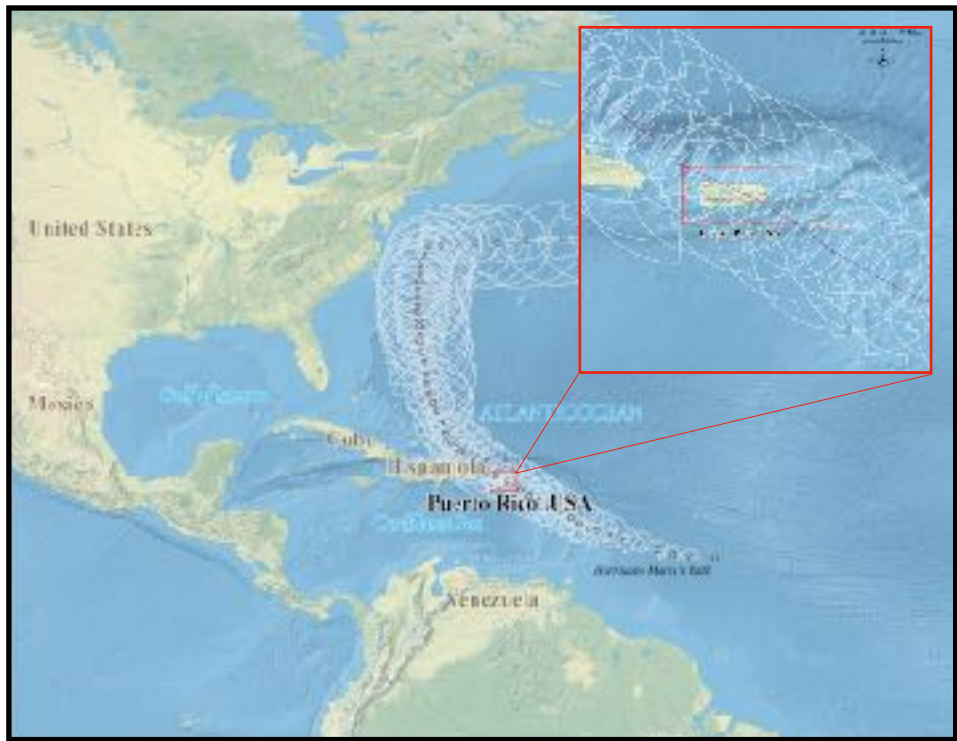


Resilience and Recovery Among Farmers in Puerto Rico's Mercados Agrícolas After Hurricane María

Introduction



On September 20, 2017, Puerto Rico was hit by the strongest hurricane of the last hundred years. Hurricane María was an unprecedented climatological disaster, which decimated farms across Puerto Rico. The project at hand collected and assessed primary-source information about the effectiveness and reach of agricultural programs and policies to (a) respond after a climatological disaster (b) build resilience among farmers and (c) enable them to return to markets (mercados agrícolas) in Puerto Rico.

The transition from a predominantly agricultural economy to an urbanized country that is heavily dependent of the manufacturing industry began in the 1940's with a set of policies that orchestrated the shifts that have since outlined the political and economic

integration of Puerto Rico with the United States. The transformation was drastic, and it resulted in the almost-complete abandonment of agriculture in the island. Progressively, Puerto Rico has lost control of its food supply, 85% of which is currently imported. The resulting deterioration of its food security reached its peak when 80% of all agricultural crops were destroyed after the hurricane and food insecurity among residents spread across socio economic groups.

Climate change exposes communities' vulnerability to food insecurity and events like María are expected to increase in frequency and magnitude. Since the 1970's a neo-peasant movement has intersected issues of political independence and ecological conservation on the island, parallel to similar movements in South America. The agro-ecological movement highlights the use of agricultural practices that apply permaculture to maintain biodiversity and promotes soil conservation. Contrary to conventional agriculture, the movement centers its work on social equity, using food as a mechanism of sovereignty. By obtaining primary-source data from a sample of the agro-ecological farming community in Puerto Rico, this project aims to provide a preliminary perspective of the potential impact of agro-ecological practices in food systems resilience in Puerto Rico.

