans suffer from a variety of attributes. The older population is greatly illiterate. 78.1% of males can not read or write. 77.9% of women can not read or write. The children who are able to go to school stay in school for 10 years on average. The education expenditure is a total of 10% of total GDP. The GDP per capita was about \$4,500 as of 2013 (Nicaragua). The agriculture sector contributes 17.1% of the GDP (Nicaragua). Child labor is a problem in Nicaragua. 223,992 of children are a part of child labor. This is 14% of children in this country. This excludes the thousands of children that are restrained from daily attendance due to participation in the family farm. The mean of mother's age of first birth is 19.7. There are 20.36 deaths at birth for every 1,000 children born. The life expectancy in Nicaragua is about 72 years of age. There are 63.2% of sanitary facilities in urban areas. In rural areas the sanitary facilities are limited at 37%. Common water or food borne diseases are more severe in Nicaragua than in the United States. These diseases include diarrhea (100 deaths), hepatitis A, and Typhoid fever (400 deaths). This could be due to the very low physician density. There are only .37 physicians for every 1,000 people. Health care is limited, almost nonexistent outside of Managua. Seeing a doctor in Nicaragua is difficult, since citizens must pay for medications and check-ups completely (Nicaragua).

Extended family plays a key role in the family aspect of Nicaraguan life. Many Nicas live with aunts, uncles, grandparents, cousins, and great-grandparents. In rural areas, family members tend to live side by side. Nicaraguans love the idea of large families. Men and women gain social status from being a parent. Amongst the higher class, parents tend to have three or four children. In the rural-low income areas of Nicaragua, the families tend to have five to seven children. In these poorer areas, children begin to help their parents on the farms or in the home as a nanny to younger siblings as early as nine or ten years old. Girls learn to shop at local markets, cook, and clean while boys learn to till the land (Nicaragua).

Women play a key role in society. Women gained rights after the civil war between 1926 and 1927, during the Sandinista period. In this time period, many men were sent away and killed. In response to this, mothers became heads of the household and filled the gaps in the workforce. There has been a women president, Violeta Chamorro. Yet, there is an issue with unequal wages in Nicaragua (Nicaragua).

The agricultural sector accounted for 17.1% of Nicaragua's GDP in 2013, however this sector employed 31% of the labor force (Nicaragua). Primary products include coffee and bananas (Nicaragua). There are two types of farms in Nicaragua: small family farms and large plantations for export. These family farms are no larger than 10 acres. The plantations owned by people of higher class have farms much larger in order to export 4.9 million metric tons of sugar cane, corn, rice, bananas, and coffee annually as a nation (Nicaragua).

In contrast to the large plantations, family farms usually cannot afford to plant fruits and sugarcane. These farms usually plant rice, corn, different types of beans, and coffee. An average family farm includes livestock including, chickens, cows, and pigs (Nicaragua). The farms that once reaped benefits from the high coffee prices now struggle to have the initial money needed in order for the farm to be profitable due to the major drop in coffee prices after 1989. The price of coffee hit its lowest peak in 2001, 30 cents/lb (Cheng). This makes the farm fairly small and unstable. Small-scale farmers tend to practice conventional tillage farming. Yet, conservation agriculture, a cheaper and less time consuming alternative, is spreading throughout Central and South America (Fritschel). About 20.3% of the land is

involved in agriculture. Nicaraguan farms have a difficult time profiting financially. Necessary technologies to do so are unaffordable to the small family business (Nicaragua).

The lack of profit in these small family farms has many potential causes. One of these setbacks could be from the absence of paved roads. There are only 3,282 km of paved roads in Nicaragua out of the 23,897 km of roadways, thus making it difficult to transport a successful harvest to market. Also, a major reason for lack of profit could be due to the inability of access to electricity. About 72% of Nicas are able to use electricity in some way. In the rural areas of Nicaragua, only 1 in 5 households has access to electricity (Nicaragua). This makes storage of perishable foods a challenge.

Another significant reason why agriculture is not profitable is Nicaragua's corrupt government. Ten years of civil war between 1980 and 1990 and an economic crisis that began in 1987 have caused the collapse of the country's economy (Environmental Sustainability Issues in Nicaragua). Environmental disasters, such as Hurricane Mitch, which caused extensive destruction and loss of life in November 1998, have also worsened conditions for the rural poor. Even though this happened about 16 years ago, this country has not been able to recover, which leaves them at a state of poverty (Silva).

