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Puerto Rico, Climate Volatility

Puerto Rico: Fighting for Food Sovereignty Against The Climate Volatility

Context

A U.S territory that once thrived on producing its own agricultural commodities, has become a territory where over 85% of its food source is derived from foreign imports. Before being colonized, Puerto Rico was inhabited by the Native Taíno population who naturally cultivated the land as their food source. Once Spanish explorers colonized the island in 1493, Puerto Rico became an agricultural center for producing commodities (Poole, 2011). The island would remain under Spanish control for centuries until the Spanish American War when the United States would take over control of the territory in 1898 (Diaz, 2021). After the U.S. took control of the territory, they promoted the production of sugarcane. This monoculture practice limited the island's growth and diversity in food production. When the U.S. later stopped the intensive sugarcane production on the island, they supplied the territory with funds to grow the infrastructure and promote tourism instead. (Gould, 1978). However, over time this shift towards tourism depleted agricultural production in the nation and made the problem of food insecurity on the island more prevalent than ever before.

This over-reliance on foreign goods has created a record high rate of food insecurity in the nation; with over one-third of adults in Puerto Rico suffering from a lack of access to nutritional food (Diaz, 2021). While combating this problem begins with increasing internal food production, it becomes a challenge when farms have been consistently decreasing by 58.7% since 1998 (United States Department of Agriculture, 2018). While the surviving farms fight to help produce more internal commodities both climate change and natural disasters have made it harder for these farmers to stay in production. In an effort for Puerto Rico to combat food insecurity, the nation must increase food production from within and adapt more farms with agroecological practices to combat climate change.

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Current Challenges

For the three million people living in Puerto Rico, the territory faces food scarcity in both access and affordability (United States Census Bureau, 2019). According to an analysis done by Dr. Mahmud from the New England Journal of Medicine, when Hurricane Maria struck Puerto Rico in 2016 the infrastructure, economy, and access to fresh food were completely demolished amounting to over \$90 billion in damages. This disaster showcased the extent of the food insecurity as ports were closed, foreign imports stopped and nutritious food became scarce. With many roads closed, those who lived in rural communities were cut off from access to resources and struggled with hunger (Mahmud et al., 2018). The storm played a key role in demonstrating how over-reliant Puerto Rico is on foreign exports in times of need. While access to food is one issue of food insecurity, it is the cost of food that also is a challenge. With the average median household income at \$19,759 two times less than the national average, it makes Puerto Rico the territory out of all 50 states with the lowest yearly income (Guzman, 2019). This low income has contributed to a poverty rate of 45.6 percent in the country. With almost half of the population living in poverty, access to affordable and nutritious food becomes a challenge for many families (Bishaw, 2012). These socioeconomic factors have only contributed to increasing the problem of food insecurity across the island.

With food insecurity being caused by unemployment rates and low incomes, climate change, and over-reliance on foreign imports only worsen the problems. Despite seemingly having a warm climate all year round, perfect for consistent growth of certain crops or production of livestock, challenges still arise. As previously mentioned, Hurricane Maria not only destroyed infrastructure but destroyed over 80% of farms and agricultural land (Mahmud et al., 2018). However, Hurricane Maria showcases one section of the growing issue of climate change in Puerto Rico. In recent years, Puerto Rico has experienced increased sea levels, increased rate of natural disasters, and higher temperatures that have already caused

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shifts in agricultural production. (Febles & Félix, 2020). As Puerto Rico consistently faces these challenges in their limited internal food production being destroyed by natural disasters; farmers must look for an alternative solution to save their livelihoods.

Agroecology Alternative

For farms fighting to survive, the solution lies in implementing agroecological practices. Agroecology applies the study of ecological systems to agricultural practices. When applied to agricultural practices it becomes a sustainable agricultural method that involves farmers working with the specific environmental conditions of their arable land to reduce the need for outside resources and decrease the rate of erosion (Wizel et al., 2009). Agroecological practices can play a key role in being the solution for combating climate volatility in Puerto Rico and increasing internal food production. The effectiveness of agroecological practices was shown in a study conducted by researchers for the Climate Justice and Community Renewal Book where they studied the resilience of Puerto Rico post-maria and the role it had on agroecological systems already in place. Their research showcases that farms with agroecological practices experienced less erosion, soil depletion, and economic loss after the hurricane compared to farms without these practices (Febles, Félix., 2020). In addition to these benefits, researchers from Global Food Security looked a global scale at the impact of these practice on food security and nutrition. By conducting a meta-analysis of data on over 55 sources they found that there was a “78% increase in food security and diet diversity” when these practices were applied to farms. In addition, they found a link to increased diversification of plants, soil health, and input reduction with both fertilizer and pesticide use (Kerr et al., 2021). Both studies showcased the positive impact that agroecological farming can have on food sovereignty in Puerto Rico. It is for the sake of Puerto Rican farmers that they must begin implementing this alternative method to adapt agroecology practices to combat climate change and increase production.

