# Piñones Preparation, Response, Recovery Project

An Interactive Qualifying Project Report
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Sponsor Liaison
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# Abstract

The Piñones neighborhood in Loíza, Puerto Rico struggles to prepare for frequent natural disasters. Our team worked to improve the BARA GUABEL program, an initiative that combats the lack of community preparedness for natural disasters through networking and collaboration. We improved communication between residents by surveying community members and logging the collected data in a technical mapping database. This helped inform Piñones leaders of residents' amenities, skills, and needs. Piñones currently possesses resources and skills to better prepare for incoming natural disasters. The new connections and a plan for centralized resources through BARA GUABEL has built a foundation for the community to increase its resilience to natural disasters.



# Acknowledgments

We would like to extend a special thank you to everyone involved in the Piñones Preparation, Response, Recovery Project; our sponsor organization COPI; co-researchers Shawn Halliburton, Paola Rolon Diaz, and Angel Bermudez, organizational leader Giomar Cruz Látimer, and all of the hardworking Piñones residents and community leaders who helped complete this project. The relationships formed during this process have been essential to the growth of the BARA GUABEL program and PPRR project. We've learned valuable skills throughout working with the listed names and will forever be grateful for the time we spent in Puerto Rico working amongst an exceptional group of people.


# Executive Summary

Piñones, a community within the municipality of Loíza, resembles an island within an island. It is separated from the rest of Puerto Rico by three natural barriers: a river, a large mangrove forest, and the Atlantic Ocean. The only way to access Piñones is via a single two-lane road that extends along the coast. The lack of accessibility to Piñones inhibits the flow of both resources and people. Therefore, it is important for Piñones residents to be able to take care of each other in times of emergency.

In order to combat this challenge, our group worked alongside La Corporación Piñones Se Integra (COPI). COPI is a small organization that strengthens the community of Piñones through sustainable initiatives. COPI offers cultural and ecotourism services such as Bomba workshops, Afro-Puertorrican music shows, bike rentals, kayak rentals, and mangrove forest tours.

In 2021, COPI started the BARA GUABEL program. BARA GUABEL stands for Bringing Awareness to Rural/ at Risk Residential Areas Generando Unidad A través de Buenas obras, Educación y Liderazgo, which translates to Generating Unity Through Good Actions, Education and Leadership. The BARA GUABEL program concept was created as a result of expressed concerns from Piñones community members regarding their vulnerability to natural disasters and their inability to reach people in the event of an emergency.

The BARA GUABEL program combats the lack of community preparedness for natural disasters through networking and collaboration. Throughout the seven weeks that our team spent in Puerto Rico, we collaborated with sponsors, co-researchers, and the community to expand the influence of the BARA GUABEL program in Piñones.

**Connecting the Community to Each Other Through the BARA GUABEL Program**

We gathered information from the community by walking door to door, holding conversations with residents and asking them to fill out surveys. The information collected includes technical skills and personal needs that members of the Piñones community may possess or require. The BARA GUABEL program will use this information to help prepare for incoming natural disasters in addition to informing the community about events, opportunities, and services available to them.

Piñones community members exhibited a multitude of strategies by which they rely on the land around them to survive. Between local fruit trees, the capturing of local livestock, and knowledge of medicinal plants in the area, the community demonstrated their deep understanding of self-sufficiency. The community members also demonstrated a wide variety of technical skills and abilities. We found that residents within the community reported having experience in fields such as carpentry, mechanical, electrical, construction, medical, and cooking. The residents we interviewed were willing to provide their skills to fellow community members in times of need. Utilizing the community's self-sufficiency and technical skills prior to the onset

of disasters can reduce their vulnerability to extreme weather events by lessening their reliance on outside resources.

**Identifying Strategic Partnerships**

We were able to connect the BARA GUABEL program to the Centro Comunitario Emiliano Figueroa Torres, a vacant school in Piñones that is actively being renovated into a community center. There are eight non-profits working out of Centro Comunitario Emiliano Figueroa Torres. A meeting has been set up with the leaders of all the organizations on May 3rd. At this meeting, our co-researchers will explain BARA GUABEL's goals and purpose. They will also express how we believe the community center would benefit from a centralized way to promote its events and goals.

**Advancing the Technical Mapping System**

The technical mapping system contains all the information we collected via our surveys. This includes residents' locations, the skills they are willing to offer to the program, their needs in times of emergency, etc. There are currently 29 households represented in the technical mapping system.

This map will be used by community leaders to identify households that have specific needs, desirable skills, and useful amenities. Having a central location storing all of this information will be helpful to leaders when trying to promote what resources the community has available, as well as during emergencies to ensure that the community remains safe.

**Conclusions and Recommendations**

In the process of completing our project, our team learned that Piñones already possesses the resources, skills, and information to better prepare for natural disasters and everyday emergencies within their community. The missing step that Piñones has not yet accomplished is getting its residents to work together both in times of prosperity and in times of need.

If the BARA GUABEL program continues to enhance connections within the Piñones community, Piñones will be able to withstand, adapt, and recover from natural disasters more efficiently.

**Recommendations for the BARA GUABEL Program**

- Develop a method to regularly update the community on BARA GUABEL's progress.
    - Facebook or Whatsapp
- Work with the Centro Comunitario Emiliano Figueroa Torres non-profit groups to create a centralized platform to promote their causes.
- Request a space at the community center and stock it with emergency supplies.

**Recommendations for the Piñones Community**

- Reach out to each other in times of prosperity and in times of need.
- Replace gas-powered generators with solar-powered ones.
- Understand the importance of supporting each other for the benefit of the community as a whole.

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# Introduction

Being highly vulnerable to unpredictable natural disasters, such as hurricanes and extreme flooding, puts Piñones residents at risk. The recovery period following a disaster lasts for months. On average, Puerto Rico experiences a tropical storm every five years (Fritz, 2017). Once the damage from the last storm is restored, another storm hits and causes more damage. This makes the recovery efforts feel like a neverending nightmare.

Piñones is an island within an island. It is separated from the rest of Puerto Rico by three natural barriers: a river (Río Grande de Loíza), a large mangrove forest, and the Atlantic Ocean. Piñones is isolated from the rest of Puerto Rico; the only access point to Piñones is via a single two-lane road that travels along the coast.