Methodology

Participant Enrollment

This study was conducted in various cities in Puerto Rico. The farmers selected were based on participant enrollment. The recruitment process of the study participants began with a consultation with a key-informant (KI) of the agro-ecological farming community of Puerto Rico, who led Puerto Rico's largest agro-ecological cooperative, Cooperativa Orgánica Madre Tierra. Madre Tierra is owned by growers, producer, and consumers committed to the cultivation, marketing, and consumption of agro-ecological products. The KI was extremely helpful in identifying members of the community who play a critical role in the agro-ecological farming movement in Puerto Rico. They possess years of experience with the practice in Puerto Rico, community engagement, and have contributed greatly to the development of the movement on the island. The farmers varied by age, gender, and location of their farms.

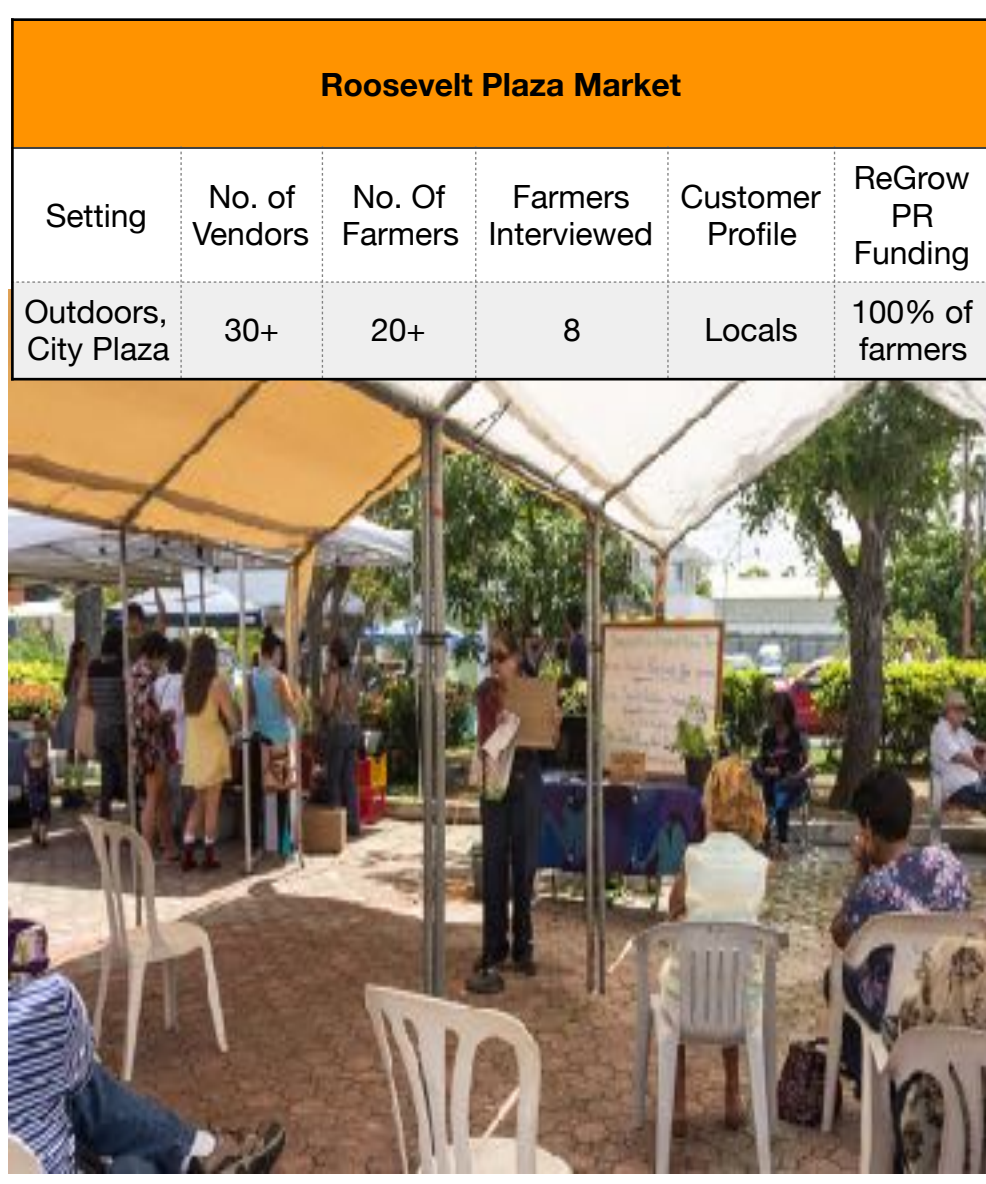
This study took a fieldwork approach using mixed methods, including non-participant and participant observations and in-depth interviews. The field data collection lasted for about three weeks in 2018, during the month of August. The purpose of using observations is to provide a contextual understanding to the findings of the interviews. The in-depth interviews allowed participants to share their stories and give their personal perspectives of the research topic. Observations were conducted at five agro-ecological farmers markets and seven farm visits. We also participated in a brigade that was organized by the farmers. In-depth interviews were conducted with 32 farmers and 5 leaders and organizations using an interview guide and were audio recorded with the consent of the respondents.

