

ADVANCING COMMUNITY CLIMATE ADAPTATION

CASE STUDY ON RESILIENCE CENTERS IN PUERTO RICO

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Advancing Community Climate Adaptation: Case Study on Resilience Centers in Puerto Rico

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ABSTRACT

The goal of this project was to assist in the development of community climate adaptation in Puerto Rico. To realize this goal, we conducted two case studies on separate resilience centers at different levels of development to increase our understanding of the daily operations and problems that these centers face. The project resulted in the creation of an Emergency Management Toolkit which contains an emergency information mapping system and a networking and outreach campaign for one center.





EXECUTIVE SUMMARY

Puerto Rico is a small territory of the United States located in the northeastern Caribbean Sea, east of the Dominican Republic and West of the Virgin Islands. It encompasses beautiful cities, sandy beaches and about 3.2 million people (World Bank, 2021). In 2017, Hurricane Irma and Hurricane Maria hit the island destroying the power grid and causing the longest blackout in United States history taking 328 days to restore power to all customers (Zahn, 2022). It also caused major flooding and damage to large infrastructure on the island. This was certainly not the first hurricane to hit Puerto Rico and will not be the last.

Current and future climate risks for small islands such as Puerto Rico include sea level rise, tropical and extratropical cyclones, and increasing air and sea temperatures (Nurse, et al., 2014). Climate change plays a large role in hurricane destruction and is forecast to further increase wind and rain damage. Changing climate patterns are a large threat to Puerto Rico's population and infrastructure. Ineffective response to Hurricane Maria has alerted government officials and

independent organizations that Puerto Rico, the federal government, and local communities must do much more to prepare for and adapt to future climate hazards (de Arzola, 2018). A lack of sophisticated preparation left many communities without resources and information when they needed it most. Hurricane Maria left only one radio tower standing on the island, and it was only operational if citizens could get through uprooted trees and destroyed roadways. This left the island with poor communication and displayed a lack of response systems to inform the public during times of crisis. Hospitals were unable to adequately help patients due to inadequate resources and an inability to communicate with staff members internally and externally (de Arzola, 2018). With no power grid and limited access to water and resources, civilians were left to fight for their lives.



FIGURE 1: A PHOTO OF THE DESTRUCTION HURRICANE MARIA CAUSED IN 2017 (KUDACKI, 2017)

Many in Puerto Rico believe the governmental bodies of the United States and Puerto Rico failed to provide effective aid and recovery (Clement et al., 2018). With the failures of top-down approaches, many communities recognize the importance of being more self-reliant in the face of emergencies. Implementing a bottom-up approach can “effectively engage people in everyday transformational changes focused on meeting material needs” (Simon et al., 2020, p. 100). This approach starts by working with community centers and other community stakeholders and is referred to as community climate adaptation (Dahlman, 2023).

It is a process that can “improve the collective resilience and knowledge of people who may not have traditionally responded to, or been excluded from, local government engagement processes, particularly around climate change” (Simon et al., 2020, p. 101). Many communities are adopting this concept and using it to build community resilience. One key approach is in the construction of resilience centers that help bring people together and supply them with much needed resources. These centers can help provide food, clothing, education, and electricity especially in the event of an emergency. Resiliency centers can also help organize the community and bring people together to help each other outside of emergency situations. Two examples of these centers are the Cubuy-Lomas Center and Taller Comunidad La Goyco center (La Goyco Center).

Programs like the National Oceanic and Atmospheric Administration’s (NOAA) Climate Adaptation Program (CAP) seek to advance the cause of community climate adaptation by creating “sustained, collaborative relationships that help communities build lasting and equitable climate resilience” (Climate Program Office, n.d.). One of these initiatives is the Caribbean Climate Adaptation



Network (CCAN). Launched in 2023, the CCAN looks to “form a regional knowledge-action network of researchers and stakeholders that can evaluate needs, provide technical-scientific expertise, facilitate communication, and build cross-regional connections and capacity” (*NOAA RISA Narrative*, 2022, p. 1) One aspect of their methodology is to adopt an approach that focuses on Human-Centered design and participatory planning to “build a just and equitable climate resilience capacity in local society by improving planning for future climate, social, and economic scenarios” (*NOAA RISA Narrative*, 2022, p. 1). However, to start this process CCAN needs to better understand how “populations and communities that are most vulnerable to multiple environmental stressors can be better served and prepared for climate adaptation” (*NOAA RISA Narrative*, 2022, p. 8). A potential way to form this understanding would be to study resilience centers, to understand what resources each center has and needs, and what it takes to build and maintain an operational center.

Between the years of 2007 and 2018, Puerto Rico has seen a record number of schools closed on the island. Due to an economic recession and the effects of hurricanes Maria and Irma, 44%, or 673 of

the island's schools were closed and abandoned (Abizeid, 2020). These events left an unprecedented number of buildings across the island empty and without purpose. Some communities have decided to repurpose these school buildings as resilience centers. Resilience Centers are locations that specialize in distribution of goods to the community in times of crisis and disaster (Afshar, Haghani, 2012). While they specialize as a rally point during disasters, many of these centers also work to support the communities year-round.

Our mission was to assist the development of community climate adaptation in the Caribbean by furthering the development of resiliency centers. The execution of a case study on the Cubuy-Lomas and La Goyco resiliency centers helped us understand the vital role these centers play in emergency situations and community preservation. Our findings will be shared with CCAN so they can better assist community climate adaptation efforts.

Our newfound knowledge of the operations and troubles involved with running a resilience center allowed us to further community climate adaptation in Puerto Rico through the creation of





three main outcomes highlighted below: An Emergency Preparation Toolkit, a showcase with community leaders, and social media tools for the Cubuy-Lomas community center. The Emergency Preparation Toolkit helps provide communities strategies for effective emergency preparation. In times of emergency, such as hurricanes, one of the most important strategies is to plan and have systems in place to allow for effective response. The two main strategies featured in this toolkit are the Critical Information System (C.I.S.) and the Emergency Support Function (ESF) chart.

The C.I.S. system was built off the work done by the Piñones Preparation Response and Recovery project in 2021. The original concept was created by Jack Gomes, Cole Varney, Sarah Hildreth and Nicole Logrecco in collaboration with their sponsor organization La Corporacion Piñones Se Integra (COPI) as well as co-researchers Paola Rolon and Shawn Halliburton. Please find out more about this project on the PRPC site here: <https://wp.wpi.edu/puertorico/projects/2021-fall/pinones-mapping/>

There are two components to the CIS system, the technical and structural outlines. There is the

community hub and coordination committee. These two groups oversee managing the Critical Information System. They will be the organizers and decision makers in emergency situations. These groups will also be the bridge to the community, collecting the information that will be used in the CIS. Once that information is collected through Google Forms, it will be stored in a database using Google Sheets and visualized through Google My Maps, this is the technical component.

The ESF Checklist uses information from Puerto Rico's All-Hazards Plan to evaluate a community center's capabilities during times of crisis. We took the seven most important core capabilities that the All-Hazards Plan says are essential and put them into a checklist. This allows centers to easily check for what they already have, what they have in the works and what they need to prepare for the future.

Our team conducted a showcase on the C.I.S. and Emergency Preparation checklist with Mariana Reyes, Executive Director of La Goyco, and Alex Villegas, Community Resilience Coordinator for Estuario. They expressed great interest in the C.I.S. system after we walked through how the application



works and how they can implement it within the different communities they are working with.

As of right now, Cubuy-Lomas community center has no funding and runs strictly off donations and volunteers. After receiving a dead website from the 2021 Cubuy-Lomas WPI group, we set up a domain subscription for two years and linked the GoFundMe page to the donations button in the top corner for easy access. As of now, we have raised a total of \$275 for Id Shaliah. After building and showcasing the GoFundMe to Javier, we taught him how to run the page so he can do it himself. The same goes with the website. On top of these two applications, we also provided Javier with QR codes to both the GoFundMe page and the website. Both the website and GoFundMe page will be essential tools for reaching out to potential organizations and donors because it shows signs of legitimacy and helps envision the future goals of the center.



FIGURE 2: OUR TEAM HELPING DISTRIBUTE WATER TO LOCAL ORGANIZATIONS



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BACKGROUND

To fully understand this project, it is important to go over a few key aspects of Puerto Rico as well as information on the project sponsors. The first topic discussed is climate change in the Caribbean and in Puerto Rico specifically. Climate change plays a major role in the lives of everyone who lives in this region. There have been multiple strategies and organizations dedicated to helping the people of Puerto Rico in the event a climate disaster strikes again.

These are discussed with respect specifically to resiliency centers and the project's sponsors. These centers are responsible for helping their respective communities during times of need. The two centers this project focuses on have very different challenges that they face due to their location and specific needs that they must address. Information on all of this can be found below



Climate Change

Climate Change in The Caribbean

Climate change is prevalent across the entire globe and the Caribbean Islands have an increased vulnerability to climate change effects. The Intergovernmental Panel on Climate Change (IPCC) recently published a report on the climate impacts for small islands in the Caribbean. Current and future risks for small islands include sea level rise (SLR), tropical and extratropical cyclones, and increasing air and sea temperatures (Nurse, et al., 2014). The development of adaptation and mitigation programs, and their effectiveness, can strengthen the local and international support they receive. Adapting to climate change impacts can generate larger benefits to small islands when they develop community-based approaches to disaster preparedness and recovery development. Each island will have a different risk profile due to the unique demographic and locational overall (Nurse, et al., 2014). The IPCC published Figure 1 to “reflect the degree of confidence in the link between observed changes in several components of the coastal, terrestrial, and human systems of small islands and the drivers of climate change” (Nurse, et al., 2014). This is

important when understanding which aspects of small islands will be the most influenced by climate change.

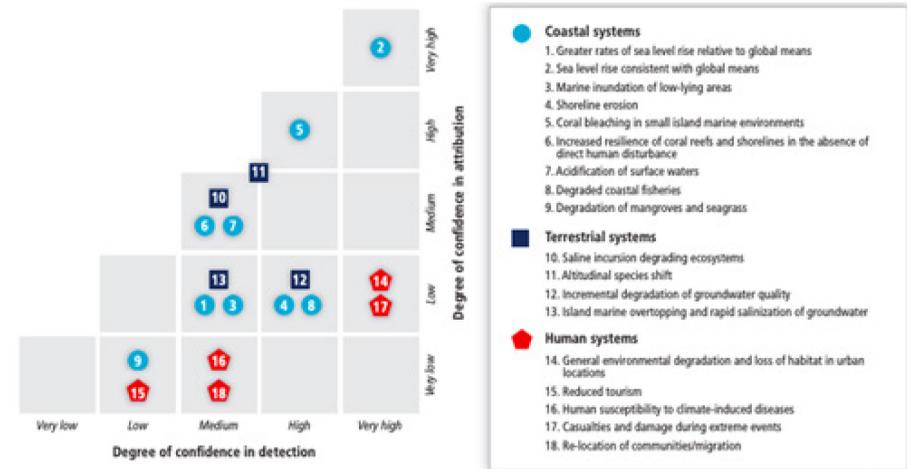


FIGURE 3: OBSERVED IMPACTS OF CLIMATE CHANGE ON SMALL TROPICAL ISLANDS (IPCC)

A comparison of the degree of confidence in the detection of observed impacts of climate change on tropical small islands with the degree of confidence in attribution to climate change drivers currently. For example, the blue symbol No. 2 (Coastal Systems) indicates there is very high



confidence in both the detection of “sea level rise consistent with global means” and its attribution to climate change drivers; whereas the red symbol No. 17 (Human Systems) indicates that although confidence in detection of “casualties and damage during extreme events” is very high, there is at present low confidence in the attribution to climate change. It is important to note that low confidence in attribution frequently arises owing to the limited research available on small island environments (Cramer, 2014).