The lack of accessibility to Piñones inhibits the flow of both resources and people. It is difficult for emergency vehicles to get to Piñones, which can delay response times and evacuation procedures. Piñones was one of the last areas to receive power after both Hurricane Maria and a Blackout on the Island in April 2022. A lack of power makes it harder to reach out for help and communicate about recovery efforts. This highlights the importance of being prepared for natural disasters because once a storm hits, there is no knowing when outside help will come to Piñones. The residents can only rely on the resources they have prepared and the help they receive from each other.

In Piñones, taking care of each other in times of need is often the only option. Prior to the implementation of an emergency management program, Piñones' efforts to support one another were unorganized. Creating a system to assist and organize the community in a formal and accountable way will make Piñones a more resilient community following natural disasters (Sarah, Hildreth et al., n.d.).

Formally called the Piñones Preparation, Response, Recovery Program (PPRR), the BARA GUABEL program is meant to help the Piñones community create a network for emergency awareness and preparedness. The information we collected through conversations with residents includes community members' names, contact information, addresses, what services they can provide the community with, and if they feel prepared for future disasters. The

information is put into a technical mapping system that displays the community's contact information and skills.

Having this information in a central location will help recognized community leaders inform residents not only of incoming natural disasters, but also of community events and opportunities that are available specifically to them. The utilization of this tool will promote shared values and relationships among the community and allow Piñones to function more effectively.

# Background

## 2.1 The Impact of Extreme Weather on Coastal Areas

Extreme weather is becoming the new normal across the globe. Weather events that were once rare occurrences are now increasingly more common. Rapid changes to our global climate are contributing to these extreme weather conditions. The burning of fossil fuels for electricity, heat, and transportation releases carbon dioxide, a greenhouse gas that traps solar radiation. In the last century, we have witnessed massive increases in carbon dioxide, methane, and other greenhouse gas emissions, resulting in a warming planet (*How Climate Change Is Fueling Extreme Weather*, 2021). These increased emissions affect the frequency and severity of natural disasters, which have the ability to destroy communities whether they are prepared or not. Low elevation coastal areas are the most susceptible to hurricanes and flooding. Fitting this definition, Puerto Rico is a high-risk area. On average, Puerto Rico has experienced a tropical storm every five years (Fritz, 2017). Puerto Rico needs to prepare and adjust for the inevitable increase in the frequency and severity of future storms.

### The Impact of Hurricane Maria on Puerto Rico

Hurricanes are classified into five categories based on two factors: wind speed and storm surge height. Major hurricanes consist of winds over 111 mph and surges over 9 feet tall. These high winds and increased sea level surges damage properties and critical infrastructure systems, degrade economic productivity, and cause injuries and mortalities in extreme situations (*Natural Hazards | Hurricanes*, 2017).

The most devastating hurricane to impact Puerto Rico in recent history was Hurricane Maria in 2017. More than $870 million in federal funds were provided to Puerto Rico survivors. Maria destroyed much of the commonwealth's electricity grid. It took more than 200 days to restore power to Puerto Rican residents (FEMA, 2017). In total, more than 56 million liters of water and 48 million meals were distributed, which resulted in FEMA's largest and longest commodity delivery mission in its history. Further, the impact Maria had on Puerto Rico resulted in one of the largest medical response missions ever, where upwards of 4,700 medical personnel deployed and cared for more than 37,600 survivors. Maria's death toll is estimated to be between 3,000 and 4,500 people (Florido, 2019).

There are parts of Puerto Rico that have still not fully recovered from Hurricane Maria. Congress allocated $64 billion to Puerto Rico's recovery and response efforts after Hurricane Maria. Only 29% of those funds have been utilized by the recovery operations four years after the storm (Marxuach, 2021). There is a funding rollout plan that accounts for fund distribution through 2035. This diluted 15-year plan is harmful to the current state of Puerto Rico as it creates a false sense of complacency due to Hurricane Maria not directly affecting the lives of Puerto Ricans anymore. The COVID-19 pandemic and Puerto Rico's ongoing financial crisis are two additional economic shocks that hinder the Hurricane Maria recovery efforts (Marxuach, 2021).

## 2.2 Defining Community Resilience and Disaster Preparedness

Disaster response professionals are preaching the importance of being proactive instead of reactive when it comes to dealing with the impacts of Natural Disasters (Patel et al., 2017). In 1994, the US Federal Emergency Management Agency (FEMA) announced its National Mitigation Strategy, an effort to reduce the escalating disaster losses by fostering public-private partnerships and incentives for mitigation (Cutter et al., 2008). More proactive use of community engagement for natural hazard reduction can make communities more resilient (Cutter et al., 2008).

"Community resilience focuses on enhancing the day-to-day health and wellbeing of communities to reduce the negative impacts of disasters" (*Community Resilience*, 2015). "Resilience refers to a community's ability to withstand, adapt, and recover from adversity" (*Community Resilience*, 2015). Developing community resilience benefits both disaster planners

and community members. The community resilience approach extends the traditional preparedness approach by promoting community action while also addressing factors that influence individual health. A community is said to be resilient to disasters if partnerships have been made with community stakeholders, their hazards and vulnerabilities are recognized by the community members, actions have been taken to reduce risk, and then successes, as well as failures, are measured and used to prepare for the future (Cutter et al., 2008).

Social capital is defined as the shared values and relationships among people who live in a community that enables the community to function effectively. Establishing networks of stakeholders and resources within a community increases the community's social capital. Residents of a community can reduce their vulnerabilities to extreme weather events through community‐based organization techniques, nurturing and utilizing their social capital prior to the onset of disasters (Delilah Roque et al., 2020). Looking into how communities in Bangladesh and California have mitigated the impacts of natural disasters proves how effective the utilization of social capital can be.