Since the devastating drought starting in spring of 2014, Central American farmers have found their lives heavily impacted from the drought, due to the lack of profit being made. 2.5 million Central Americans are struggling to feed themselves due to this drought. In the summer of 2014, there was 80% less rain than the predicted rainfall for that season. Hit hardest are the countries of Honduras, El Salvador, and Nicaragua (Silva).

El Niño is a warming of the Pacific Ocean. This happens for about three months in every 2-7 years. During this natural phenomenon, there are changing winds and a fall in air pressure. In Central America, once fertile lands are dried out to a point where the land cracks (Livesay).

In the summer of 2014, El Niño triggered a food scarcity scare. Thousands of victims waited for the late spring rains to plant their crops (Silva). The rains never came. Many family farmers lost all of their crops due to this absence of rain. The Nicaraguans had lost their "wet period". Naturally, the months of December, January, February and March bring little to no rain. The citizens depend on the wet period to be able to plant, yet the absence of rain continued. With the drought still in action in September, farmers were unable to plant for a late harvest as well. Nicaraguans are not consuming enough nutritional value and falling into a state of malnutrition (Silva).

The loss of crops collapsed the families' income and furthermore, crushed the Nicaraguan economy as well. El Niño destroyed crops for the 2014 year, and drove food prices up as a result. This drought caused a major water scarcity, causing a tragic loss of crops (Livesay). Developing countries, such as Nicaragua, take much longer to recover from major droughts like this, due to lack of resources. Once a family farmer has lost close to all of its profit for a year, they are likely to live in poverty for the rest of their life, making El Niño a severe issue. The small family farmers are the most severely impacted. More than half of the country's total harvest was destroyed (Global Water Initiative Created in Response to World Water Crisis). With the loss of their crops, farmers remain helpless with the absence of their staples; beans, rice, and corn, until the rains return. Today, Nicaragua is struggling to make up from the devastating disaster. Few Nicaraguans have disposable income that they can use to purchase food they do not harvest, leaving many hungry. In time of crisis the head of the household leaves to find work in cities or a neighboring countries. This leaves women and children abandoned. The children are usually sent to live with grandparents or other family members who also are struggling to feed themselves. In times of crisis families resort to skipping meals or making budget cuts by taking children out of school (Global Water Initiative Created in Response to World Water Crisis).

El Niño and changing of weather patterns is not new to Central America. El Niño is mostly an unpredictable phenomenon. Scientists believe that another El Niño period is coming soon. An El Niño weather event is highly likely to reappear before the end of the year and disrupt climate patterns worldwide (Gallucci). The El Niño effects, this year, have not been as strong since 1997-1998. Scientists are able to measure El Niño strength by calculating movement in the Pacific Ocean and watching temperatures in Central and South America. Scientists believe that El Niño effects will keep escalating due to man-made pollution and global warming. This leaves the families who live in the “danger zones” in difficult positions (Silva). Crescencio Polanco, a Nicaraguan farmer, states, “The last three rains have been miserable, not enough to really even wet the earth. It’s all lost and now I just have to see if I can plant in late August or September,”(Silva), he told IPS (Inter Press Service) with resignation. If farmers like Polanco were able to bypass these months of drought, then they could harvest crops on time, at a constant pace, leaving them with profit. 100,000 families in Nicaragua are suffering from food insecurity due to agricultural and livestock loss (Silva). Livestock is not able to graze and be healthy when the lands are dry. As of August 2014, 2,500 cattle passed and 600,000 were at an unhealthy state, with an additional month of El Niño looming (Images From Drought-Hit Nicaragua).

Solving this issue sounds near impossible. But if this was to be resolved, the economy of Nicaragua would benefit do to the food sustainability. If farmers were able to make profit throughout the dry periods, they would be able to make money year round, which makes it easier to provide for their families. El Niño is a time where all farmers find some sort of struggle. If something can be implemented during this time, all Nicaraguans can benefit. Prices of food can remain consistent. This results in farmers having more customers. If people are able to buy the products they are able to become more nutritiously stable. With less of a food crisis, due to the drought and weather changes, families would be able to stay together.