Climate Change in Puerto Rico

Puerto Rico has its own set of unique challenges with climate change and natural disasters due to the varying geographical regions. This section will provide context on the coastline and mountainous regions of Puerto Rico.

Coastline Regions

Puerto Rico’s risk profile is built on the vulnerability of both coastal and mountainous regions. Sea level rise will be detrimental to coastal communities and infrastructure, and the estimated SLR in San Juan, Puerto Rico could be 5 ft or more by the end of the century depending on changing

climate patterns (Kunkel et al., 2022). The importance of mitigation efforts for SLR directly correlates with emergency preparation that will continue to be crucial for Puerto Rico. The southern coastal regions are especially vulnerable to SLR, and the current infrastructure will need to adapt to mitigate damages.

Coastline regions, and the entire island, are also vulnerable to hurricanes and tropical storms. This was very apparent when Hurricane Maria and Irma made landfall in 2017 destroying the power grid and causing the longest blackout in United States history taking 328 days to restore power to all customers (Zahn, 2022). The NOAA office of coastline management says that Hurricane Maria’s total costs were over \$92 billion and “Hurricane Maria was the strongest hurricane to make landfall there since 1928. It caused over 2,900 fatalities and widespread devastation to the island’s transportation, agriculture, communication, and energy infrastructure” (*Puerto Rico*, n.d.). Due to climate change, hurricanes are projected to decrease in speed, but storms will increase in duration and rain intensity leaving the Puerto Rican coastline regions even more vulnerable to storms (Kang & Elsner, 2015).

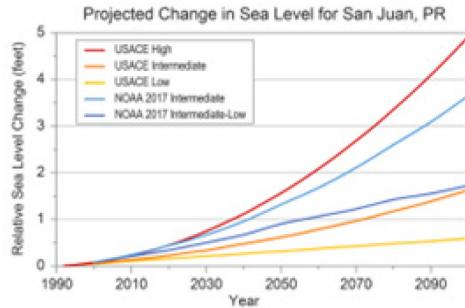


FIGURE 4: SEA LEVEL RISE PROJECTION IN SAN JUAN (NOAA)



FIGURE 5: GEOLOGICAL EFFECT OF 5FT SLR IN PUERTO RICO

Mainland and Mountainous Regions

The mainland mountainous regions of the island also face other challenges from climate change. The most prevalent involves precipitation events. Drought events in these regions tend to decrease stratigraphic integrity and increase susceptibility of wildfires (PRCCC, 2022). This includes the rainforests and agricultural areas that make up the mainland and mountainous regions of

the island. Climate models on a global and local scale predict a future decrease in precipitation (PRCCC, 2022). The middle of the island typically receives more rain and is where agriculture is most prevalent. Figures 6 and 7 display historical rainfall patterns in Puerto Rico by region, highlighting regions where mitigation and preparation processes are most urgent.

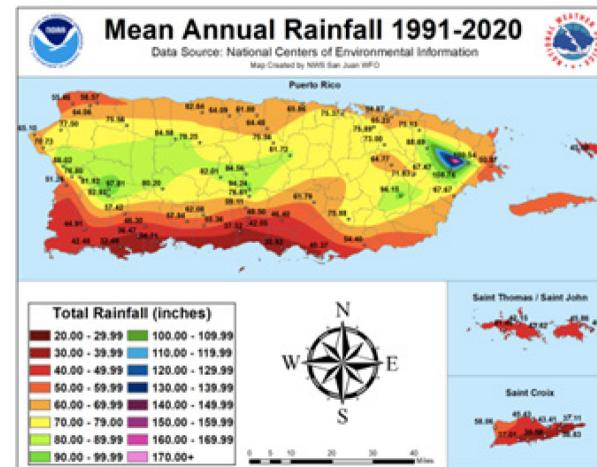


FIGURE 6: MEAN ANNUAL RAINFALL ACROSS THE ISLAND FROM 1991-2020 (NOAA)

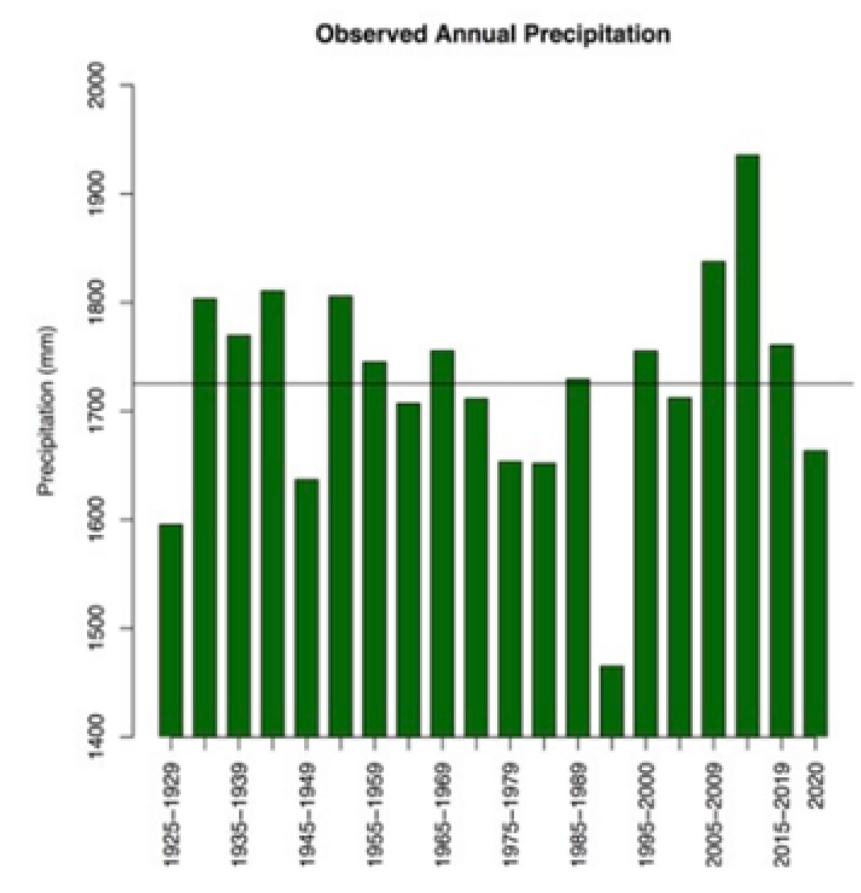


FIGURE 7: ANNUAL PRECIPITATION PATTERNS 1925-2020 (CLIMATE CHANGE COUNCIL OF PUERTO RICO)





Community Climate Adaptation

There are two main approaches to dealing with climate change related issues, mitigation, and adaptation. Mitigation focuses on limiting the effects of climate change caused by humans, for example pushing to lower carbon production or reforestation. Adaptation focuses on the ways in which people can adjust to the expected and observed changes to the environment, to limit the negative effects of climate change. So, in a sense, mitigation is an attempt to stop or slow climate change while adaptation is about minimizing risk by adjusting to the already apparent effects of climate change (Simon et al., 2020). However, there are some fundamental issues of justice and equity when looking at these concepts. Mitigation and adaptation call for a transformational socio-economic change, but to what extent are the positive and negative aspects of this change evenly distributed?

When looking at approaches to climate adaptation, it is commonplace to see priority placed on engineering solutions and more “top-down” policies. These approaches tend to be ineffective due to a lack of emphasis on people. They “ignore the

specificities of place, use impractical technologies, [and] involve little to no consultation” (Simon et al., 2020, p. 94). Different approaches need to be taken to effectively adapt to these issues.

It is better to understand climate adaptation as a long term process not just a one-off project, climate adaptation needs to be “part of the dynamics of societies rather than simply being a technical adjustment” (Simon et al., 2020, p. 94). This is why a more “bottom-up” approach to adaptation is needed. This introduces the concept of Community Climate Adaptation, which focuses on creating meaningful community engagement that allows for transformational changes focused around meeting the needs of the community. Most of these approaches are designed to increase sustainability as well as improve collective resilience and knowledge. The focus is on people who are traditionally marginalized or excluded from engagement in local government processes (Simon et al., 2020). This approach means a “wider range of options for adaptation, reducing the risk of policy implementation failure, increased on-the-ground understanding of the impacts of climate change, and increased trust between local government and communities” (Simon et al., 2020, p. 94).





NOAA Climate Adaptation Partnerships

The National Oceanic and Atmospheric Administration (NOAA) is a scientific and regulatory government agency under the United States Department of Commerce. NOAA (2022) is responsible for daily weather forecasts, severe storm warnings, climate monitoring and coastal restoration. They provide citizens, planners, emergency managers and other decision makers with reliable information that they can use. One main goal of the NOAA is to improve our ability to understand climate change. The Climate Program Office (CPO) is a part of the NOAA that supports and manages research programs. One important program is the Climate Adaptation Partnerships (CAP), the program looks to build stronger resilience to climate change. Due to this, the CAP program supports “networks of people working together to plan for and adjust to change using science and local knowledge” (*NOAA Climate Adaptation Partnerships Program*, n.d.).

Caribbean Climate Adaptation Network (CCAN) is a National Oceanic and Atmospheric Administration’s (NOAA) CAP program. CCAN looks to advance the cause of community climate adaptation by creating a network of academics and

other key stakeholders in the Caribbean region. This network “can evaluate needs, provide technical-scientific expertise, facilitate communication, and build cross-regional connections and capacity” (*NOAA RISA Narrative*, 2022, p. 1). This will allow for better collaboration among those that will help improve adaptive capacity. Figure 8 (*NOAA RISA Narrative*, 2022.) lays out CCAN’s approach to creating a network at different levels of stakeholders.

One aspect of their methodology is to adopt an approach that focuses on Human-Centered design and participatory planning to “build a just and equitable climate resilience capacity in local society” (*NOAA RISA Narrative*, 2022, p.1). CCAN’s interdisciplinary and collaborative approach will help to better prepare for emergency situations. The project’s statement of work lays out the expected outcomes:

(1) “A comprehensive understanding of how communities respond before, during, and after extreme weather phenomena” (*NOAA RISA Narrative*, 2022, p. 3).