**Bangladesh's Utilization of Social Capital to Mitigate Natural Disaster Consequences**

Bangladesh can expect a major disaster every two years. Bangladesh's coastal areas often get hit by cyclones, storms, and tidal surges (Mathbor, 2007). The idea for a Cyclone Preparedness Program (CPP) started in 1965. CPP was established in 1972, and operates using a communication networking system that is quick to respond to the immediate needs of coastal communities. This communication system consists of both direct personal contact and impersonal communication through media. CPP uses its volunteers to convey the program's messages to the people. CPP conducts a year-round training program for volunteers. They engage in public awareness activities, stage dramas, video shows, and other similar events. They use social work and psychosocial support as key components of their emergency response ("Cyclone Preparedness Program (CPP)," 2021).

**Table 1** below shows the 64 major cyclonic storms that hit Bangladesh from 1822-1997. Bangladesh has been able to significantly decrease the number of deaths from cyclones since 1991. Effective utilization of human and social capital such as social networks, social cohesion, social interaction, and solidarity has helped to mitigate the consequences of natural disasters in

Bangladesh. Other coastal regions would benefit from similar programs that utilize social capital (Mathbor, 2007).

| Year | People killed |
|---|---|
| 1822 | 40,000 |
| 1876 | 110,000 |
| 1897 | 32,000 |
| 1961 | 11,000 |
| 1963 | 11,000 |
| 1965 | 20,000 |
| 1970 | 500,000 |
| 1991 | 138,882 |
| 1995 | 21 |
| 1996 | 2 |
| 1997 | 111 |
| Total | 863,016 |

**Table 1:** Number of fatalities caused by cyclones in Bangladesh. Note the significantly lower death tolls after 1991 (Mathbor, 2007).

As seen in Bangladesh, if social capital is effectively utilized prior to and during natural disasters, communities will be able to recover faster.

**California Combats the Effects of Earthquakes with Network Stakeholder Organizations**

The California Earthquake Authority (CEA) has reported 11 earthquakes close to or above a magnitude of 5.0, since 2014. For further context, an earthquake of magnitude of 4.0 (M4.0) will cause noticeable shaking of indoor items, but significant damage is unlikely. A M5.0 earthquake can cause major damage to poorly constructed buildings over small regions, and a M6.0 earthquake or greater can be destructive in areas up to 100 miles or more. Earthquakes of high magnitude and high frequency require aid and preparedness. The state of California has programs to prepare and inform communities of their vulnerability to natural disasters (*CEA*, 2022).

Despite the guidance communities receive from the Federal Office for Preparedness and Response, many communities still lack the resources necessary for disaster preparedness (Blake

& Fry-Bowers, 2018). California combats the repercussions of earthquakes with a network of public and private stakeholder organizations, regional alliances, and individuals effectively coordinating earthquake education efforts that inspire the people of California to prepare.

ECA was founded in 2003 in Southern California. ECA is a statewide public-private partnership of people, organizations, and regional alliances. Each regional alliance conducts its own activities and collaborates with the others via the statewide ECA to improve preparedness, mitigation, and resiliency in California (*The Alliance*, 2016).

**Figure A** shows ECA's coordination structure (*The Alliance*, 2016). La Corporación Piñones Se Integra (COPI) is interested in creating a similar public-private partnership of people, organizations, and regional alliances in Loíza, Puerto Rico. They hope to have a similar organizational structure to the ECA, where each region of Loíza has representatives that collaborate with COPI as well as each other to improve resiliency in Piñones through activities and preparedness.