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Implementing Agroecology

While implementing agroecology farming methods in Puerto Rico may appear as a simple solution, however there are many complex aspects to its implementation that form limitations in this solution. As previously mentioned, Puerto Rico deals with a large rate of food insecurity with a big portion of it to do with the lack of resources available across the island. With Puerto Rico having a largely rural community, access to resources and educational opportunities becomes a challenge within the nation. When promoting the inclusion of agroecological practices, these are methods that would have to be taught to the farmers within Puerto Rico currently. Addressing this limitation of educating farmers can be done through the territory's land grant university, The University of San Juan. Land grant universities are colleges that are given funding for agriculture education programs through the U.S government. Similarly in Florida, the land grant university, University of Florida, pairs with the Florida Farm Bureau to help farmer and spread and educational programs (Carter, 2004). Drawing from Florida, the Puerto Rican Farm Bureau can work with the University of San Juan to develop outreach programs for these rural communities. This would help solve the solution of access to rural communities by this partnership providing farmers with resources to learn about agroecological practices and apply them to their farms.

Not only does access to resources for farmers to be taught agroecological practices become a limitation, but the affordability of switching to an alternative method also becomes a new limitation with this solution. While research has shown that the long-term benefits of agroecological farming are more beautiful to farmers with the decreased use of resources and ability to combat climate change (Kerr et al., 2021). It still takes money and resources for farmers to begin the process of this switch when many of these farmers have been following the same practices for generations. Addressing this limitation can be done through agritourism as a way for these farms to draw funding into their bussiness for new

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agroecology practices. Agritourism can also be used as a way to promote the growth of the agricultural industries within Puerto Rico. According to researchers for the *Tourism Management Journal*, they found that agritourism leads to increased revenues, advertising of farm-related produce, and increased consumer education (Tew & Barbieri, 2012). With Puerto Rico already serving as a tourism center, incorporating agritourism can play a key role in eliminating the limitation of affordability. Outside of the United States, other countries have begun to see the benefits of agritourism. Specifically, the East Asian island nation of Seychelles has been moving towards an agritourism-based economy to combat food insecurity (Ajong, 2020). If Puerto Rico were to draw similar strategies from Seychelles being an island nation themselves, they could apply their methods towards implementing agritourism as a part of their economy. While agritourism is present in Puerto Rico today by increasing agritourism beyond its current place, it would combat the affordability for these farms and promote consistent agricultural growth on the island.

Another limitation to this solution is addressing the access to arable land. When the shift of agricultural production took place in Puerto Rico, the Puerto Rican government took over the majority of the arable land. This land is unable to be sold to people but rather can only be leased. If this land was released to allow the public to purchase it and make a long-term investment; it would encourage the growth of opportunities for families to begin farming (Mahmud et al., 2018). However, if foreign goods are always cheaper than the profits for island farmers will never be sufficient. Instead, the Puerto Rican government in conjunction with the U.S. must create more equal prices to stop more people from automatically producing cheaper foreign alternatives. This way the market can stay competitive and create a sufficient income that encourages families to start farms or continue generational farms already in place.

Long-term Impact

In an attempt to solve food scarcity in Puerto Rico, the territory must become dedicated to increasing the food production on island farms. However, food sovereignty in Puerto Rico can only effectively be increased with farms that can withstand climate change. To solve this problem, farmers must implement

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agroecological practices to provide a more sustainable and climate-resistant method of farming. However, the solution does not end there. Puerto Rico must work towards opening up access to education on these practices through the University of San Juan and the Puerto Rican Farm Bureau. They must also promote farms to take part in agritourism to help provide funds and promote affordability of introducing these new methods. By addressing both these factors of the solution it can lead to long-term growth in the country's internal food production and ability to withstand climate change. Ultimately, by Puerto Rico implementing agroecological practices, they will be able to solve the problem of food insecurity and be able to combat climate volatility in years to come.

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