(2) “A pathway to translate hazard prediction and planning to local disaster risk reducing actions” (NOAA RISA Narrative, 2022, p. 3).

(3) “Increased trust, communication, and feedback between scientists, risk forecasters, government agencies, non-governmental organizations, and communities” (NOAA RISA Narrative, 2022, p. 3).

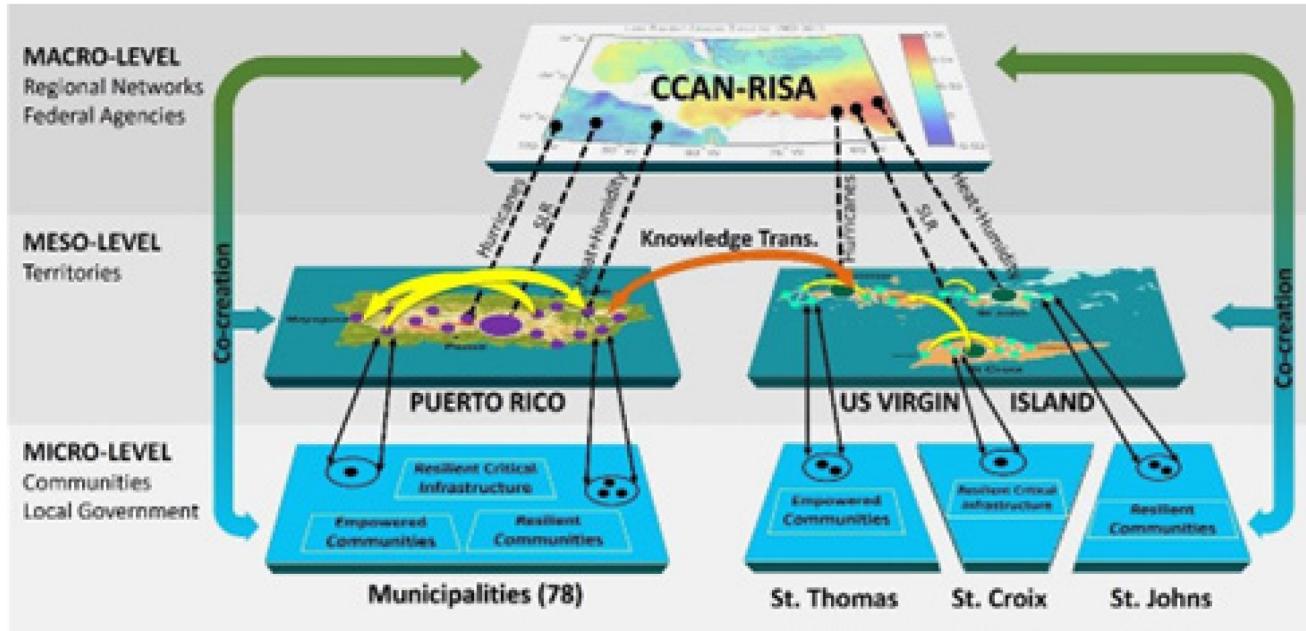


FIGURE 8: CCAN ACTION NETWORK CONCEPT (NOAA RISA NARRATIVE, 2022)

Puerto Rico All Hazards Plan

Puerto Rico’s All Hazards Plan (Puerto Rico Department of Public Safety & Puerto Rico Emergency Management Bureau, 2020) was written by the Puerto Rico Emergency Management Bureau Commissioner and the Governor of Puerto Rico. Their mission is to coordinate all government resources to provide the fastest and most effective services before, during and after emergency situations to ensure the protection of the life and property of citizens. Figure 9 shows the steps of the response process they have put into place.

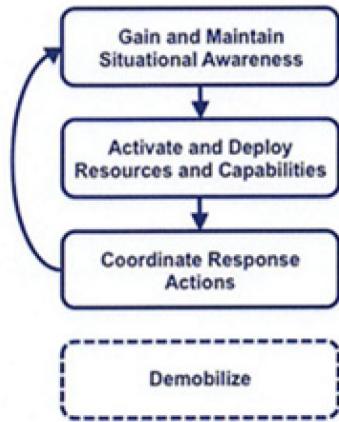


FIGURE 10: PUERTO RICO ALL-HAZARDS PLAN RESPONSE FLOW CHART

The ability for Puerto Rico to recover more efficiently and effectively starts with pre-disaster efforts. Understanding situational awareness and deploying the correct resources to the correct location will help mitigate further loss of infrastructure and fatalities. Mitigation efforts are organized by planning and insurance objectives: risk analysis, risk reduction, and risk insurance. These mitigation efforts are also incorporated in emergency management decisions during natural disasters. The

Phase 1			Phase 2			Phase 3		
Pre-Incident Operations			Post-Incident Operations			Recovery and Restoration Operations		
1a	1b	1c	2a	2b	2c	3a	3b	3c
Monitor Threat	Elevated Threat	Credible Threat	Immediate Response	Community Stabilization	Sustained Operations	Recovery Program Delivery	Long-Term Recovery Operations	Regional Closeout

FIGURE 9: PUERTO RICO ALL-HAZARDS RESPONSE AND RECOVERY OPERATIONAL PHASES

figure below highlights response and recovery operational phases.

Hazards that threaten Puerto Rico such as landslides, hazardous materials and floods may occur with little to no notice. Other situations such as tsunamis, hurricanes or tropical storms are noticed days before the event. Depending on the situation, there can be a grace period between response and recovery within operations. An example of this



happened when Hurricane Maria hit in 2017, destroying the power grid that relied on maritime shipping that took several months. Spot generation enabled stabilization within communities but the long lead time for needed resources delayed the sustained operations in place for the restoration of infrastructure. A strong community network from the bottom up would prevent these issues from happening again. Many areas on the island do have Emergency Support Function (ESF) Activation. The ESF is a formation of teams within different areas of the island that are responsible for working with the commonwealth and local officials to identify unmet resources that are needed and coordinate the flow of these materials. This responsibility is met by delivering and sustaining the response core capabilities laid out by the All-Hazards Plan (2020):

- (1) develop an action plan.
- (2) begin situational awareness assessment.
- (3) establish a joint information system and center.
- (4) facilitate basic communication.
- (5) establish coordination with stakeholders and the commonwealth.

(6) deploy adequate response capabilities within each region.

(7) and determine the most appropriate transportation services to facilitate the emergency response.

Information and Communication Prior to a Disaster

During Hurricanes Irma and Maria, residents did not always receive targeted warnings when needed due to delays in response and lack of access to information (Bui, 2019). Smart phones have opened the door for formal and informal communication networks that can be used for mass spread of information before and during a disaster. Unfortunately, the Puerto Rican emergency warning systems have not integrated the use of this technology to acquire real time experiences from affected people during a disaster.

Early warning systems (EWS) are the initial steps towards preparing for a natural disaster (Bui, 2019). They are used to provide information about potential disasters to the public as well as decision makers across sectors like the government, NGOs, or civil societies. EWSs are designed to minimize risk





to life and property as well as spread valuable information to those who will be affected. EWSs consist of a monitor who is usually a scientist who tracks and collects data on the conditions of the disaster. They will then send their findings to a centralized location to have the data analyzed. This results in a forecast about possible damage, zones that will be affected, and timeframe of the storm. The forecast is then distributed to the decision makers of the affected areas to issue a warning about the ensuing dangers (Bui, 2019). The effectiveness of an EWS relies on the accuracy of the forecast.

Resilience Centers

Resilience Centers are locations that specialize in distribution of goods to the community in times of crisis and disaster (Afshar, Haghani, 2012). Methods of success vary from organization to organization depending on resources available and funding. The Federal Emergency Management Agency (FEMA) is an organization that is tasked with assisting civilians and emergency personnel to advance the nation's ability to prepare for, and respond to existing disasters and emergencies (Afshar, Haghani, 2012). FEMA has a seven-branch

system that is used to distribute goods based on need to the proper places. Logistic centers are permanent facilities that receive, store, ship, and recover disaster commodities and equipment (Afshar & Haghani, 2012). Supplies are then shipped to commercial storage sites which are permanent facilities that are privately owned and used to store disaster recovery goods. When the need arises for the resources to be reallocated to specific areas they are shipped to “mobilization centers (MOBs) to be received and pre-positioned for deployment as required” (Afshar & Haghani, 2012). MOBs would then distribute the assets to sites that focus on the dissemination of goods at a state level known as FOSA sites. The supplies continue to move to sites that operate on a smaller scale until the supplies end up at a POD, a point of distribution, normally consisting of school buildings and hospitals. (Our case study in Cubuy-Lomas is a POD because they handle distribution of goods directly to affected persons.) This management system is effective but only because of abundant resources and funding. Under the Biden-Harris administration FEMA’s funding went from \$700 million to \$1.16 billion their first year in office and more than doubled to \$3 billion for the year 2022 (FEMA 2022). FEMA received this increase in



annual funding due to the increasing fear surrounding climate change and preparation of increased unpredictable weather disasters.

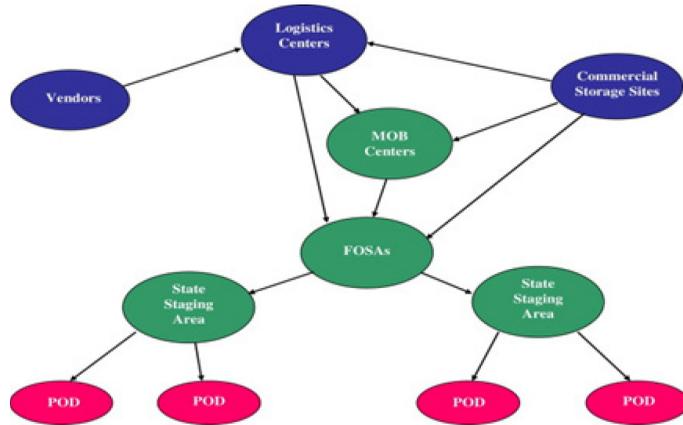


FIGURE 11: FEMA DISTRIBUTION NETWORK

Through interviews with 32 representatives from 21 different organizations Karen Smilowitz (2011) compiled thoughts and information about current disaster relief and distribution problems from local, state, federal, and volunteer organizations. It was found that one commonality between funded programs is to focus on needs assessment. Larger operations have staff members who periodically go to affected areas to record the needs of the people, thus maximizing the benefits of distributing relief

goods. Many volunteer agencies emphasize the amount of effort that is required to ensure even and fair distribution of the goods. Monitoring the population to track its needs and developing relationships with local leaders to ensure fair distribution requires resources.

