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Dominican Republic, Climate Volatility

Dominican Republic: Adapting to Climate Change by using Sustainable Agriculture

Lying between the Caribbean Sea and the Atlantic Ocean is an island called Hispaniola with a population of 21.5 million people. On this island are two countries, the Dominican Republic with a population of 10.65 million and Haiti. Covering 18,704 square miles, The Dominican Republic makes up over half the area of the island and is similar to the size of two Vermonts. [Population, Total] The Dominican Republic faces many struggles but the main issues are natural disasters and climate change. Although the country's economy has been growing since 1996, it still faces struggles like economic inequality and poor farming practices. Lack of access to new technology and occurring natural disasters also contribute to difficult crop production. [Poverty]

The day in the life of a Dominican Republican child consists of waking up and doing chores that may consist of moving cattle into a new patch of land to graze, retrieving water for their family, running errands, buying food, or taking care of their younger siblings. The child will then go home and study for school. If he or she finishes early enough they might go play with their friends in the village. The child will then walk to school and once he or she gets there, they will eat lunch with all the children around 12 p.m. After they eat, they start their classes.[We are the World] Many will complete primary (7 years) and middle (additional 2 years) education but very few will go on to secondary education or beyond, especially children who come from poor families.[Education System] Education is free for children but in some communities, only 50% of children will go on to attend high school. [Haller, Jamie] Some classes that they have are language which consists of Spanish and English, Mathematics, Science and Social Studies.[We are the World] After school is dismissed, he or she may go play games like baseball or dominoes with their friends if there is no work to be done at home. Other days, children may walk through the village and pick mangos. When the child gets home, he or she will do their chores if they have any, and then get ready for bed. [A day in the Life]

For adults, their daily life is different compared to their children's. A percentage of Dominican Republicans do not have a job because most jobs are in agriculture or growing food. If Dominicans do not have a sustainable amount of land or a direct water supply running through their property, it is difficult for them to grow crops. With almost half of the area of the Dominican made up in agriculture land, the majority of working men work growing beans and pigeon peas. Most women are housewives and spend the day cooking and cleaning. [Haller, Jamie] Most people that are unemployed will have conversations with their friends and neighbors throughout the day because it is so hot and humid to do anything else. Although they do not have a lot, their communities are very tight knit. By being very close with their neighbors and friends, they are creating a sense of community that is important for their happiness. While the Dominicans have little in terms of material goods, they are wealthy in relationships and spirituality. [Dominican Republic]

The average family size in The Dominican Republic is 5 or more including children and parents. On average an individual will eat three meals a day with no real snacks in between. Their first meal consists of sweet coffee with sugar, and sometimes an egg with a root vegetable such as a potato, squash, yucca, or boiled green bananas. Dinners are small and consist of a root vegetable with fried salami or an egg. Nutritious food is very limited. Their diet is very carbohydrate centered with little vegetable access. A truck occasionally passes through selling tomatoes and lettuce.[Haller, Jamie] Depending on the

community, since the Dominican Republic is very diverse, substantial foods like eggs, cheese and meat can be too expensive and not always readily available. For example, one United States dollar is equal to

38 pesos and eggs can cost 5 to 6 pesos each in the Dominican. It is nearly \$2.00 for one dozen eggs when more than one third of the population live off of \$1.25 a day. Some people own chickens but will only have meat a few times a month due to the price. Most people will only have access to their local vendor unless they grow their own or buy their goods from the locals. Their housing developments consist of dirt floors, leaky roofs, walls made out of tin and wood which make the shelter unbearably hot, and structurally unstable. [Dominican Republic]

Although many people in the Dominican are able to have jobs, many are also not able, which makes it difficult to buy health insurance where the standard is poor. For the people that are unemployed, it is much more expensive but for others, the standard is acceptable. Some of the areas the health insurance covers are eye, dental and hospital care. In the bigger cities and tourism areas, there are hospitals, and clinics but for the rural areas, the nearest hospital can be over an hour away. With 11% of children facing poverty, 31.6% of the population under the poverty line and 20.16% making up their rural population, this can be a serious health issue for many. [Agriculture Land] Outside of the major cities and tourist attractions, the health care drops considerably and even emergency services can be limited or nonexistent. [Health Care] Over half of the population does not have access to sanitary toilets and half of the country does not have access to clean water. [Dominican Republic] People including children, will receive their drinking water from the streams without filtering it. Because of this, the students receive anti-parasite vaccines every year at school. [Haller, Jamie]