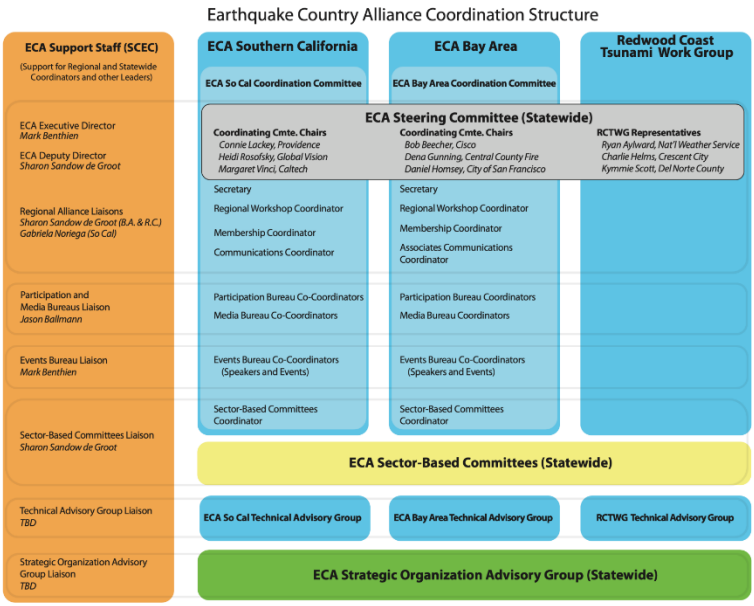



**Figure A:** Coordination Structure of the ECA (*The Alliance*, 2016).

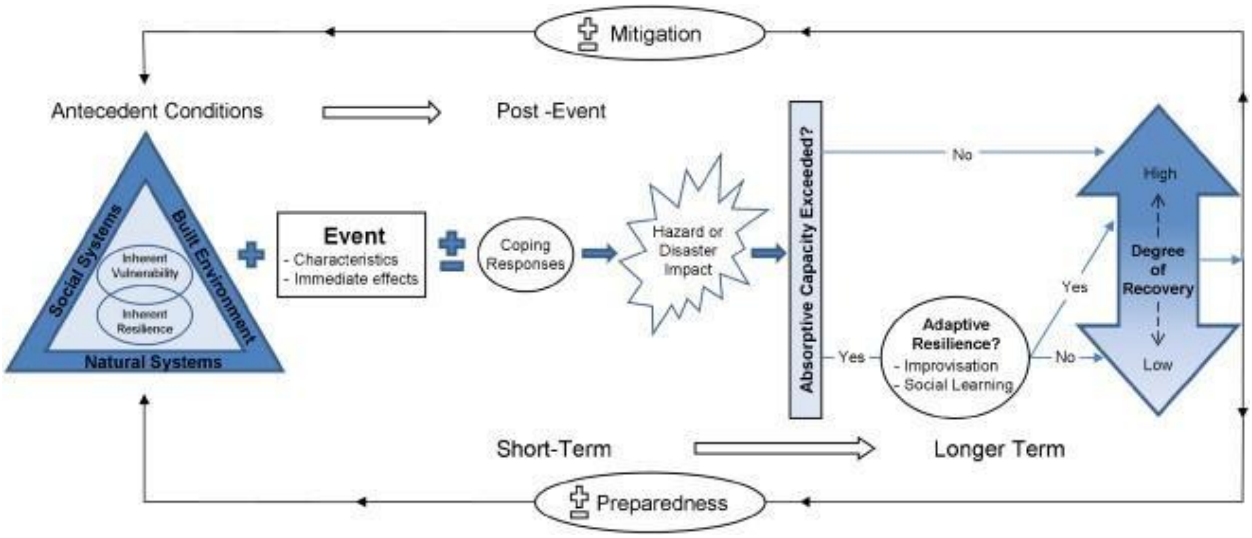
## The Cyclical Nature of Resiliency

Disaster management involves activities at several stages or levels: preparedness, response, recovery, assessment, prevention, and mitigation, as seen in **Model 1**. With the

completion of each cycle, new lessons are learned, new measures are adopted, and people are better prepared for the next disaster (Khan, 2008).


**Model 1:** Cycle of Disaster Management (Khan, 2008).

Provided in **Model 2** is a conceptual framework that is designed to improve comparative assessments of disaster resilience at the community level (Cutter et al., 2008).




**Model 2:** Model for Disaster Resilience of Place.

In the Disaster Resiliency of Place (DROP) model above, the disaster's impact on a community depends on the characteristics of the disaster and the community's absorptive

capacity. Absorptive capacity consists of the existing procedures, physical resources, and other predetermined strategies to reduce the impact of the disaster. If this capacity can absorb the impact, then the degree of recovery is high. As the capacity is exceeded, the degree of recovery decreases (Early et al., 2021). To effectively increase a community's absorptive capacity, communities need to learn from past disasters. To sustain resilience to disasters, regular ongoing training is suggested.

## 2.3 Loíza: The Difficulties that Come with Being an Island within an Island

Loíza is a municipality in Puerto Rico that resides on the island's northeast coast, as seen in **Figure B** below. Piñones is a sector of the Loíza, detached from the rest of the municipality by three natural barriers: a river to its West (Río Grande de Loíza); the largest mangrove forest surrounding its Southern border; and the Atlantic Ocean to the North. Piñones is only accessible using one, two-lane road that runs through the community along the coastline of the Atlantic Ocean; this is shown in **Figures C & D** (García-Rivera et al., 2017).

**Figure B:** Map of Puerto Rico. The municipality of Loíza is highlighted in red. Wikimedia Commons, the free media repository. (2020, October 27).

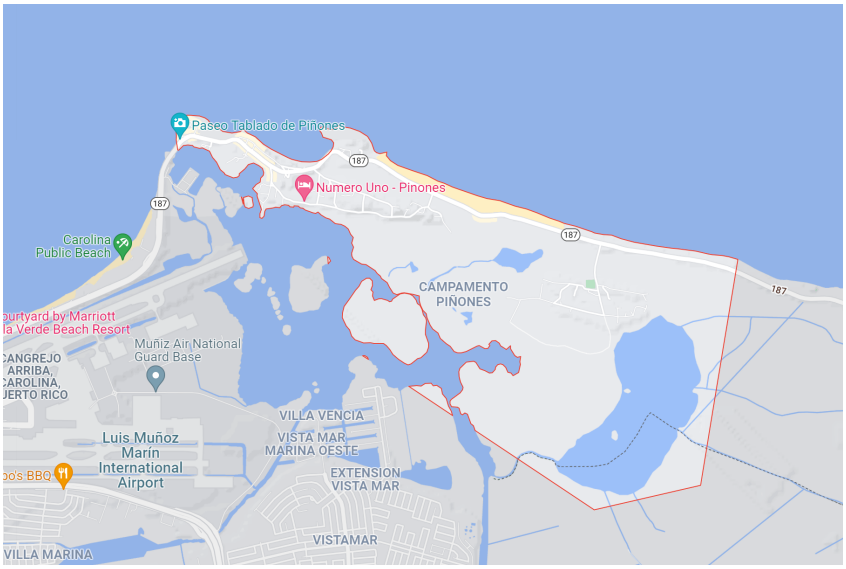



**Figure C:** Google Maps: Piñones (2022)

**Figure D:** The only road that leads to Loíza from San Juan. (April 2022)

The bridge in **Figure D** was not constructed until the 1950s and serves as the only access point to this portion of Puerto Rico. Piñones was an island within an island. People would travel to the ports in San Juan via boats on channels or the ocean.

The lack of accessibility to Piñones inhibits the flow of both resources and people. This holds true before, during, and after natural disasters. Consequently, emergency vehicles struggle to get to Loíza in a timely manner. Evacuating the area in preparation for a hurricane presents a challenge as traffic has a 'bottleneck' effect when a surge of residents attempt to enter or exit

Loíza simultaneously. As a result, Loíza residents cannot expect a swift evacuation or timely arrival of outside help. This highlights the importance of natural disaster preparedness because once the disaster occurs, the local residents only have the resources that they are prepared with.

**How Natural Disasters Affect Loíza's Local Economy**

Millions of people each year travel to Puerto Rico to enjoy its culture, history, and popular attractions. Tourism has been a very important source of revenue for Puerto Rico for decades given it is a host to diverse natural wonders, cultural and historical buildings, concerts, and sporting events ("Tourism in Puerto Rico," 2022).

Natural disasters have the ability to compound with other factors to disproportionally affect local businesses that rely on tourism. Namely, when natural disasters strike the region, travelers are much less likely to visit Puerto Rico. Consequently, these local establishments are dealing with issues like property damage, lack of resources, and power outages. They are simultaneously receiving little to no income until the island is back to somewhat of its original state. After Hurricane Maria in 2017, the island's tourism industry was decimated, with typically jam-packed areas like Old San Juan becoming "ghost towns" (Warren, 2020).

Loíza is a touristy area known for its African heritage, music, dance, and culinary traditions (*Loíza*, n.d.). Following Hurricane Maria, the tourist industry in Loíza was destroyed. Businesses struggle to generate the amount of revenue they did prior to Hurricane Maria.