Rescued Schools

Between the years of 2007 and 2018, Puerto Rico has seen a record number of schools closed on the island. Due to an economic recession and the effects of hurricanes Maria and Irma, 44%, or 673 of the island's schools were closed and abandoned (Abizeid, 2020). Schools in Puerto Rico were not only places for children but were a focal point of communities. In most cases there is no backup plan for the building's use, so they become abandoned and begin to deteriorate. However, there is a growing movement in Puerto Rico to repurpose these school buildings for the surrounding communities. In some areas, local people have begun to repurpose these schools as resilience centers. Events like glass workshops, jazz concerts, cinema nights, and community fairs are offered at these places (Am et al., 2021).

These spaces are also being used to save lives. Places like the Cubuy-Lomas Center focus on bringing safety and emergency preparedness to their



towns in case of natural disasters. Once up and running, this center aspires to be multi-purposed and be able to provide more locals with supplies for disaster. Food, water, and shelter are very important goods in times of crisis. Supplies only last so long and because Puerto Rico is an Island, they depend on importing goods, meaning that they have limited supply when the storm starts. Centers like these can be better prepared for natural disasters that plague the island to protect and serve the community in time of need.





FIGURE 12: OUR TEAM DISTRIBUTING WATER AT THE CUBUY-LOMAS COMMUNITY CENTER



Sponsor: ID Shaliah

ID Shaliah was established in 2020 and was founded by Javier Valedon. ID Shaliah or the Cubuy-Lomas Community Services and Development Center's (Cubuy-Lomas center) main goal is to be a lead resource supplier to communities in Cubuy-Lomas. These resources include, "...medicine, hot food boxes, adult diapers, medical equipment, essential items for preparing for emergencies, and home rescue services, amongst other things" (Conway et al., 2021). They provide resources to disabled people in need of wheelchairs, walking sticks and glucose testers. They also help people whose homes have been damaged by Hurricanes Irma and Maria.

Because of the location, it is hard for residents of Cubuy to have easy access to resources. ID Shaliah wants residents to turn to them in times of crisis. This is why they started to renovate the elementary school. ID Shaliah has many goals for the center with the main goals being opening a medical clinic, pharmacy, kitchen, and potable water tanks that hold drinking water from the city. With these plans implemented, Cubuy will be better prepared for emergencies.

Sponsor: Taller Comunidad La Goyco

Founded by Tito and Mariana Reyes in 2020, La Goyco is a community center that has an emphasis on culture and community. Mariana Reyes' goal is to contribute to the "...historical, social and potential wealth of the Machuchal community and the Loíza street sector in Santurce, Puerto Rico". The center is used to provide for the surrounding community as well as host cultural events and classes (Am et al., 2022).

With their focus being more on culture, they offer something different compared to other centers. Goyco also has a focus on emergency preparedness. They use solar panels and rainwater collectors to be better prepared in case of an emergency. While they do have protocols in place, they aren't fully developed, and they are looking to expand their protocols to be better prepared (Mariana Interview Notes in Appendix).

METHODOLOGY

Mission Statement

Our mission was to assist the development community climate adaptation in the Caribbean by furthering the development of resiliency centers. The execution of a case study on the Cubuy-Lomas and La Goyco resiliency centers helped us understand the vital role these centers play in emergency situations and community preservation. Our findings and toolkit will be shared by CCAN so they can better assist community climate adaptation efforts.

OBJECTIVES

1. Understand the development and operation of community centers to assist WPI-CCAN in their role as a supporting organization.
2. Developed outreach and networking campaign to spread awareness and advance connections with the Cubuy-Lomas Center
3. Synthesized an emergency preparation toolkit for our community center partners and other organizations.

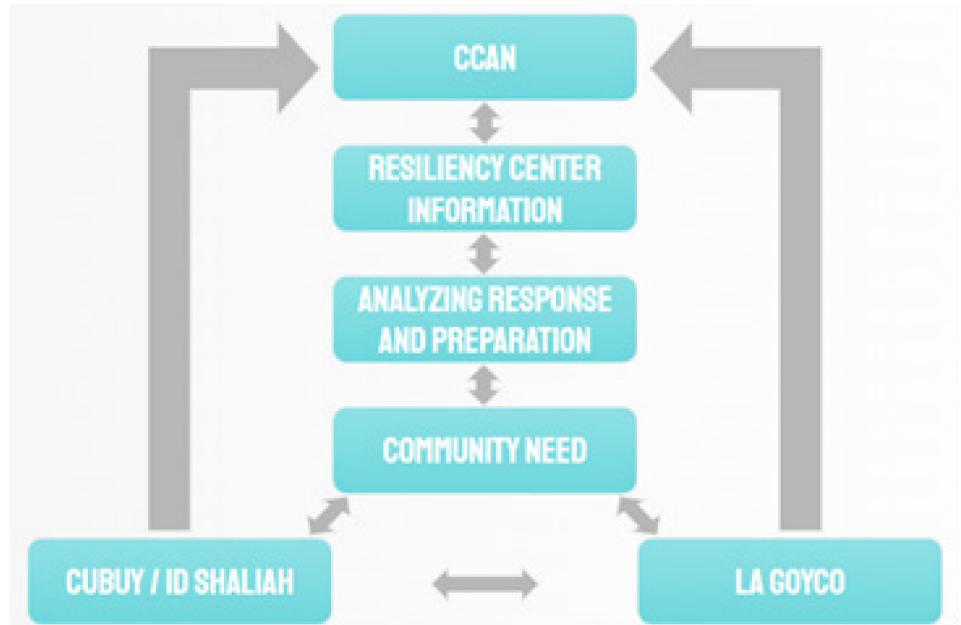


FIGURE 13: REPRESENTATION OF OUR BOTTOM-UP METHODOLOGY



Objective 1: Understand the development process of resilience centers to inform CCAN on how to assist the growth of community climate adaptation.

Our group helped strengthen connections between the WPI-CCAN team with the La Goyco and Cubuy-Lomas community centers in Puerto Rico. While assisting Javier Valedon, the head of the Cubuy-Lomas center, we learned how developing resilience centers are put together. The La Goyco center is much more established and faces different obstacles. During our time in Puerto Rico, we worked hand in hand with both groups, tracking the difficulties advancing centers face at different levels of development.

We have relayed the information we gathered to the WPI-CCAN team through our Puerto Rico Project Center, providing insight into how resilience centers operate and what might be supported. This data will help the rest of the CCAN understand challenges that centers face at varying levels of development so they can organize support networks and provide effective assistance to the centers.





Methods:

1. Executed a case study between La Goyco and Cubuy-Lomas community centers:
 - a. Developed vs. Undeveloped
 - b. Mountainous vs. Coastline regions
 - c. Explored funding differences.
2. Conducted key interviews to gain further knowledge:
 - a. Mariana Reyes, Executive Director of La Goyco
 - b. Javier Valedon, Founder of Id Shaliah and the Cubuy-Lomas center
 - c. Ricardo (Ricky) Otero Garabís, Head of Maintenance at La Goyco
3. Worked hand in hand with the volunteers at La Goyco and Cubuy-Lomas:
 - a. Manual Labor
 - b. Saturday work brigade at La Goyco
 - c. Distribution of water and food to local organizations





Objective 2: Developed outreach and networking campaign to spread awareness and advance connections with the Cubuy-Lomas Center.

A large part of establishing a community center is finding funding and spreading awareness of the center. Our team wanted to help Javier gain donations and spread awareness of his project through different social media outreach campaigns. These included updating his current social media accounts as well as reuploading the Cubuy-Lomas website that was active during 2020. The implementation of this website allowed supporting organizations to be informed on Javier's mission and goals before they decide whether to support him. As for existing social media accounts, we worked with Javier to update his Facebook and Instagram accounts. In Puerto Rico the population uses facebook regularly so prioritizing this site proved to be helpful to continue the spread Id Shaliahs reach.

Another method for spreading awareness as well as creating a method of accepting donations was to create a GoFundMe for Javier's organization. This included a step-by-step detailed list of the developmental plan of the Cubuy-Lomas site. Elaborating how donation money will be spent and why donations are so important incentivized donations. The site was also a great method of storytelling because it displayed how the site came to be and why the surrounding community needs the center so desperately. Also allowing people from all around Puerto Rico to support Javier's dream without having to travel up the mountainous region but still impacting the surrounding communities.





Methods:

1. Website:
 - a. Received the website information from the Advancing the Cubuy-Lomas Center in Puerto Rico project completed in 2021. Link to their project here: <https://wp.wpi.edu/puertorico/projects/2021-fall/cubuy-lomas-center/>
 - b. Researched payment options for Wix websites
 - i. Talked with Javier about which payment plan works best for his goals.
 - ii. Determined payment method for the domain.
 - c. Updated the website to make it more current and add different bios for current volunteers.
 - d. Attached donation box that directly links to GoFundMe page.
2. Social Media:
 - a. Gained a better understanding of the current social media accounts Javier uses.
 - b. Updated these accounts and bio.
 - c. Continued to update the social media accounts while we are here.
 - d. Uploaded photos
 - e. Updated the accounts with relevant information about the organization and what it is about.
3. GoFundMe:
 - a. Started a GoFundMe page that correlates with Javier's vision and goals.
 - b. Trained Javier on how to use GoFundMe effectively so he can run it himself.
 - c. Shared the GoFundMe and collected donations.
 - d. Wrote down a detailed list of how the money will be spent after donation.
 - i. Added the steps and stages of development for the site.
 - e. Connected the GoFundMe page directly to website.
 - f. Shared Javier's inspirational story.
4. Flyers with QR code directly linked with GoFundMe page and website:





- a. Easy access to donation box
 - b. Easy access to the website
 - c. Flyers placed around Cubuy-Lomas community center.
- 5. Provided a detailed folder with essential documents to Engineers Without Borders Madison Wisconsin (EWB-MW):
 - a. Cad models
 - b. Blueprints





Objective 3: Synthesized an emergency preparation toolkit for our community center partners and other organizations.

We developed an emergency preparation toolkit to help the La Goyco center and others better prepare for the next large tropical storm that hits the island. This toolkit includes a Critical Information System (C.I.S.) with a facilitator's guide, and an emergency preparation checklist. These tools are based on the work of the Piñones Preparation, Response, Recovery Project in 2021, for more visit WPI's Puerto Rico project center website: <https://wp.wpi.edu/puertorico/projects/2021-fall/pinones-mapping/>. The checklist is based off of the Puerto Rico's All-Hazards Plan written in 2020.

Methods:

1. Emergency Management Toolkit
 - a. Emergency Preparation Checklist with descriptions
 - b. Critical Information System (C.I.S)
 - i. Google My Maps system
 - ii. Google Excel Database system
 - iii. Google Forms
2. C.I.S Facilitators Guide and Manual
 - a. Developed understanding of why and how to use the C.I.S system.
 - b. Showcase the system to the community outreach committee at La Goyco



CASE STUDIES

Introduction

Our project focuses on learning the developmental process of resilience centers in different stages to help further community climate adaptation. Hence, our team conducted case studies on the established Taller La Goyco community center and the developing Cubuy-Lomas community center.