Data Analysis

The information collected during the community observations was recorded through detailed field notes. The assessment of the observations was informal and did not include a previously generated checklist. The recordings of the interviews were reviewed and coded using deductive and inductive reasoning. The data was categorized to reflect the themes and patterns that arose from the respondents. The analysis of the data was an iterative process that included discussions and feedback from senior faculty and key-informants, which led to further analysis.

Ethical Standards Statement

Each interview was audio recorded with the oral consent of each respondent and all identifying information was anonymized to preserve the identity of the respondents. This study was conducted as part of a graduate student research fellowship program and funded by the Tufts Institute of the Environment. This study has been reviewed by the Tufts Health Sciences IRB.



Findings

The observations and in-depth interviews demonstrated three central themes: agroecology and resilience, informal networks, and a lack of government support. A total of 37 in-depth interviews were conducted. Observations were collected at the agro-ecological farmers markets and farm visits. The demographics of the respondents were diverse. Many of the farmers were either retired professionals or new and young farmers. The farms were commonly run by families, often a couple. Almost all of the farmers we interviewed said that farming was their main source of income and how they supported their families. A majority of the in-depth interviews were conducted at the agro-ecological farmers markets. There are five of these markets across the island, some running weekly and others a few times a month. For most of the farmers we interviewed, these markets are their main point of distribution of their products. The agro-ecological farmers markets are a place where people can access healthy, locally grown foods, share knowledge, and gather as a community. After the hurricane many of the agro-ecological farmers were quick to recover and were back to the markets within a month. They attributed their quick recovery to their agro-ecological practices. This included, a diversity of crops, nurturing of soil health, lack of dependence on external inputs, and a strong network.

When the agro-ecological farmers were asked if they had received any government support, many of them said they were not registered, did not qualify for government funding, or that the process was too arduous and confusing. The greatest amount of physical, emotional, and financial support came from informal networks, such as local community organizations, volunteers, and fellow farmers. Community organizations, such as Visit Rico, created a fundraising campaign with the help of Farm Aid, called ReGrow Puerto Rico to reactivate the agricultural economy. Almost every farmer we interviewed had received this funding and expressed that this assistance was paramount to their recovery. Apart from funding, local organizations supported the creation of brigades, which are groups of farmers and community members that band together each week to assist the farmer with whatever they need help with, such as planting, harvesting, or clean-up. We were lucky enough to be invited to a brigade, where we assisted in preparing the land for a yucca planting.

Each interview concluded by asking what steps can Puerto Rico take to be more resilient and what are the current gaps in the agricultural system. Overall, many of the farmers claimed that the biggest gaps in the system were the lack of government support and funding for agro-ecological farmers, greater access to markets to distribute their products, and a stronger consciousness of agroecology and sustainable agricultural practices.