**Loíza's Access to Technology and its Effects on Emergency Program Implementation**

More than 2,000 United States Army Corps of Engineers (USACE) and contractor personnel were on the ground in the power restoration effort along with seven power-industry incident management teams from 15 states supporting the restoration of Puerto Rico's power grid that was devastated from Hurricane Maria. FEMA reported that these teams worked to restore power to the most populated areas, and then moved into less densely populated areas until all power was restored on the island (FEMA, 2017). After waiting 18 months, power was fully restored to the island following the complete destruction of the electricity grid during the 2017 hurricane.

Although restoring power to the most populated areas is logical, it is important to note that in doing so, it isolates areas like Piñones. Piñones residents are left without power for

extended periods of time after major natural disasters, compounded by the difficulty of moving resources into and out of the community.

Puerto Ricans are heavily dependent on cell phones, which are a primary source of internet access on the island. The island's cell phone penetration rate is nearly 100 percent according to government data (Graham & Respaut, 2017). This knowledge is critical when considering the most efficient way to reach members of the community and as a part of our emergency response plan. Technology can be used to keep community members informed and connected prior to natural disasters, but there also needs to be a system in place that does not rely on technology for times when the community is without power.

## 2.4 Corporación Piñones Se Integra (COPI):

The sponsoring corporation that we worked alongside is Corporación Piñones Se Integra. COPI is a community-based non-profit within Piñones. COPI's mission is to transform the diversity of populations through education, community economic development, culture, music, and natural resources, achieving culturally, economically, and socially empowered communities. To fulfill its mission, COPI preserves the community's culture and nature while promoting human, cultural, and ecological rights. They do this by hosting activities, projects, and programs relevant to the Afro-descendant community.

Although neither emergency preparedness nor natural disaster recovery are the main focal points of their organization, COPI has found itself called on in times of need. After Hurricane Maria, Piñones residents were without electricity for several months. The emergency response was described by COPI members as 'unorganized and hectic.' The community turned to COPI for help, but COPI was unprepared to take on this task. Realizing their shortcomings in the most recent disaster, COPI started the Piñones Preparación Respuesta Recuperación Emergency Program, a community project sponsored by COPI that is designed to incentivize local services and relief in the event of a natural or personal emergency. During our time working on the program, it has been renamed to BARA GUABEL. The new name better suits readjusted goals by the program leader. The acronym stands for "bringing awareness to rural/at risk areas and generating unity through good action, education and leadership." This is the english translation.

## 2.5 Project Goal:

Our project goal is to establish connections within the Piñones community, raise awareness for the BARA GUABEL program, and design a cohesive network that informs residents of incoming natural disasters as well as shares information about community events, opportunities, and services available to them.

# Methods

Throughout this chapter, several different aspects of the project will be laid out and organized by objectives. These objectives display the steps the group took once arriving in Piñones and conducting fieldwork.

**Main Objectives:**

- Connect the Piñones Community to the BARA GUABEL Program
- Fill the Leadership Positions within the BARA GUABEL Program
- Establish Hubs/Community Centers for the BARA GUABEL Program
- Expand the BARA GUABEL Technical Mapping System

## 3.1 Connect the Community to the BARA GUABEL Program

The strength of the BARA GUABEL program relies on consistent engagement from the community. It was important to emphasize the program's purpose and potential to the community members to earn their trust and faith in the program itself.

We gathered information from the community through surveys and questionnaires distributed during field research with co-researchers. The previous WPI student team found that the Piñones community was not very active during the day because many of the community members were at work. The team also discovered that community members were not very receptive to outsiders inquiring about their community (Hildreth et al., 2021). To help combat this, we conducted in-person surveys alongside our sponsor in the late afternoon.

The data we collected includes information that could be considered personal to Piñones community members, so it is important for the participants to understand why BARA GUABEL wishes to gather their data as well as what they plan to do with the collected information. During the data collection process, it was both explained verbally and written on the survey itself that if

the individual in question does not feel comfortable with COPI collecting their information, they may simply not take the survey or answer only the sections that they are comfortable and willing to share. We made our best effort to fully explain that by helping us conduct our research they're ultimately helping their community as a whole.

The BARA GUABEL program is looking to collect information on both skills and needs that members of the Piñones community may possess or require. The questions asked in the forms can be seen in **Appendix A**.

## 3.2 Fill the Leadership Positions within the BARA GUABEL Program

The BARA GUABEL program consists of individuals having different roles and responsibilities including Sector Leaders, Hub/Network Managers, Outreach/Resource Recruiters, and Service Providers.

| | |
|---|---|
| Sector Leaders | ● Know the needs of their community<br>● Contact point between community and BARA GUABEL program |
| Hub/Network Managers | ● Hub maintenance<br>● Update database so it accurately reflects what resources can be found within the hub |
| Outreach/Resource Recruiters | ● Use their influence within the community to motivate residents to partake in the BARA GUABEL program<br>● Locate resources and services that could be valuable to the BARA GUABEL program |
| Service Providers | ● Those who filled out the survey and consented to offer their services to the community |

**Table 2:** Organization of roles in the BARA GUABEL Program

These leaders and representatives will assess the most urgent needs and concerns within the community and find ways to remediate them with the resources available through the program within the community. The committee also will have to plan events and activities that will be beneficial to the community including open houses, town halls, workshops, discussions, and food drives. During a natural disaster or a community emergency, they will be the people helping manage the emergency response.

While in Piñones, we made connections with well-known community figures that helped deliver BARA GUABEL's message and expand the program's reach across the area. First, we created a detailed program proposal and pamphlet to help inform these figures about why they should get involved and how they could play a role in the program. We then collected their contact information from our sponsors and scheduled introductory meetings. In these meetings, we informed them of who we are and what we were doing in Piñones using the proposal and pamphlet. These can be seen in **Appendix B** and **Appendix C**. This was how we established a relationship with Giomar Cruz, who agreed to be a Sector Leader and Outreach/Resource Recruiter for the BARA GUABEL program.