Considering that the population is growing in Nicaragua, the food security issue is expected to become worse. Nicaragua’s population has grown from 5.1 million in 2000 to 6.26 million in 2015 (Nicaragua). A rise in population can only worsen the food security issue in this country. In order to have enough food for all, the agriculture and food industry must grow along with the population.

Knowing that El Niño causes extreme droughts periodically, the agriculture becomes extremely difficult to grow along with population. The growth in population can affect the food security for future generations. 25% of the farming population is extremely poor and depend on their crops (Some of the Major Issues Surrounding Nicaragua). According to the FAO the temperature in Nicaragua is rising. Even though the rise in temperature seems slight, as little as 1.1 degrees Celsius, agricultural experts believe that this can make a big difference in crop production. A rise in temperature can hinder crops anywhere, but in Nicaragua where the farmers suffer from droughts from El Niño, the results can be dramatic, including triggering El Niño. With the rise in temperature, El Nino will only result in greater destruction (Under Nutritiousness Around the World).

Unrest in Nicaragua directly connects to food scarcity in the country today. “In the twentieth century, the Central American country of Nicaragua saw civil wars, foreign interventions, dictatorship, and revolution.” (Grossman) An unstable government and constant unrest has caused severe damage to the economy. Specifically the Nicaraguan Civil War and American intervention are causes for economic disaster in Nicaragua today. These tremendously bloody events triggered the start of poverty and destruction for this country. The present day Nicaragua highlights that this part of Nicaraguan history described above has been left unhealed. The power-exchanges and shaky economy only encourages other problems in Nicaragua to arrive.

A succeeding problem in Nicaragua is Pollution. Nicaragua is famous for its amount of fresh water sources, yet for the rural families, getting daily water is a great challenge. One third of the population

does not have potable water. In rural areas the percent exceeds to 72%. Many citizens have difficulty finding water. A main issue that results in scarcity of water is pollution. “[M]any of the rivers, streams, and lakes are polluted with pesticides, residential sewerage and industrial waste and toxins.”(Under Nutritiousness Around the World) The lack of sewage coverage is a major contributor to the pollution problem. The major city, Managua, has no sewage treatment. 34% of the urban residents have access to sewage coverage, yet many of the sewage plants have deteriorated and have lost efficiency (Under Nutritiousness Around the World).

The coffee industry has impacted the food security by making hazardous working conditions and the reduction of price of coffee in exports. Coffee is a major export in Nicaragua, and its economy relies on this export. Before 1990, coffee farmers benefited greatly from the profit of coffee. Coffee farmers were able to finance hospitals, schools, etc, “but all these benefits have evaporated since the 1990’s when the world coffee price slumped to unpredictable low levels.” (Cheng) This directly impacts local coffee growers, but also greatly impacted economy of Nicaragua. Since the downfall of the coffee industry, coffee plantations have become inhumane. Housing conditions consist of one-room bunkhouses with no toilets or shower. The working conditions are unsafe due to the absence of safety equipment or the use of unsafe pesticides. Workers have few rights because they do not have a contract, much less a contract that mentions a consistent wage. Lastly, children are commonly found in this field. The coffee industry is not nearly as profitable as before 1990’s, a fact that impacting the lives in central America and specifically Nicaragua.

The WFB, World Food Programme, began, distributing rations of kidney beans, maize, vegetable oil, and rice to 46,000 families. But this effort was not enough. Due to lack of food during drought periods, I suggest enforcing the consumption of Iguanas. Based on my research, I believe this would be an advantageous short-term solution because of its abundance and easy accessibility. Last winter, a government expert in Nicaragua has recommended breeding and eating iguanas as a way of providing food, as well as income. (Rush) After scientists concluded that iguanas have 24% more protein than chicken, and record drought was starving citizens, Nicaragua’s Government allowed the growing and hunting of iguanas for food purposes since the nation of Nicaragua is under state emergency (Jackson). Through the growing and hunting of iguanas, families will be able to omit the soaring food prices. Without organized breeding farms, this urge of consuming iguanas may wipe out its population. Once at a captivity state, iguanas can be bred and sold at rapid paces benefiting the Nicaraguan people. The loss of cattle and other livestock has left 2.5 million Nicaraguans and neighboring countries starving (Jackson). Even though this solution seems outlandish, iguana meat is said to taste like chicken but sweeter and is nutritiously beneficial due to its high quantity of protein.