The Dominican Republic's infrastructure is poor and unevenly distributed. In the bigger cities and tourism attractions, there are well paved roads. In the mountains and rural communities, the roads may or may not be paved. If they are paved, they still face issues like potholes, unmarked speed bumps and missing manhole covers. [Road Infrastructure] Most mountain roads are dirt roads and are very rough and hard to maneuver. 9 Very few rural communities have electricity and cell phone service is rarely found anywhere but the tourism attractions. [Infrastructure] Electricity varies from community to community, the bigger cities will have electricity, but it is scarce to find in rural areas. [Haller, Jamie] Electricity throughout the country is government-owned and operated. It's very poor with periodical outages typical both in cities and rural areas. [Infrastructure]

The Dominican Republic economy is widely based off of their tourism and their exports. The economy in the Dominican Republic is highly dependent upon the U.S., which is the destination for nearly 60% of their exports. [Economy] Some of their exports include cocoa beans, coffee beans, coconuts, mangoes, spices, fruits, vegetables, and herbs. Almost all of the Dominican's staple food is produced in their own country, meaning they don't receive many imports. [Government] The money the U.S. pays them for their goods and services is equivalent to 10% of their Gross Domestic Product. Of the goods that they produce, 20% is exported. The U.S citizens contribute 75% of their tourism dollars. [Economy] The main industry in the Dominican is tourism and because of this, rural areas are often overlooked when it comes to government investments. Therefore, they don't receive new technology or financial assistance in their businesses and agricultural jobs and the government has not done much to address the low agricultural productivity. [Poverty]

If it is not already, the Dominican Republic will be one of the most affected regions from climate change due to being an island. The reason for climate change in the Caribbean is the same reason everywhere else - the amount of greenhouse gases being emitted into the atmosphere. When carbon dioxide is released, it acts as a blanket in the atmosphere, reflecting all of the sunlight back onto the Earth instead of escaping into space. [Climate Change] Hurricanes are the most common natural disaster that hits the Caribbean islands and the Dominican Republic. Hurricanes form when there is low wind shear and high ocean

temperatures. Wind shear forms when an El Nino system forms in the Pacific which tends to create high wind shear in the Atlantic. Wind shear will rip storms apart before they develop into massive storm systems. In the year of 2017, though, there were not any El Nino or La Nina systems that could generate wind shear. At the same time, the Atlantic Ocean has been quite warm. Warm water helps the storms intensify and absorb heat energy from the water. The more heat energy that goes in, the more vigorously a weather system can churn. So, as you can imagine, the hurricanes were catastrophic in the Caribbean in 2017. The reason for the warming oceans are two different causes: one is that weaker trade winds and wind speeds in the Atlantic have led to less evaporation, which would normally cool the ocean more. The other factor is climate change. Oceans absorb much of the heat that's emitted into the atmosphere, which leads to warmer water. Along with rising sea temperatures, climate change also causes sea-level rise — which makes cities more vulnerable to the storm surge that comes with hurricanes. Global warming is also expected to lead to a higher concentration of atmospheric water vapor and more intense, heavier, rainfall. [Here's Why]

Although residents are already seeing a change, rising temperatures will continue to increase because of tropical storms, natural disasters and hurricanes. For example farmers from a specific community said that this is one of the driest years they have seen. Some of the climate change can be linked to the deforestation in the Dominican. Less trees means less rain. Although drought conditions are occurring inland, on the coast they are seeing severe flooding that has wiped out their banana plantations. Because of this, solutions will have to be diverse in order to adapt to the environmental issues. Other problems the country is seeing is rough terrain and mudslides which can also wipe out part of a community or even their whole plantation of crops. Many of these farmers do not have access to insurance, leaving them at a loss of words when a natural disaster is upon them. This continues to be a big issue because of these small farmers, 72% rely on their crop production for their sustainable food supply, for them and their families. [Haller, Jamie]

There are several solutions that are viable for the Dominican Republic. One of the main ones is being able to educate the Dominicans. We need to make these new farming practices, techniques and technology available to them so they are able to produce a more efficient and better yielding crop. There are various ways to educate them but one that could help them tremendously is introducing genetically modified organisms to their differing regions. One type of plant that could be changed in their coastal region are bananas trees. By doing this, it would make the stalks or trunk sturdier which would be resistant to strong winds and heavy rains. By making the stalk stronger as well as the outer covering or peel of the banana, they would be hardier plants to these catastrophes. Working with a corporation like Monsanto or Dupont would enable willing volunteers, like the individuals in mission trips and the Peace Corps, go to the Dominican Republic and introduce these new plants to their region. Through either of these corporations, they could genetically modify these banana trees by inserting a genetic makeup of a sturdier plant from the musaceae plant family in place of the gene structure for the bananas. The process of crossing thousands of genes is called “selective breeding” which could someday be what they are most dependent on. [Haller, Jamie]