## 3.3 Establish Hubs/Community Centers for the BARA GUABEL Program

A hub is a business or small-scale community outreach center. Similar to the ECA's organized activities that help those who live in counties vulnerable to earthquakes be prepared to survive and recover quickly, the BARA GUABEL hubs will host activities or occasional workshops to enhance Piñones' connectedness. These hubs will give locals access to supplies such as first aid, emergency backpacks, anti-mosquito tools, propane stovetops, light sources, long-term food storage, and generators. In times of emergency, they will offer shelter and aid. The goal is to eventually establish a central hub in each sector of Piñones. However, establishing one functioning hub within Piñones is a more attainable goal for our group. We then can use it as a model to gain traction for the same idea across different communities.

**Finding a Prime Hub Location in Piñones**

We need to connect with establishments such as businesses, churches, and community centers to figure out the best location for a hub in Piñones. We believe the best way to find an establishment that will be willing to be a hub is through the community. As we surveyed the community we asked Piñones residents if they own any businesses in the area and if they would be willing to help. The hub needs to be in a non-flood zone, be able to store a sufficient amount of supplies for the residents it supports, and be easily identified as a hub by the community.

## 3.4 Expand the BARA GUABEL Technical Mapping System

A large aspect of our project is expanding the BARA GUABEL technical mapping system. The system that we will be utilizing to create the technical mapping system is Google Drive Suite. Google Drive Suite is easy to use and stores feedback from Google Forms that are integrated with Google Sheets, resulting in access to a spreadsheet of the collected data. The form can be distributed through email, put onto a website, or printed (*Advantages and Disadvantages of Google Forms*, 2018).

The previous WPI IQP student team provided a BARA GUABEL technical system architecture; this can be seen in **Figure E** (Hildreth et al., 2021).

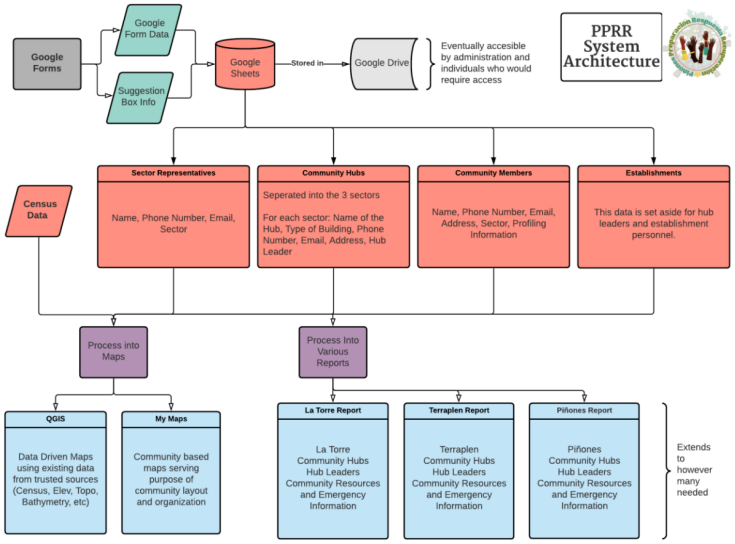



**Figure E:** Post-Collection Information Flow (Sarah, Hildreth et al., n.d.).

Through our conversations with the community, we collected information from local households that would benefit the program. This included, but was not limited to phone numbers, addresses, and household capacity. The data was then transcribed into the technical mapping system. It will provide the leaders of the BARA GUABEL program with community member contact information, which community members live in a flood zone, what resources community members have access to, and what skills they can provide to the community. It is an efficient way to centralize information that the leaders of the BARA GUABEL program may need. The

information collected can be used not only to start informing residents of incoming natural disasters, but also to inform residents about community events, opportunities, and services available to them.

# Field Research

## 4.1 Interviews with the Community

Throughout the group's time in Puerto Rico, the team spent approximately 20 hours walking through the community of Piñones. During this time, we were able to interact with 12 community members. Our co-researchers collected surveys without us as well. The collected data represents 29 out of 80 estimated households (*US Census Bureau*, 2020) in Piñones. Only one member in each household would fill out our survey, but would encompass the information for the household as a whole. Eighty-one community members are accounted for in total.

Since community members are not receptive to outsiders inquiring about their community, the team would send just two of our three group members to Piñones at a time. The field research was always completed alongside our co-researcher, Shawn Halliburton, a member of the community. Each time the group traveled to Piñones, we met Mr. Halliburton at the DRNA park. We would walk from the park to different sections of the community during each day that we spent surveying. Shawn would initiate conversations with community members by introducing himself as a member of the community, then describe the program's goals and purpose. After Shawn had grabbed the community member's attention, he would open up the conversation to the team. We would ask them if they were willing to volunteer their contact information and further explained that it will be used to distribute information about local services and events to the community in both times of prosperity and need.

As our group walked through the community, we saw homes that appeared abandoned and unmaintained as well as well-kept homes appearing to be in pristine condition. There was an abundance of wildlife. The team ran into stray dogs, horses, lizards, cats, and tarantulas. We rarely saw people outside their homes, and when we did they tended to be older members of the community. It was explained to us that this is because the younger residents of Piñones work in the San Juan Metropolitan area during the hours that we conducted field research, and when they

return home from work, they would generally be unwilling to have conversations with us about the program.

**Interviewing on 4/1/2022**

The first day that group members went to the community with the intention of collecting information was Friday, April 1st. The people completing the field research that day were Shawn Halliburton, Sai Vadlamudi (A member of a different WPI IQP team who was also working with COPI as their sponsoring organization), and Holly Mason. We spent 3 hours in Piñones and completed 2 interviews.

We spoke with a man in his 70's that is known for his work with the mangroves. When IQP group member Holly asked him if he felt prepared for future storms and emergencies, he explained that he did because his house had survived the previous disasters. Shawn Halliburton explained our program's purpose to him, then asked what the interviewee would want from the program. He was very interested in the collection of the community's technical skills. The resident does not believe that the young people in the community have technical skills because "the new generation has not been raised for labor." He talked about how all of the older men in the neighborhood used to be handymen. They would help build houses together and dig wells together. He is concerned that the newer generations have never experienced physical labor like such. At the end of our 45-minute conversation, he filled out the program's survey questions and his information was added to the technical mapping system.