Iguanas are common to come across in Nicaragua due to its large population. This makes the animal cheap and plentiful. The Nicaraguan people can farm these iguanas that average at seven feet long (Jackson). Iguanas continue to grow throughout their lifespan, but reach adulthood in 2-3 years. Iguanas can lay up to 30 eggs a season (Green Iguana). Iguanas can be eaten at any time; even iguana eggs are consumed but not suggested due to a slow inbreeding (Jackson). The iguana can be used for two major uses: Food and profit. Nicaraguans can eat the nutritious meat, along with the eggs. Also Nicaraguans should grow the iguanas and sell the off springs. This local farming of the iguanas can be profitable and low in management. An iguana farmer must consider the Iguana’s diet and necessities to stay alive, grow, and reproduce. Great for a less fortunate Nicas, iguanas do not need to eat any more than every few days (Green Iguana). These animals eat a variety of foods but mainly plant products. This easy-to-care-for-animal makes for a possible profitable Nicaraguan when at a state of struggle. An average serving of iguana can reach prices equivalent to 1.45 American dollars, which may not seem like much profit for an iguana Farmer, but considering that two thirds of rural people strive to survive on one American dollar (addressed earlier), this can make a big difference to these farmers lives. Nicaraguan officials are encouraging consumption and selling of iguanas in order to help their fellow citizens (NBC News).

At a local level, farmers of maize, rice, and coffee can set up iguana farms along with their current products to help them financially and nutritionally. The issue here is this: how are the local farmers supposed to become aware of this vital information? This is where the national level comes in. Nicaraguan government officials have encouraged the consumption and farming of iguanas. Further more, the information of iguana farming must spread to all. Slowly, this information has spread by word of mouth. In severe times, this iguana solution can be life saving and must be spread quickly. The nation of Nicaragua should set up an emergency plan. This emergency plan should be in forms of radio broadcast and traveling volunteers; considering that many Nicaraguans do not have the ability to use electricity and are illiterate. The broadcast and speech by volunteers should include ways to become apart of the WFB food assistance. Along with this information considering the benefits of setting up an iguana farm.

The Nicaraguan people need help now. The short-term plan (iguanas) must be implemented immediately. A large project to start up, Heifer International, can be extremely beneficial and life changing, yet takes lots of time to get necessary volunteers and start up donations.

The idea of relying on iguanas for food security can be a worrisome thought. What if people don't follow the correct breeding protocol and there is a drop in Iguana population? The plan to consume and farm iguanas is a great start, and can positively impact Nicaraguan people quickly. Yet, Nicaragua needs a long-term reform in order for poverty levels to lower and remain consistent. A way we can implement a long-term policy is through Heifer International. This is a large organization that links communities together and provides sustainable agriculture to people living in poverty. Specifically, Heifer International gifts livestock to families through donations. Once the first female offspring is born, the current owner passes this new born to a different family in the community. This action improves the community as a whole by providing food and reliable income that grows throughout the community. Through Heifer International, we can fund a project that focuses on rural communities in Nicaragua. This way Heifer can develop farms, businesses, and education to this community resulting in long lasting beneficial effects (What Can You Do?).

At an international level, Nicaragua is getting help from the Global Water Initiative Created in Response to World Water Crisis. “ The 7 leading International NGOs including Action Against Hunger | ACF International, CARE, Catholic Relief Services (CRS), The World Conservation Union (IUCN), International Institute for Environment and Development (IIED), Oxfam America and SOS Sahel – UK have come together to address the shortage of fresh water in the world” (Food Scarce for Thousands of Nicaraguan Families). This Organization focuses in on countries in Central America, including Nicaragua. The organization brings water to rural communities lacking fresh water. For a long lasting effect, the Global Water Initiative plans to make investments to strengthen institutions. “Examples of early projects include training micro-watershed committees on risk management issues; constructing and improving the water and sanitation infrastructure in community schools; rehabilitating water harvesting ponds; raising awareness of the opportunities for multiple water use; and offering leadership training to women.”(Food Scarce for Thousands of Nicaraguan Families) This plan will help the farmers in rural parts of Nicaragua greatly. Not only will they be able to drink fresh water, they will be able to provide fresh water for livestock and crops, which will bring forth stronger profits. In order to work towards fresh, clean, useful water, Nicaraguans must have access to water. In seasons of drought this is a great issue.