The opposite of these flood conditions is drought circumstances which they have been struggling with inland on the Dominican Republic. In this situation, scientists from America, can also create a genetically modified organism that instead of being resistant to flooding and high winds, would be tolerant to low quality soils, and receiving only small amounts of water. [Haller, Jamie] Their main staple crops grown inland are beans and pigeon peas which require an adequate amount of water, but if they become tolerant to drought conditions, they could grow just as well. In pigeon peas, each year they grow back, the seed production decreases. Pigeon peas collect nitrogen throughout the air and ground which is called nitrogen fixation and stores it in nodules on its roots. If they were able to rotate plant crops each year with a plant that uses a lot of nitrogen like lettuce, tomatoes, squash, cucumbers, or cabbage, their crop would not

require as much fertilizer. [Pigeon Peas] Their pigeon peas would also grow better if they replaced them every year since they have a decreasing yield every year. With genetic modification we can also make the plants produce a higher yield per plant or acre which would give the Dominicans a bigger supply of produce. We would also introduce these new plants through an organization through mission trips or the Peace Corps. The main issue standing in the way is that the Dominican Republic's government limits the imports of GMOs because they question whether they are safe for their population and environment. Before we can introduce these new plants to their regions, educated Americans that consider themselves professionals would first have to teach these people that they are a huge, safe and helpful tool that is needed in their country.

Another way to engage in education is new farming practices. Agrilunks, which is a United States Agency of International Development funded a program called Farmer-to-Farmer, which works toward introducing new techniques to Dominican farmers. These new techniques such as ridge farming, utilizing soil testing kits and using grasses for ground cover all aim toward creating sustainable agriculture in the Dominican Republic. Farmers can improve soil conservation, and cut back on deforestation which, in turn, reduce the amount of pollution in rivers and streams and counteract climate change. [Sustainable Agriculture]

The Ministry of Environment has started taking steps to tackle the issue of deforestation. Although most farmers in the Dominican Republic grow beans and pigeon peas, the Ministry has developed a program to promote more of a tree-based agriculture. They are paying farmers in specific communities to change their land from beans and pigeon peas to crops like avocado, mango and pine with the end goal of promoting more rainfall in the region and still supplying them with a crop. This is one example of ways the country is trying to adapt to rapidly changing climate. An additional solution would be to create an irrigation system from their main streams and rivers. By doing this, more farmers would be able to access the water to grow crops. Although there are already several systems built in the Dominican, some communities and small farmers do not have access to them. Expanding these systems to more of the agriculture population would help their production and way of living greatly.

For individuals that do not farm, but are still struck with poverty there is an alternative. They can grow their own sustainable food supply on a smaller level. Although this amount of produce won't feed their whole family, it will provide some nutrients they could be lacking as well as bear some of the burden of the lacking food supply. Receptacles like a burlap sack or other breathable containers would be acceptable for a miniature garden. We could educate them on how to build their own solar panels from scratch, use it to generate a pump to collect rain water and then water their sustainable garden. Although this idea may not work in all regions because of the diversity and different levels of poverty, it could help some find solutions to the conflict of hunger. [Haller, Jamie]

Although there is no one solutions to solving hunger and poverty in the Dominican Republic, solutions are literally at our fingertips. With a quickly changing climate, it is challenging many farmers and people

to adapt and change their everyday ways. With organizations like Farmer to Farmer, The Ministry of Environment, Monsanto and Dupont as well as many others, unnecessary malnourishment of people and crops as well as poverty can and will be prevented. With these organizations as well as the hard working missionaries and individuals that work with the Peace Corps that are working with the Dominican Republic population, this nation could thrive as a developed country in the future. By applying new technology and ideas, their yields will go up, which will force hunger and malnutrition to go down. With an already very developed tourism economy, the country will make great strides in becoming a developed country in the near future. Although it is a timely process to fully disconnect with poverty, the Dominican Republic's poverty numbers are slowly going down. By implementing these solutions and ideas to their different regions and working together, the end to poverty and hunger might be closer than we all think for the Dominican Republic.

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