Taller Comunidad La Goyco

Introduction

Taller Comunidad La Goyco (La Goyco) is an established community center located near the coastline of San Juan, Puerto Rico. The building that houses La Goyco is an abandoned middle school that was vacant starting in 2015 after gentrification of the area. La Goyco officially claimed the building in 2020, but their work at the school began closer to 2015. Mariana Reyes is the co-founder and current Executive Director of the La Goyco center. La Goyco provides local community residents with food, water and a safe meeting ground during natural disasters or other emergencies.



FIGURE 14: THE ENTRANCE OF THE TALLER LA GOYCO BUILDING

Slowly La Goyco was able to continue their growth after increased resources and help from community volunteers. They were given solar panels and two Tesla batteries through a donation. These efforts boosted their traction within the community and gave them more financial resources to further develop the center. They now offer needed refuge during the hurricane season when the island gets hit hard by tropical storms etc. This is a crucial piece to their essential presence within the community.



FIGURE 15: LA GOYCO'S KITCHEN WITH SOLAR PANELS AND WATER TANK ON THE ROOF

Mariana Reyes, Executive Director, stated that La Goyco's mission is to "Defend the community... by focusing on three main factors: health, environment, and community." For more



information on La Goyco visit the La Goyco Facebook page or WPI's Puerto Rico project center website. She went on to explain that the main problems the community faces recently are gentrification, trash, business disruptions and natural disasters. Mariana emphasized that there are currently 2,000 houses that surround the La Goyco community center and about 800 of them are Airbnb which disrupts the local economy due to gentrification. Homes and rental properties that were affordable for residents are now too expensive because they were replaced by high-end condominiums. This draws on the resiliency of the local community. La Goyco provided a structure developed and maintained by the local community. Everyone that works at La Goyco is from the area and wants to contribute where they can. A defining feature of their success has been the recent hiring of staff members after many years of being exclusively volunteers. This is a big hurdle many aspiring centers face. This type of community hub demonstrates strength, which is certainly needed during natural disasters and other emergencies. Striving for everyday resilience in Puerto Rico is vital, and La Goyco plays a significant role in the community of San Juan. Figure 12 highlights the rooftop garden

and seed bank at La Goyco. This garden is small, but offers various fruits, vegetables and seeds that can be used to consume or create compost. The garden beds are made of repurposed plastic tanks and are a fitting example of how La Goyco uses their resources efficiently. This garden highlights a notable example of everyday resiliency.



FIGURE 16: LA GOYCO'S ROOFTOP GARDEN AND SEED BANK





Developmental Findings

During our time at La Goyco we found several crucial findings that help the development of their center, but also to other community centers that are not as developed yet. The knowledge gained from La Goyco will be compared and used to help the Cubuy-Lomas community center that is discussed later in this report. Our first finding concerns how La Goyco gets funding.

Funding

La Goyco started with \$0 in funding in 2015 and now in 2023 they recently received a one-time \$1M grant to add onto their annual budget. How did they do this? It all started with their kitchen. Once they were able to provide free food and water to the community, their status within the community began to grow. This led to more volunteers, donations, and overall support from the community. Then once the small classrooms were refurbished and ready, they began renting out small art studios to different artists who needed a space to work. They also rent out larger rooms as office spaces for small local businesses and organizations. These rentals bring in a large percentage of their budget for the year. They

also host art showcases for the artists to sell their work, which drives foot traffic to the center.

They also have a small thrift store at the entrance of the building that sells items at a discounted rate. These items range from clothes to baby strollers to sunglasses. They receive most of these items by donations and then sell them for a small profit to the community. The thrift store makes up a small percentage of their funding budget.

La Goyco also takes donations and works alongside local organizations, such as Estuario, to gain resources and funding for projects. Estuario is a local organization that works in various regions of the island to help develop community centers further by providing the necessary funding or resources. For more information visit estuario.org. The second most crucial piece for La Goyco was receiving grants from the government. Mariana Reyes and the board members at La Goyco have experience with fundraising and strong formal communication skills required for writing successful grant applications. As noted in the recommendations for CCAN, grant writing should be a focal point for helping the development of community centers in Puerto Rico.

Geographical Advantages and Challenges

La Goyco is in San Juan, Puerto Rico in the northeast region of the island. They are roughly 4 blocks away from the ocean and about 10 blocks from the Condado strip, which is a very popular strip for tourists and businesses.

La Goyco's location presents unique advantages and disadvantages for the community center. The first example is the location of the community center is in a busy urban area. It is also on one of the most popular streets for food and business in the area and gets a lot of attention from locals and tourists. This helps them gain more awareness, volunteers, and donations for the center. However, it also means that in times of crisis they must also be able to provide aid to a larger population of residents. The location of the center also means they have easier access to necessary resources due to its position within the island's central city, with multiple access routes. The community center is still susceptible to hurricanes and other natural disasters, but when you compare it to other parts of the island, San Juan is a good spot to be in.

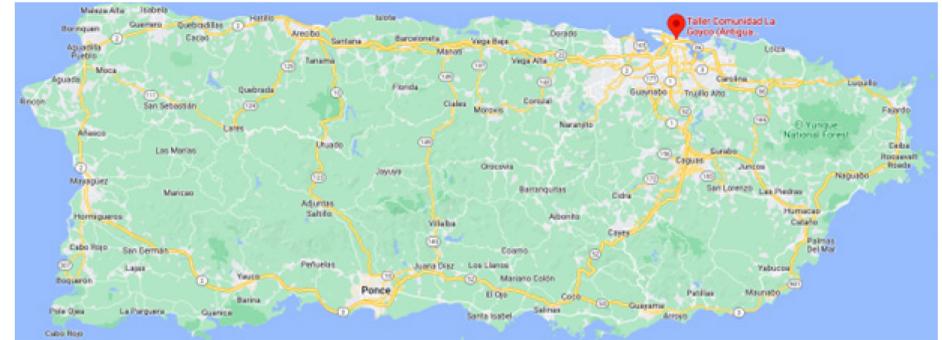


FIGURE 17: LA GOYCO GEOGRAPHICAL LOCATION RELATIVE TO THE ENTIRE ISLAND



FIGURE 18: LA GOYCO GEOGRAPHICAL LOCATION RELATIVE TO SAN JUAN

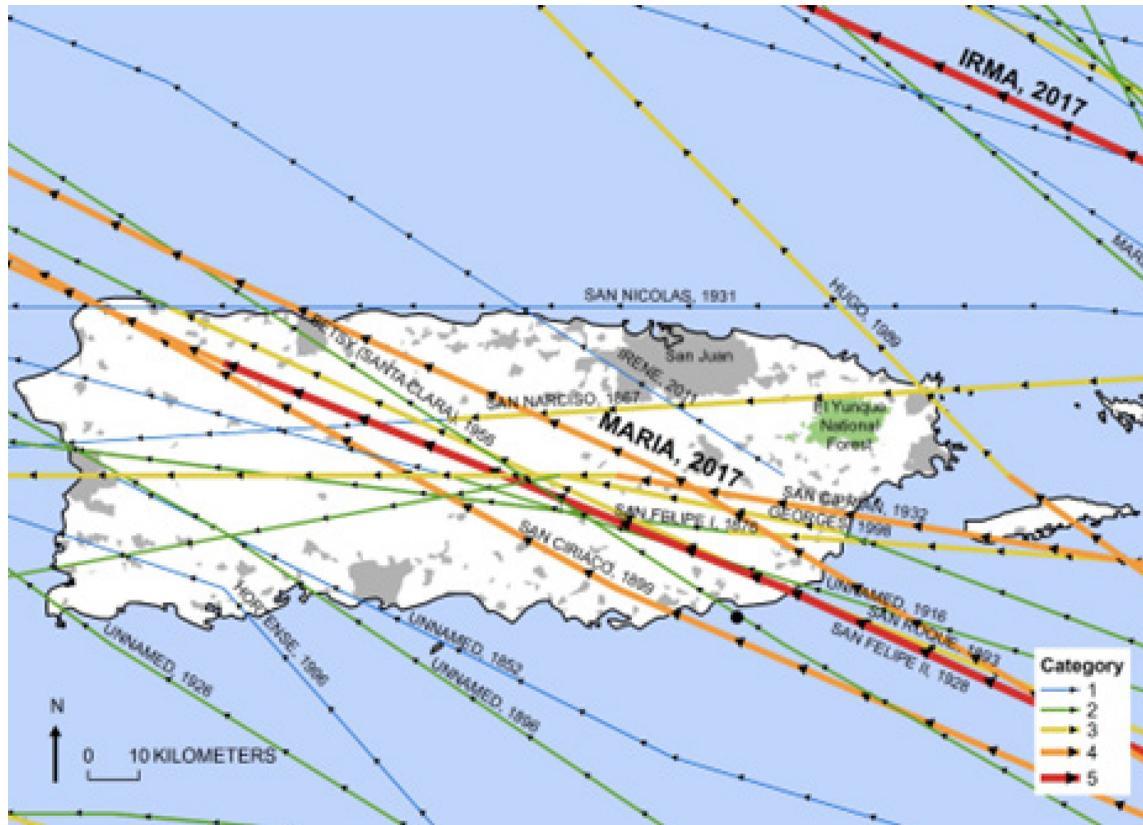


FIGURE 19: PUERTO RICO HURRICANES MAP (PUERTO RICO HURRICANES MAP | U.S. GEOLOGICAL SURVEY, N.D.)



Recommendations

For La Goyco to continue to develop its resilience center capacity, we recommend the following:

1. Adapt the C.I.S mapping system to meet the needs of the community and La Goyco and share it with the entire community.

Our team has developed a system designed to keep things organized and structured in an emergency or natural disaster. The application can serve multiple purposes not only when there is an emergency. The use of the C.I.S mapping system can be changed and molded to fit the exact needs of the community center whenever needed. An example would be changing the questions on the Google Form to get different information. Putting a QR code on the monthly La Goyco flyer would serve as an easy method of collecting information and would build a strong database where assets and vulnerabilities can be stored for future use. Specific instructions will be labeled out in the manual of the Emergency Preparation Toolkit. Study and use the manual to best determine how information from the community should be collected and stored.

2. In the event of an emergency or natural disaster, use the Emergency Preparation Toolkit.

The C.I.S mapping system and database are informative on their own, but together they work even better. Using both functions during an emergency could alter the response and preparation to natural disasters in the future. One example would be filtering through who is currently the most vulnerable in the community, so you can determine their location and prioritize helping them. Using both functions together would also mean better asset management because you can determine who has certain things, such as a generator, and then find exactly where they are on the map. Understanding how to use both functions will be very beneficial to the mitigation and response of natural disaster damages.