Discussion

In comparison to conventional farmers, our research found that agro-ecological farmers had increased capacity to recover quickly after a shock, as was Hurricane María. Consisting almost entirely of non-registered farmers, the study group's resilience was found to be supported by three main sources: independent economic support, inter-farmer organization post-shock, and access to niche markets.

Independent economic donations made to the ReGrow Puerto Rico Fund and distributed to agro-ecological farmers who were participating in mercados were reported as the principal mechanism of relief for farmers. The quick distribution of funds (< 4 weeks after the shock event) and the amount of the economic donation (\$500-4,500 per farmer over a year) were identified as key factors for keeping the sampled farmers engaged in farming activities post-shock. It was reported that the funds were used to address physical damage to the farms, replace tools, and supplement lost income.

Through diverse mechanisms, agro-ecological farmers and members of the agro-ecological movement leveraged existing organizations or created new methods of organizing to provide mutual support through the recovery process. The development of La Guagua Solidaria (The Solidarity Bus), funded through the Puerto Rico Resilience Fund, is an example of such mechanism. Developed by local artists, chefs and farmers, the bus brought brigade support, food and entertainment to farms which were located in hard-to-reach areas. In Aibonito, six different farms formed an informal collaboration to support each other's wellbeing through the period of recovery post-shock through brigades, knowledge-sharing, and time for camaraderie. The collaboration has remained in place long after the recovery phase and has evolved into a system of collective growth for the farmers involved. Existing organizations with large networks of members, such as Cooperativa Madre Tierra and Visit Rico, served as connectors between donors (i.e. funds, seeds, tools), brigade groups, and farmers.

Existing mercados agrícolas provided a venue for farmers to bring their produce and find loyal and needy clientele when food was scarce in the island and farmers needed income. Unlike traditional farmers whose sales are conditioned on volume and quality, agro-ecological farmers were able to bring whichever amount and type of produce they were able to recover and harvest soon after the shock and leverage the existing market as a point of sale.

The stories captured through this research are stories of success, gratefulness and optimism. The agro-ecological movement in Puerto Rico has regained the momentum it was experiencing prior to hurricane María and some farmers reported having turned to agriculture as a result of the hurricane. The following are observations offered for consideration as ways to strengthen this progress.

- Lack of government trust among agro-ecological farmers has dis-incentivized their registration with the USDA's Food Service Agency. Thus, there is no official record of a majority of these farming operations. In the absence of official registration, an independent census of agroecological farmers may be a suitable alternative to characterize agro-ecological farms by operation size, productivity, and changes over time. This information would help establish a historical record, would attract further research and support resource allocation.
- To build upon the collaborative spirit developed among farmers post-María, strategies that develop sector-wide organization and collaboration can help transition the movement from one that is based on shared ideals to one that gains broad recognition and can leverage collective power. Law 238 would recognize such collective and would grant power over government resources, if properly organized.
- Connecting agro-ecological farmers with processing streams can help develop their business and provide amidst climatic events. Infrastructural development as well as the promotion of farming activities as opportunities for entrepreneurial innovation could help foster this development. Current processing sites lack human resources to promote outreach or facilitate farm-to-facility transfer of materials.

Study Limitations

This study had a diverse group of participants, but it was not representative sample, because of the limited number of participants and the specific focus on the agro-ecological sector of the agricultural system in Puerto Rico. It would be useful to gain a wider set of perspectives to understand the broader impact on the agricultural community. The timing of the study was also limiting, we only had three weeks to collect data and it was a busy time in the season for the farmers. Many of the interviews were conducted at the farmers markets, which limited our ability to interact with the participants fully at times.

Acknowledgments

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Researchers: Nayla Bezares and Alyssa Melendez, Friedman School of Nutrition Science and Food Policy at Tufts University
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Projection: UTM Zone 20N
Data Sources: National Elevation Dataset to Meter, 2015; United States Geological Survey; Natural Resources Conservation Service; Land Cover and Forest Formations for Puerto Rico, 2000, International Institute of Tropical Forestry; Tropical Cyclone Best Track, September 2017, National Hurricane Center; ESRI World Imagery