The next person we spoke with was another elderly man from the community. The man was able to recall the time before the road was built and men took boats through the canals and ocean to sell their crabs, coal, and sugar. This individual said he would earn $1 for 3 dozen crabs and would sell 80-weeks worth of mined coal for $20. The gentleman reported feeling prepared for future hurricanes. He trusts that his house will be able to withstand extreme weather conditions and he has many neighboring family members that he trusts to take care of him. He shared that they check in on him on a daily basis. At the end of the 40-minute conversation, a family member of his brought him pizza for dinner. When Shawn explained the BARA GUABEL program, the community member seemed supportive, yet he did not fill out our survey.

**Interviewing on 4/7/2022**

On Thursday, April 7th, team members Derek Childs and Jack Fredo traveled to Piñones accompanied by co-researcher Shawn Halliburton to conduct conversations with local residents and potentially collect information from them to transcribe into the technical mapping database. The team members walked around the Piñones community for 5 hours and had conversations with three individuals who were willing to participate in the BARA GUABEL program by volunteering their information. Three successful conversations were held while at least 30 homes appeared vacant during the period that the team members were walking around Piñones.

The team's first conversation on April 7th was with a male resident in his late 70s who lives in the oldest house in the neighborhood. He had lived in Piñones his whole life and used to share the house with his mother who had unfortunately passed away years ago. As we approached the fence surrounding his yard while he sat on his porch preparing locally caught crabs for a meal, our co-researcher explained the details of the BARA GUABEL program to him and how it would benefit the community as a whole. Like most residents that the group attempted to have conversations with, his demeanor was initially standoffish. As time went on and the program was explained, he allowed the team to enter onto his property and was extremely willing to come forward and answer any questions that the group had. The group inquired about how he planned to combat the recent power outage that had occurred the day before, and he said that he was concerned with how long he would be without electricity because you cannot store crabs without refrigeration. His primary source of income and food comes from almost exclusively catching, eating, and selling crabs. The resident willingly offered his cooking skills to the program if the community were to need someone who had knowledge of traditional cooking abilities. The conversation lasted roughly 45 minutes.

**Figure F**: A local resident cooking crabs on his porch during the April 6th blackout (April 2022).

The second conversation conducted that day was with another older gentleman in his 60s. The group took the similar approach of introducing themselves from behind the gate protecting his property and after co-researcher Shawn Halliburton explained who he was and what the group was trying to accomplish, it was revealed that the interviewee was in fact Shawn's uncle. Recognizing the importance of community connectedness, this resident was happy to give us any information that the group inquired about. We asked if there were any resources from the community that he might need during an emergency and he replied that he would benefit from the use of a generator since he did not possess one himself. The interview lasted roughly 30 minutes.

The third and final conversation on this day was with two residents, a mother (estimated to be 80 years old) and her daughter (estimated to be 50 years old), who were sitting on their porch that afternoon. Our co-researcher Shawn Halliburton explained the basis of the BARA GUABEL program, and they allowed the team onto their porch to discuss its benefits and to volunteer some of their information to the program. The conversation was held almost entirely in Spanish, with Shawn Halliburton and the younger female going back and forth, with short breaks to translate the conversation to the IQP team members. From what was translated back to the group, both of the residents in question were receptive to the idea of the program and were

willing to provide any information that they thought would be useful. They filled out the survey we had prepared and their information was added to the technical database. The interview lasted roughly an hour.

**Interviews on 4/12/2022**

On April 12th, team members Jack Fredo and Holly Mason traveled to the Piñones community accompanied by co-researcher Shawn Halliburton yet again. The team met up at around 2:00 in the afternoon and was able to talk to three individuals, two of which were willing to take part in BARA GUABEL. The interview session as a whole lasted roughly four hours and thirty minutes.

Upon their arrival to the community, the team came across a group of male residents who were actively constructing a new home next to their family's existing one. co-researcher Shawn Halliburton approached the trio and explained that the group was looking to collect information on the community and would appreciate it if one of the construction workers could offer a few minutes of his time to speak with the team. A man in his 30s explained to the team that he was constructing a new house for himself adjacent to his family's existing home. The worker illustrated that he currently did not live in Piñones, yet he wished to construct his own home in the neighborhood to live closer to his relatives. The group inquired about the decision to construct the home out of concrete. The response was translated back to the group describing how concrete was sturdy, inexpensive, and easy to use. Further, the group questioned how the building material would react during natural disasters, specifically high winds and flooding. The gentleman informed the group that concrete actually does quite well in these conditions and that the iron rods that support the foundation of the home were dug multiple feet into the ground prior to the start of the building process. This practice reinforces the stability of the structure and helps the home to withstand the harsh conditions that extreme weather may bring forward. The gentleman agreed to give the BARA GUABEL program some information about himself that he thought would be useful and consented to the group taking pictures of the progress of their construction. The images taken can be found in **Figure G** below. The interview lasted roughly 45 minutes.

**Figure G:** Photo taken by team members of the construction progress from across the street (Left). Photo taken by team members of the construction progress up close (Right).

The second conversation with local residents on April 12th was with a woman in her late 50s. She accepted the invitation to talk with the group about the BARA GUABEL program. As co-researcher Shawn Halliburton explained the initiative, the woman began to nod her head understandingly and appeared to have a very positive reaction to the idea being presented to her. She was happily willing to provide her information to BARA GUABEL. While the group was inquiring with the woman, she was boiling water to cook crabs while a male resident of the home was doing mechanical work on his vehicle in the driveway. This female resident explained that even with the recent power outages across Puerto Rico, her household was able to sustain themselves with the resources on their property. The group grew more inquisitive, and the household welcomed the team members into her backyard to further reveal how the household is able to provide for itself. She picked mangoes off of the mango tree in her front yard and offered them to the group. She also handed a large PVC pipe with a hook attached to it for the team to reach up into a papaya tree and knocked down papayas to take back to their residence. The woman additionally invited the team to view the wild pigs they had caught from the area that they were raising for meat. Photos captured from the experience are documented below in **Figure H.** Between the locally caught crabs, captivated pigs, mangoes, papayas, and the mechanical work being done to the vehicle in the front yard, it became evident to the group that the household was capable of providing for themselves with their knowledge of the land. The interview lasted roughly 90 minutes.