3. Build an Emergency Protocol for the La Goyco center.

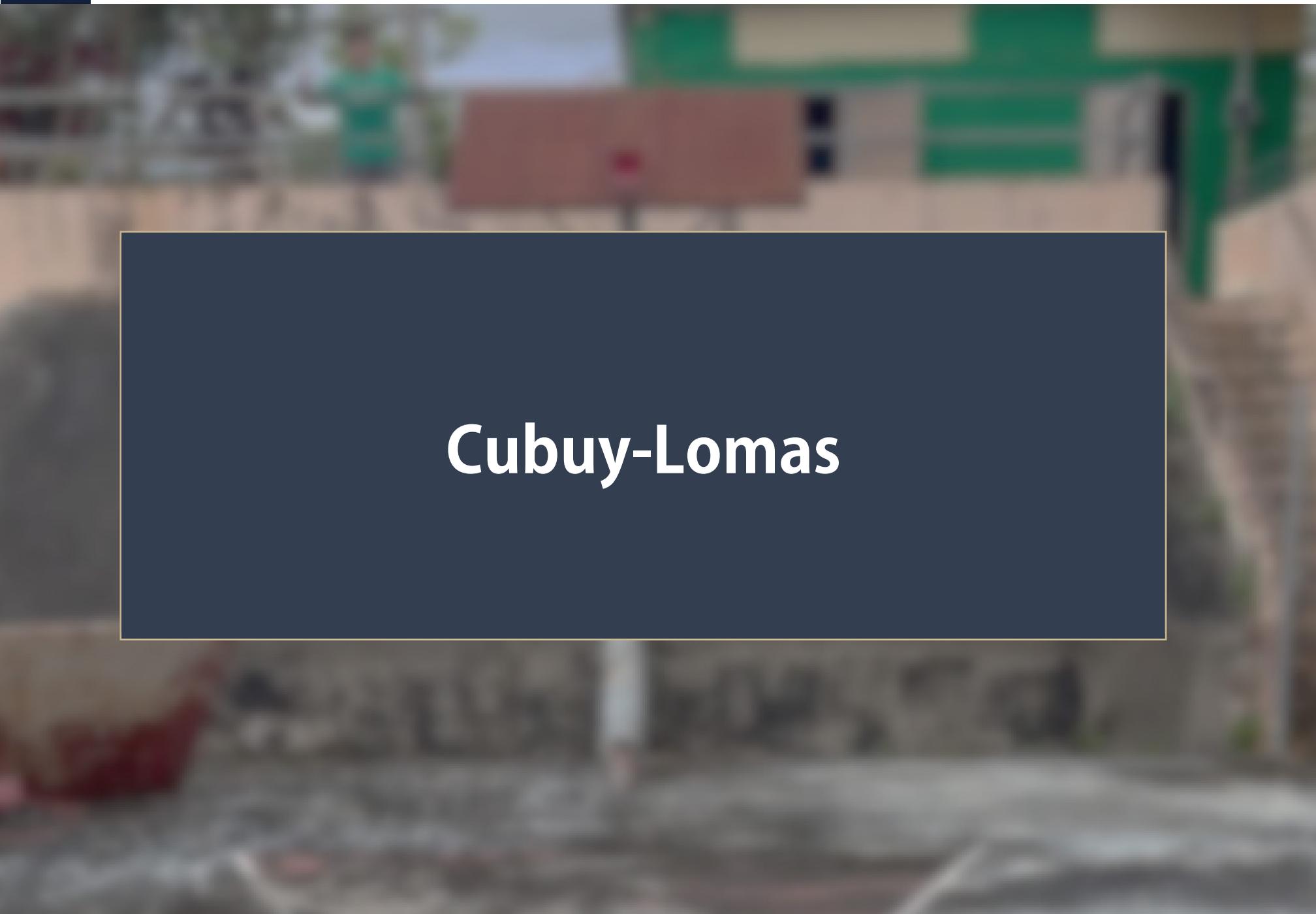
While the Emergency Management Toolkit can help centers prepare for and respond to natural disasters, it does not directly address an emergency protocol for the La Goyco center. As Mariana explained, they currently





do not have any procedures when they know a hurricane is about to hit. They simply show up to La Goyco and start doing things on the fly. Having a structured protocol in place will help create a better preparation process for the La Goyco center and the community before natural disasters occur.



The background is a blurred photograph of a school building. A prominent sign with a red dot is visible on the building's facade. The overall scene is out of focus, emphasizing the text overlay.

Cubuy-Lomas



Introduction

Javier Valedon runs the Cubuy-Lomas Center, where they focus on helping the community by distributing food and water and plan to offer other services once officially up and running. Javier came up with the idea of creating a resilience center while he was living in Columbia. He recounts that one night, God came to him in a dream and told him that his purpose in life is to feed the hungry. When he woke up, his cousin in Puerto Rico had contacted him. He told Javier that he too had the same dream that night. This event kickstarted the project and Javier moved back to Puerto Rico to begin realizing his dream of helping others.

The first thing needed to establish ID Shaliah as a real non-profit was find a space to run the organization. That was when he stumbled across the abandoned school building in Canóvanas municipality in Puerto Rico. It had lots of space and rooms to renovate and rent out to create sustainable income. In 2020 Javier investigated acquiring the building from the government, “The building would've cost me half a million dollars” Javier said. Due to the nature of his project, being a non-profit

organization and his relationship with the municipality office, the government gave him an option to lease the center for \$1 a month. With this, ID Shaliah began to operate out of the abandoned school.

Plans and Operations

ID Shaliah has come up with a three-stage process to create their center from the ground up. The first stage consists of receiving unique permission from the Puerto Rican government to officially open the center. This permission allows them to hookup electricity to the building. Obtaining permission has been slow due to an argument within the government between using certain laws from 2010 and 2020. Applying for the unique permission costs roughly \$500, but if the law gets reverted back to the 2010 ruling, Javier will have to start the process over. We managed to secure a meeting with a city planner for Canóvanas and traveled to the municipality office to learn what the next steps were for Javier. After our meeting, Javier told us that the government made less money using the law established in 2020 and is





trying to switch back to the 2010 laws due to this. Mistrust between the community and the government is very prevalent and Javier told us, “If the government was my uncle, I would already have permission”. ID Shaliah’s entire mission has been put on hold while waiting for the government to decide what they want to do. Once the permission is finally granted the first stage also includes connecting the school to electricity and water systems.

The second stage includes opening certain support systems for the community. Certain organizations such as a pharmacy and health clinic will move into two rooms that have recently been renovated. These businesses are important because the closest health service that is offered is about 30 minutes away and was inaccessible for extended periods of time during hurricane Maria. Therefore, ID Shaliah will be providing a very useful service to the residents. Also incorporated with the first stage is setting up an industrial kitchen. The kitchen will be used to create meals for the public and will be set up to look like a restaurant experience.

Lastly, the third stage will include some of the less important systems they want to add to the

center. Plans for a garden and chicken coop will provide the center with locally sourced vegetables to cook meals for the community. The chicken coop will supply eggs sold from the center as a source of funding. A self-defense room will be available for classes as well, this room has punching bags and mats for training. Javier also has several rooms that he hopes to rent to local businesses once the site gets up and running including a bakery and even a clothing shop for visitors.



FIGURE 20: ID SHALIAH TEAM IN FRONT OF THE CENTER

A resilience center is not only used for emergency preparation and response but also to connect locals by giving them a place to gather and encourage one another. In May, Javier will be hosting a farmers market consisting of over 40 stands. Most participants are local farmers and businesses that will come and set up a tent for a small cost. Local bakers will provide cakes and desserts and others will provide locally sourced vegetables. This event is a

fantastic opportunity for networking and spreading awareness of ID Shaliah and their goals.

Locational Disadvantages

The community center is located southeast of San Juan in the Canóvanas municipality. When you drive east from San Juan everything begins to change from a flat urbanized area to mountain roads with miles between homes. The center is in the forest along one of the main roads in and out of the area.

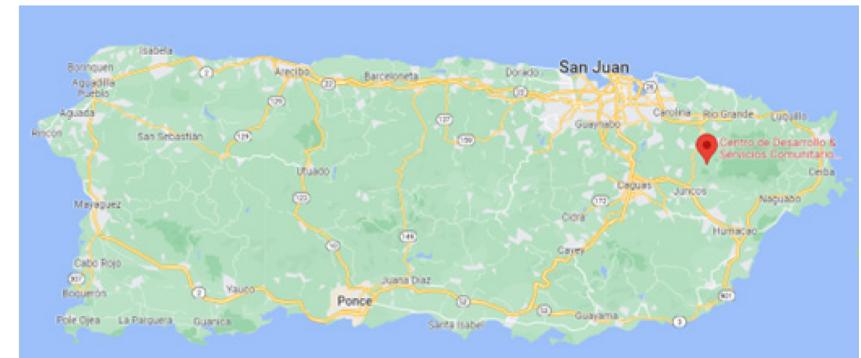


FIGURE 21: CUBUY-LOMAS CENTER LOCATION



The location of the community center is very important because of the terrain and challenges that come with it. The mountains are not easily accessible which makes it a dangerous place to be during a hurricane or storm due to the lack of transportation in the area. Also because of its location, limited services are offered, and the locals must rely on transportation in and out to get things that are easily available in other locations like San Juan, Puerto Rico. The community center that Javier is developing works to combat these issues to better prepare his community for upcoming storms.

Developmental Findings

While comparing the key differences between the developed center La Goyco and the lesser developed Cubuy-Lomas our team had to figure out how we would help Javier. Due to its locational disadvantages and lack of resources we decided that a networking campaign to spread awareness of their mission would be vital to the center. Javier emphasized one of the main problems is that “most people outside our community have no idea we exist”. This limits Javier's ability to receive the necessary funding and help from other organizations outside the community. To counteract

this problem, we worked with Javier to spread his influence by establishing a website and GoFundMe page.

Website

A large portion of our project with Javier and his community center in Cubuy-Lomas was spreading awareness of his project outside of the town it inhabits. A main way to distribute information to different supporting organizations and new stakeholders is to provide a website that contains all the basic information of the center for people to understand what they are supporting. We were granted access to a website that was created by the Cubuy-Lomas IQP group from 2021, that has been offline, and decided to adopt it. The website was previously discontinued due to lack of funding and being outdated.

The website was made using Wix, an online service that allows users to create their own websites. To put these websites up, they need to pay for a subscription plan and a domain. There are many different types of plans for Wix. There are four different website plans and three business plans. The website plans offer the more affordable options and are made for simpler websites. The business plans





are more expensive and cater for established businesses. The main difference between the two versions is that business plans allow your website to sell products.

Core Features

- ✓ Accept payments
- ✓ Plans and recurring payments
- ✓ Customer accounts
- ✓ Custom domain
- ✓ Free domain for 1 year
- ✓ Remove Wix branding
- ✓ Storage space - 50 GB
- ✓ Video hours - 5 hours
- ✓ Lead - capture forms - 10
- ✓ Fields per form - 50
- ✓ Site Booster app
- ✓ Events Calendar app
- ✓ Professional logo
- ✓ Social media logo files
- ✓ Customer care - 24/7 customer ...