A solution to this can be found in the practice of desalination. Desalination is the process of removing dissolved salt in water. For the Nicaraguans this means they can use water from the ocean to wash with, rinse crops, and even drink. Desalination equipment is already set up in some places in Nicaragua including the Genesis Water Technology. A smarter and more efficient way to power a desalination plant

is solar power. The Nicas could model their desalination plant off of the desalination plants in Abu Dhabi. A company called Hitachi successfully set up two desalination plants that use solar energy. These plants have a desalination capacity of four cubic metres per hour. The 300 square meter spanned solar panels generate 45 kilowatts of renewable electricity per hour. These plants pressurize the water through a membrane that has .0001-micron pores. This process is called RO, or reverse osmosis, which only allows water molecules to pass. After the water passes the membrane, the water is sent to a holding tank where it can be distributed and then is free to drink immediately. The left over salty water, called brine, is sent to an evaporation tank where the salt can be used for other purposes. Since this is powered by solar energy, these plants are environmentally friendly. These plants would bring clean water to the people of Nicaragua for drinking, cleaning and irrigation, along with drinking water for livestock. (Solution Hitachi) Unfortunately this miracle does not come cheap. A desalination plant in Nicaragua can take many years to be able to make an impact considering the expense, yet this can provide as a long-term solution (Desalination Industry Equipment in Nicaragua). The expense and effort does not end with the installation of many desalination plants either. The next issue to look at is in distribution. A pipe system would need to be constructed in order to reach the rural families that live in the in-land mountainous regions.

World food security is a major goal desired by millions. There are people struggling to survive in every country around the world. We can attack this goal one country at a time. If Nicaraguans can receive the help they need, we are a small step closer to our colossal dream. The country of Nicaragua does not have adequate cleaning facilities, barely any access to electricity -and the biggest issue-, lack of food and water for citizens. There can be many reasons for the food scarcity issues in Nicaragua, yet where I believe we must start is water scarcity. A natural weather pattern, El Niño, destructs Nicaragua's fields, which leads to the devastation of food stability and economy. El Niño crushes the farmers' profit, destroys farmlands, and significantly reduces livestock. The people of Nicaragua need to use the resources they have left to keep money in their pockets and maintain stability. A resource available is iguanas. Nicaraguans can set up iguana farms to breed the iguanas. This way the iguana population remains consistent. Nicaraguans can benefit from the high protein when consumed and profit received for selling iguanas. For the times during El Nino periods, this change in lifestyle can make a major difference for Demis and his family, and all other Nicaraguans like him. Through the consumption and selling of Iguanas, Nicaragua can make improvements towards food security. For long-term security, projects through Heifer International can be made. Along with this, desalination plans can progress to action. Demis has opened my eyes to a world much different than my own. I want to make a difference for people living similarly to Demis. These recommendations can do so. These realistic plans can greatly benefit Nicaraguans lives, and change the future that lies in front of these people living in poverty. In order to recover from El Niño and to prevent El Niño destruction Nicaraguans must light the flame for food security with the farming of iguanas.