FIGURE 22: FEATURES OF OUR WEBSITE PLAN

We spent time editing and updating the old website, giving it more relevant and up to date information. The largest change was adding a link to a GoFundMe page through the donation button in the top right corner of the homepage. Going with a business account added a sense of legitimacy to the website.

The previous IQP group acquired cubuylomascenter.org as the domain for the website through Wix and when the website subscription expired so did the domain. The plan we used let us use a domain for free for the first year. We decided to abandon the expired domain and got a new one, cubuy-lomascenter.org. The service costs around ten dollars, but it took roughly two weeks to get the domain connected and to have the website up and running. After the payment for the domain went through, the website should have been up and running within thirty minutes. After two days we contacted Wix’s customer support regarding our unpublished domain. We were informed that Wix had to hand it off to their professional team to take a closer look. After approximately two weeks our domain finally went live.

We sat down with Javier to see what aspects of the existing site he wanted to change and update. Some of his requests were removing certain sponsor logos from the site, as well as updating opening dates and other information. Once all this was done, we began to send emails to organizations that support similar projects, linking them to our website as a reference to gain further knowledge of the resilience center.

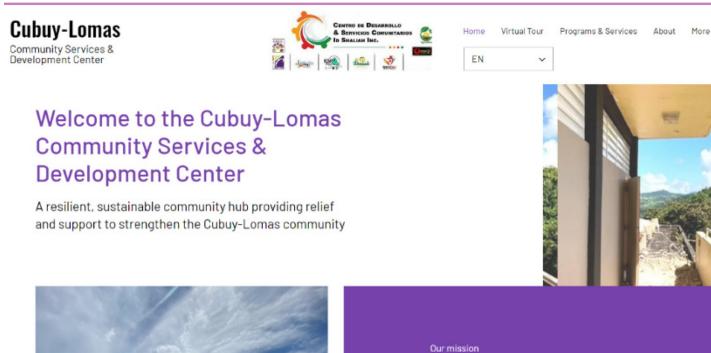


FIGURE 23: CUBUY-LOMAS WEBSITE HOMEPAGE

GoFundMe

Approximately only 25% of the smaller organizations and communities that Javier donates food and supplies to ultimately donate back to his organization, ID Shaliah. Javier is constantly reiterating the challenge of running a non-profit with minimal donations and funding. To combat this issue, he has been facing we decided to create a GoFundMe page for his project in hopes of raising money and support for his organization.

The GoFundMe page features the history of the location as well as the story of the creation of the

Cubuy-Lomas community center. It speaks upon the phases of development that Javier has planned over the next several years as well as what each phase entails. We describe how the funds will be repurposed and describe the reasons why the center is important to the surrounding community and location. To donate or visit see the link below: <https://www.gofundme.com/f/feeding-the-people2023>

Simply putting a GoFundMe up on the internet does not provide much awareness to it. Therefore, our group had decided to link the website to the GoFundMe page through the donation button. When a user clicks on the donation button, it will bring them directly to the GoFundMe page where they can learn more information and donate whatever amount they want. Our team has also spread the link to the GoFundMe on our social media to hopefully get those we know personally involved with our project. We also tried to direct message famous Puerto Rican natives including Bad Bunny, a famous Puerto Rican musical artist, about our project in hopes they would share the GoFundMe on their social media pages. Unfortunately, we did not receive a response.





Feeding The People



Javier Valedon is organizing this fundraiser to benefit ID Shaliah Inc. ✓

Después de que el huracán María azotara a Puerto Rico en 2017, más de 400 escuelas tuvieron que ser abandonadas. En 2020, la organización sin fines de lucro, ID Shaliah, adquirió una de estas escuelas y está abriendo un centro comunitario resistente que

\$275 USD raised of \$5,000 goal

6 donations

Share

Donate now



Lufkin Family
\$200 • 57 mins



Humberto Torres
\$25 • 4 d



Andrew Lufkin
\$20 • 5 d



Matt Morvillo
\$5 • 5 d



Riley Naclerio
\$15 • 5 d

FIGURE 24: GOFUNDME PAGE





Recommendations

For Cubuy-Lomas to continue its development as a community center we recommend the following:

1. Continue to apply pressure on the government to award ID Shaliah unique permission.

Due to the process that the municipality goes through to open the center, Javier is unable to continue working until he receives unique permission to begin. Unfortunately, the local government is debating between using sets of laws from 2020 or 2010. The government will not come to a decision about the community center's unique permission until the courts come to a decision. This is preventing Javier from inviting the Pharmacy and Health clinic to move into the center and begin offering their services. It is crucial to the development of the center because the organizations will be paying Javier monthly rent. The first step to producing a sustainable and effective community center is to create rental income and that can only be done when permission is given.

2. Continue networking with larger organizations.

One of the greatest qualities of our sponsor Javier is his ability to network and forge relationships with anyone he meets. This skill has opened many doors and can be used to help secure connections with likeminded organizations. Estuario is a 501 C3 non-profit that focuses on helping community centers get running by donating certain appliances. La Goyco has a strong connection with this group and many of their office supplies were donated from Estuario. During our time in Puerto Rico, we contacted Estuario to inquire about their ability to assist an association like ID Shaliah. Continuing to strengthen the relationship with Estuario as well as La Goyco will be key to receiving kitchen appliances and receiving support from a community center that is well established.

3. Continue to use our social media tools to spread awareness and gain funding for the community center.

Our group concluded that Javier needed to increase his outreach to potential funders and supporters. The awareness of the center is limited to the surrounding community. In order to increase support, they must spread their influence to different areas of Puerto Rico. Social media is a great tool to accomplish this task. Consistently



uploading photos and descriptions of the project at hand on sites like Facebook and Instagram will help build a following, increasing donations and support. Maintaining the GoFundMe and the website that we set up for Javier is a first step to developing tourism to the center and offering goods to people outside the immediate reach of the community center. Social media can also be used to promote events like the farmers market that ID Shaliah is hosting in May, increasing foot traffic, and supporting local businesses.





OUTCOMES AND DELIVERABLES

This project resulted in three main outcomes highlighted below: An Emergency Preparation Toolkit, a showcase with community leaders, and social media tools for the Cubuy-Lomas community center.





Emergency Preparation Toolkit

The Emergency Preparation Toolkit helps provide communities strategies for effective emergency preparation. In times of emergency, such as hurricanes, one of the most important strategies is to plan and have systems in place to allow for effective response. The two main strategies featured in this toolkit are the Critical Information System (C.I.S.) and the Emergency Support Function (ESF) chart.

The C.I.S. system was built off the work done by the Piñones Preparation Response and Recovery project in 2021. The original concept was created by Jack Gomes, Cole Varney, Sarah Hildreth and Nicole Logrecco in collaboration with their sponsor organization La Corporacion Piñones Se Integra (COPI) as well as co-researchers Paola Rolon and Shawn Halliburton. Please find out more about this project on the PRPC site here: <https://wp.wpi.edu/puertorico/projects/2021-fall/pinones-mapping/>

There are two components to the CIS system, the technical and structural outlines. At the top of the organization structure shown in Figure 25, there is

the community hub and coordination committee. These two groups oversee managing the Critical Information System. They will be the organizers and decision makers in emergency situations. These groups will also be the bridge to the community, collecting the information that will be used in the CIS. Once that information is collected, it will be stored in a database and visualized through GIS mapping, the technical component.

The C.I.S. uses Google Forms, Google Sheets and Google My Maps to collect essential information from people living in the surrounding area. The Google Form asks questions that allow you to find out about a specific person's current conditions and if they would be vulnerable during an emergency. It also collects information on the assets in the community, like where generators or medical professionals are located. This data is then placed into a Google Sheet that acts as a database. The database is then put into a Google My Maps that shows the person's location and information if clicked on. This information will help determine who needs help first based on their vulnerabilities and where they live. This technical outline is shown in figure 26.



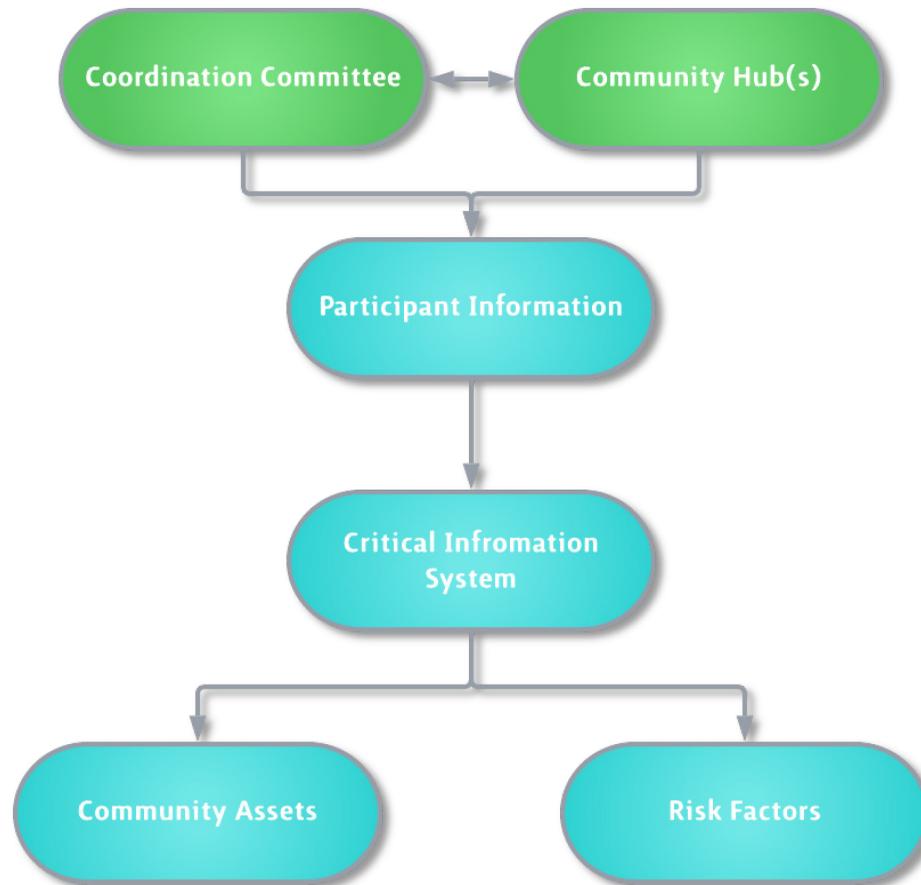


FIGURE 25: CIS ORGANIZATIONAL STRUCTURE



FIGURE 26: CIS TECHNICAL SYSTEM

The C.I.S. system will help provide multiple maps that can be used during times of emergency. This first map that will be important is the vulnerabilities map as shown in Figure 26. As shown, there can be different icons associated with each

vulnerability. An example, the icons with a baby show that there are one or more minors in the household. This type of map can alert community leaders exactly where the most vulnerabilities reside and can inform the best response plan.

The second map that can be created is an asset map. This map can be used to identify and locate much needed assets for preparation or response. This map specifically highlights generators or solar panels, cars, boats, and doctors in the community. Again, this can be highlighted through custom icons for each location as shown in Figure 27. This map is also used to identify meeting points, community hubs and evacuation routes.

We hope that this system can be used to assist communities and that the toolkit can guide them to understand how to use it. This system has potential to help people and lead to more benefits for community centers and the residents. This tool could be something that CCAN and the WPI Global Project Center can investigate and implement at other locations on the island.

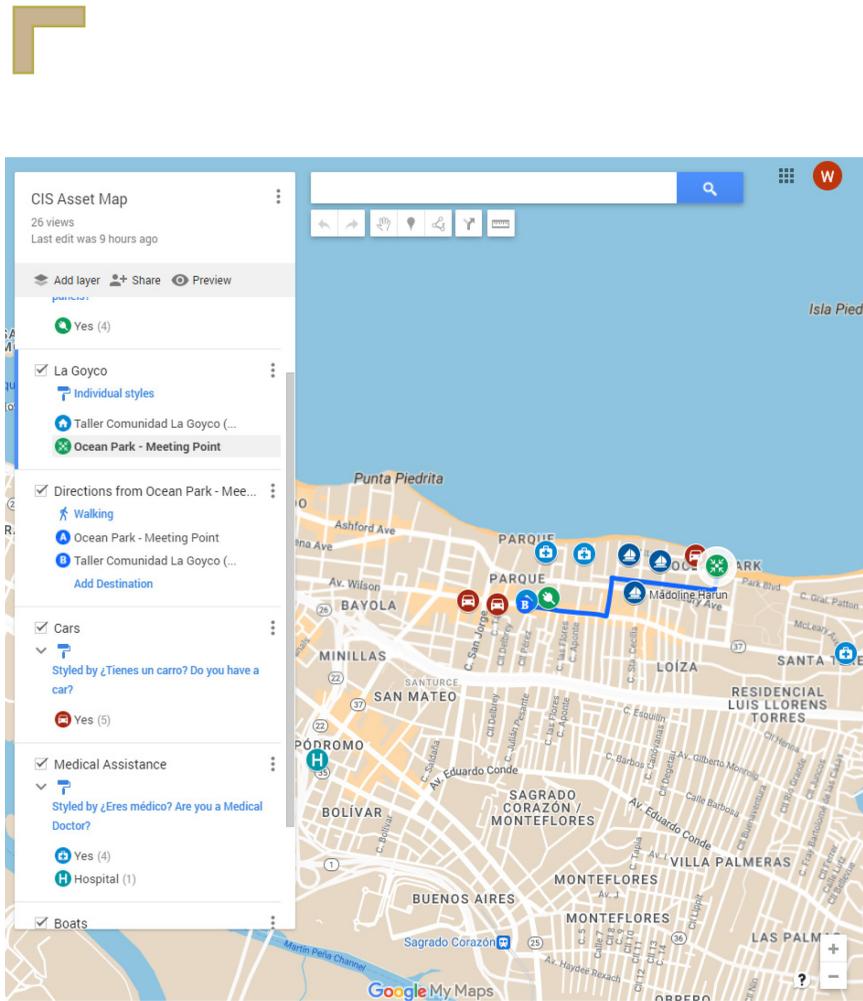


FIGURE 27: ASSET MAP

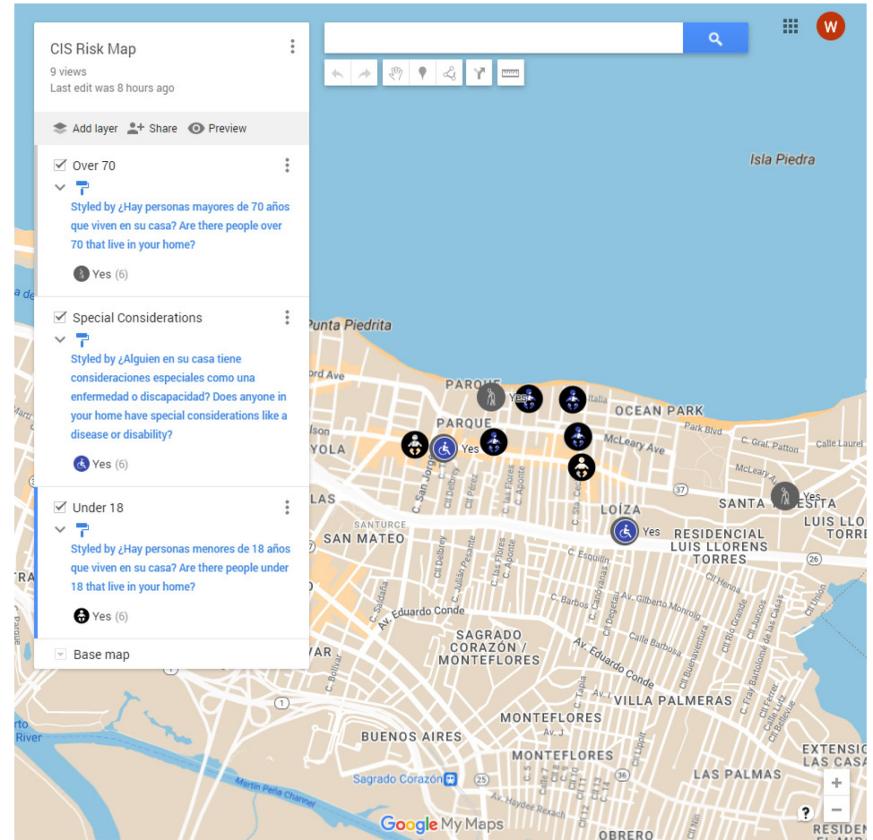


FIGURE 28: RISK MAP

few shortcomings the system faces are its offline capabilities. By the end of the project, the group was unable to access the maps without an internet connection. This could be a problem since during natural disasters, the internet is one of the first things to be lost. One solution would be to print these maps, but this would lose a lot of the functions the online version provides. This could be something a future group could try to improve so the system is more effective.

Emergency Support Function (ESF) Checklist

The ESF Checklist uses information from Puerto Rico’s All-Hazards Plan to evaluate a community center's capabilities during times of crisis. We took the seven most important core capabilities that the All-Hazards Plan says are essential and put them into a checklist. This allows centers to easily check for what they already have, what they have in the works and what they need to prepare for the future.

Emergency Preparation Checklist: Descriptions	
1. Developed Action Plan	A plan in place that can adapt to the different incidents or emergencies that arises.
2. Situational Awareness Assessment	Gather awareness of where to locate resources or help in the region before, during, and after an incident occurs.
3. Joint information system and center	A program / or committee that can provide consistent public messaging to the region before, during, and after incidents occur.
4. Basic Communication	The ability to effectively communicate within the organization and with Municipal response agencies.
5. Coordination between stakeholders and commonwealth	Establish operational coordination within local, commonwealth, and possibly federal stakeholders and coordinate operational capabilities.
6. Adequate Response Capabilities	Deploy adequate response capabilities in impacted jurisdictions to mitigate damages until responders arrive.
7. Critical Transportation Services	Determine the most appropriate transportation services to facilitate response and act if possible.

FIGURE 30: CHECKLIST DESCRIPTIONS

Emergency Preparation Checklist	
Core Capabilities	Current Status
1. Developed Action Plan	
2. Situational Awareness Assessment	
3. Joint information system and center	
4. Basic Communication	
5. Coordination between stakeholders and commonwealth	
6. Adequate Response Capabilities	
7. Critical Transportation Services	

Key	
Yes	✓
No	✗
In Progress	+

FIGURE 31: EMERGENCY PREPARATION CHECKLIST

Once we established a finalized checklist, we presented it to Mariana Reyes, the head of La Goyco, and Javier Valedon, the head of Id Shaliah so they could fill it in. The significant difference between these two community centers meant their Emergency Preparation Checklists looked vastly different. Highlighting the importance of the core capabilities and their status helps provide context on the areas their community centers need improvements in to better mitigate damages before or during an emergency.

La Goyco vs. Cubuy-Lomas

Emergency Preparation Checklist		
Core Capabilities	La Goyco	Cubuy-Lomas
1. Developed Action Plan	+	✗
2. Situational Awareness Assessment	✓	✓
3. Joint information system and center	+	✗
4. Basic Communication	✓	+
5. Coordination between stakeholders and commonwealth	+	+
6. Adequate Response Capabilities	+	✗
7. Critical Transportation Services	✗	✗

Key	
Yes	✓
No	✗
In Progress	+

FIGURE 32: EMERGENCY PREPARATION CASE STUDY CHECKLIST

For more information on the Emergency Preparation Toolkit view this file on WPI's Puerto Rico Project Center website:

<https://wp.wpi.edu/puertorico/projects/2023-mar-may-2/ccan/>.



Showcase with Community Leaders and Estuario

Our team conducted a showcase on the C.I.S. and Emergency Preparation checklist with Mariana Reyes, Executive Director of La Goyco, and Alex Villegas, Community Resilience Coordinator for Estuario. They expressed great interest in the C.I.S. system after we walked through how the application works and how they can implement it within the different communities they are working with.

They believe the C.I.S. system will be a terrific way to track assets and vulnerabilities within the community and want to discuss this application further with the project managers at Estuario. This initial showcase helped set the foundational pieces for the Puerto Rico project center to build a relationship with Estuario. We also established a follow-up meeting with Managers from Estuario, and community leaders that will take place after this report is submitted. This is a big step for the project center and Estuario. The connections we build with Estuario will also help us introduce them to Javier Valedon,

Social Media Tools for Cubuy-Lomas

As of right now, Cubuy-Lomas community center has no funding and runs strictly off donations and volunteers. After receiving a dead website from the 2021 Cubuy-Lomas WPI group, we set up a domain subscription for two years and linked the GoFundMe page to the donations button in the top corner for easy access. As of now, we have raised a total of \$275 for Id Shaliah. After building and showcasing the GoFundMe to Javier, we taught him how to run the page so he can do it himself. The same goes with the website. On top of these two applications, we also provided Javier with QR codes to both the GoFundMe page and the website. Both the website and GoFundMe page will be essential tools for reaching out to potential organizations and donors because it shows signs of legitimacy and helps envision the future goals of the center.



¡Escanee el código para donar!

¡Gracias!



¡Escanee el código para obtener más información sobre Id Shaliah!



FIGURE 33: QR CODE FLYERS FOR GOFUNDME (LEFT) AND CUBUY-LOMAS WEBSITE (RIGHT)





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