Works Cited

- Cheng, Fuzhi. *Is Fair Trade The Solution*. N.p.: n.p., n.d. Print.
- “Coffee History In Nicaragua.” *Equal Exchange*. N.p., n.d. Web. 11 Feb. 2015. <<http://equalexchange.coop/history-of-coffee-in-nicaragua>>.
- “Desalination Industry Equipment in Nicaragua.” *Environmental Expert*. N.p., n.d. Web. 3 Mar. 2015. <<http://www.environmental-expert.com/water-wastewater/desalination/products/keyword-desalination-industry-19860/location-nicaragua>>.
- “Environmental Sustainability Issues in Nicaragua.” *Foundation for Sustainable Development*. N.p., n.d. Web. 11 Feb. 2015. <<http://www.fsdinternational.org/country/nicaragua/envissues>>.
- “Food Scarce for Thousands of Nicaraguan Families.” *Action Against Hunger*. N.p., 18 Feb. 2010. Web. 23 Jan. 2015. <<http://www.actionagainsthunger.org/blog/food-scarce-thousands-nicaraguan-families>>.
- Fritschel, Heidi. *Measuring the Spending Gap*. N.p.: n.p., n.d. Print.
- Gallucci, Maria. “El Nino Event Highly Likely to Reappear by End of This Year, UN Weather Agency Says.” *International Business Times*. N.p., n.d. Web. 23 Jan. 2015. <<http://www.ibtimes.com/el-nino-event-highly-likely-reappear-end-year-un-weather-agency-says-1612490>>.
- “Global Water Initiative Created in Response to World Water Crisis.” *Action Against Hunger*. N.p., n.d. Web. 17 Feb. 2015. <<http://www.actionagainsthunger.org/blog/global-water-initiative-created-response-world-water-crisis>>.
- “Green Iguana.” *Smithsonian National Zoological Park*. N.p., n.d. Web. 3 Mar. 2015. <<http://nationalzoo.si.edu/Animals/ReptilesAmphibians/Facts/FactSheets/Greeniguana.cfm>>.
- Grossman, Richard. “Nicaragua a Tortured Nation.” *Historians Against War*. N.p., n.d. Web. 1 Aug. 2015. <<http://www.historiansagainstawar.org/resources/torture/grossman.html>>.
- “Images for Drought- Hit Nicaragua.” *World Food Programme*. N.p., 28 Aug. 2014. Web. 10 Feb. 2015. <<https://www.wfp.org/stories/images-drought-crisis-nicaragua>>.
- Jackson, Allison. “Facing Severe Drought- Nicaragua Encouraged to Eat Iguanas.” *NBC News*. N.p., n.d. Web. 10 Feb. 2015. <<http://www.nbcnews.com/news/latino/facing-severe-drought-nicaragua-urges-eating-more-iguanas-n198076>>.
- Jones, Sam. “Nicaragua Told to Eat Iguanas.” *The Guardian*. N.p., n.d. Web. 10 Feb. 2015. <<http://www.theguardian.com/global-development/2014/aug/15/nicaraguans-iguanas-drought-food-crisis>>.
- Leiva, Akssell, and Bhavani Shankar. “Drought Risk in Nicaragua.” *Journal of Risk Research*: n. pag. Print.
- Livesay, Brent. “Nicaragua Needs Water.” *Waves for Water*. N.p., n.d. Web. 11 Feb. 2015. <<http://www.wavesforwater.org/courier/nicaragua>>.

- “Nicaragua.” *Culture Grams*. N.p., n.d. Web. 4 Mar. 2015.
<http://online.culturegrams.com.ref.ualibrary.org/world/world_country_sections.php?contid=6&wmn=North_America&cid=113&cn=Nicaragua&sname=Family&snid=11>.
- “Nicaragua.” *Encyclopedia of Nations*. N.p., n.d. Web. 4 Mar. 2015.
<<http://www.nationsencyclopedia.com/economies/Americas/Nicaragua.html>>.
- “Nicaragua.” *The World Factbook*. N.p., n.d. Web. 20 Jan. 2015.
<<https://www.cia.gov/library/publications/the-world-factbook/geos/nu.html>>.
- Silva, Jose Adan. “El Nino Triggers Drought, Food Crisis in Nicaragua.” *Inter Press Service*. N.p., n.d. Web. 23 Jan. 2015. <<http://www.ipsnews.net/2014/07/el-nino-triggers-drought-food-crisis-in-nicaragua/>>.
- Solution Hitachi*. *YouTube*. N.p., 19 Mar. 2014. Web. 1 Aug. 2015.
<<https://www.youtube.com/watch?v=NgXPooc7Kml>>.
- “Some of the Major Issues Surrounding Nicaragua.” *Fica El Conqui*. N.p., n.d. Web. 11 Feb. 2015.
<<http://fincaelcoqui.com/major-issues-surrounding-nicaragua/>>.
- “Under Nutritiousness Around the World.” *Food and Agriculture Organization*. N.p., n.d. Web. 4 Mar. 2015. <<http://www.fao.org/docrep/x8200e/x8200e03.htm>>.
- “What Can You Do?” *Heifer International*. N.p., n.d. Web. 3 Mar. 2015. <<http://www.heifer.org/about-heifer/index.html>>.