**Figure H:** Boiling water over a fire to cook crabs (Left). Team member Jack Fredo knocks papayas out of a community member's tree with permission (Middle). The pigs in the backyard of the same residence (Right).

The third and final conversation held on April 12th was with a woman in her late 60s who spoke to the team for a brief few minutes. Co-researcher Shawn Halliburton explained to the woman, who did not give a name, the premise of the BARA GUABEL program and its potential to benefit the entire Piñones community. The woman was appearing receptive and seemed to be opening up to the idea of providing her information to the program. Her male relative, who lived no more than 10 feet next door to the woman, overheard the conversation going on and approached the team bitterly. Instantly, the woman herself became uninterested in talking with the group. The group thanked the woman for her time and proceeded to walk through the community. It was explained to the team members later that the man who had entered the conversation had a pessimistic outlook on the idea of the program resulting from experiences in the past where he felt taken advantage of. He did not believe that the program would be successfully implemented nor would it benefit the community. co-researcher Shawn Halliburton explained to the team that the sharp reaction from the male relative convinced the woman that she should no longer engage in speaking with the group about the program. The interaction lasted roughly 20 minutes.

**Interviews on 4/19/2022**

On Tuesday, April 19th, team members Jack Fredo and Holly Mason made another trip to Piñones and arrived around 2:30 in the afternoon to meet up with co-researcher Shawn Halliburton to talk to more residents about BARA GUABEL. The group was able to have four interactions with community members and were conducting the field research for about four hours.

The first group of individuals that the team was able to talk to on April 19th was with a male in his late 40s. As our co-researcher Shawn Halliburton began to engage in conversation with the individual, the two went back and forth for a while discussing the work that the team was doing. After about 20 minutes, the conversation was opened up to IQP team members Jack Fredo and Holly Mason. Because of the language barrier existing between the Spanish-speaking locals and the English-speaking IQP group members, at this point the team members were unable to decipher what aspects of BARA GUABEL had been discussed. Before the conclusion of the conversation, this resident elected to provide his information to the team and his information was added to the technical mapping system. Following this conversation, the IQP team members voiced the difficulty of jumping into a conversation when they do not know what was being discussed. co-researcher Shawn Halliburton acknowledged these concerns and the rest of the conversations with local community members went smoothly. This specific interaction lasted roughly 45 minutes.

The second conversation between the team and local Piñones residents was with a man in his 70s. As the team approached the residency, co-researcher Shawn Halliburton announced his presence through the open doors and windows at the home. A voice returned his advances and a conversation began through an open window about the BARA GUABEL program. The gentleman was willing to share with the team that he was disabled and used to be a truck driver in the area before he retired. Being a disabled individual, he was receptive to the idea of the program and voiced to our co-researcher that he would benefit from being more connected with the community since it has become difficult for him to leave his household with his disability. The resident volunteered his information to the program, and the conversation lasted roughly 45 minutes. A photo captured during this interaction can be seen in **Figure I.**

**Figure I:** Photo captured of team member Holly Mason (Left) and co-researcher Shawn Halliburton (Right) while talking to a disabled community member through his window (April 2022).

A third conversation was held that day with an elderly gentleman and his granddaughter. The team approached the older-looking man sitting on his walker on his porch. Co-researcher Shawn Halliburton introduced himself and the IQP team members accompanying him. The man seemed to be hard of hearing and entered his house looking for his granddaughter to accompany him during the conversation. The woman joined the team on the porch and our co-researcher began to describe the BARA GUABEL program. From the beginning of the conversation, the two had positive responses to the idea of the program. The team later uncovered that the older man was over 100 years old, and he does not know his true age because he was born before Puerto Rico had a registry. He estimated his age to be 107 years old. The woman expressed her frustrations with having to drive miles just to retrieve their mail, as well as the difficulty of travel when there is no gas station nearby. She stated that it would be her dream to open up a gas station not too far from Piñones. The group was also informed that there was a time when the grandfather got sick and was prescribed medicine from doctors, who told him that he could not receive it unless he came to them in person. Because he has a hard time moving around, he was frustrated with this order and was not able to receive his medicine. Resulting from the difficulties associated with filling prescriptions, the household had been able to use local plants to make salves and tinctures. They both consented to give their information to BARA GUABEL. The conversation was beneficial to both parties and lasted roughly 90 minutes.

The final conversation held on April 19th was with a man in his 60s. His home was noticeably newer and nicer than the other homes in the neighborhood. He also owned the largest amount of land compared to the other Piñones residents that the teammates spoke to. His demeanor remained more skeptical throughout co-researcher Shawn Halliburton's explanation of the BARA GUABEL program. The resident explained to the research team that when he was purchasing the property, he filed for a loan in which he needed $10,000, but received $40,000. Coincidentally, he was the only community member that the group talked with who expressed strong support for the local mayor of Loíza. He volunteered his information to the program prior to the conclusion of the conversation. The interaction lasted roughly 30 minutes.

## 4.2 Technical Mapping System

The previous IQP team working on this project developed a technical mapping system that collects and organizes community member information regarding emergency preparedness and relief. Our sponsor noted to us that this mapping system was incomplete, hard to use, and lacked community data responses due to complications the previous team outlined in their report.

While the data we collected appears similar to the data that should be collected and presented to the public by the United States Census Bureau, the bureau has failed to document data from Piñones and represent the area specifically and accurately. Piñones lies in the Torrecilla Baja barrio, a subdivision of the Loíza municipality. Data for the area in the US Census are labeled as estimates and are general for an area larger than just Piñones, resulting in no specific data collection or estimates for Piñones specifically. After zooming in on the interactive map of the subdivision, we noticed only half of the neighborhood contained data on the number of housing units, followed by irrelevant statistics such as the block geoid number and the county classification number.


**Figure J:** The US Census Bureau's "interactive map," which only represents half of Piñones. (US Census Bureau, 2020).

While the census estimates may be accurate, the displayed US Census information is not applicable to the information required by the BARA GUABEL Program or their efforts. The technical mapping system outlines specific resident locations, the skills they are willing to offer to the program, their needs in times of emergency, and more. See **Appendix A** for a detailed list of all survey items. Not only is the mapping system's information more applicable, it is better organized. It took about an hour to find the limited census data regarding Piñones.

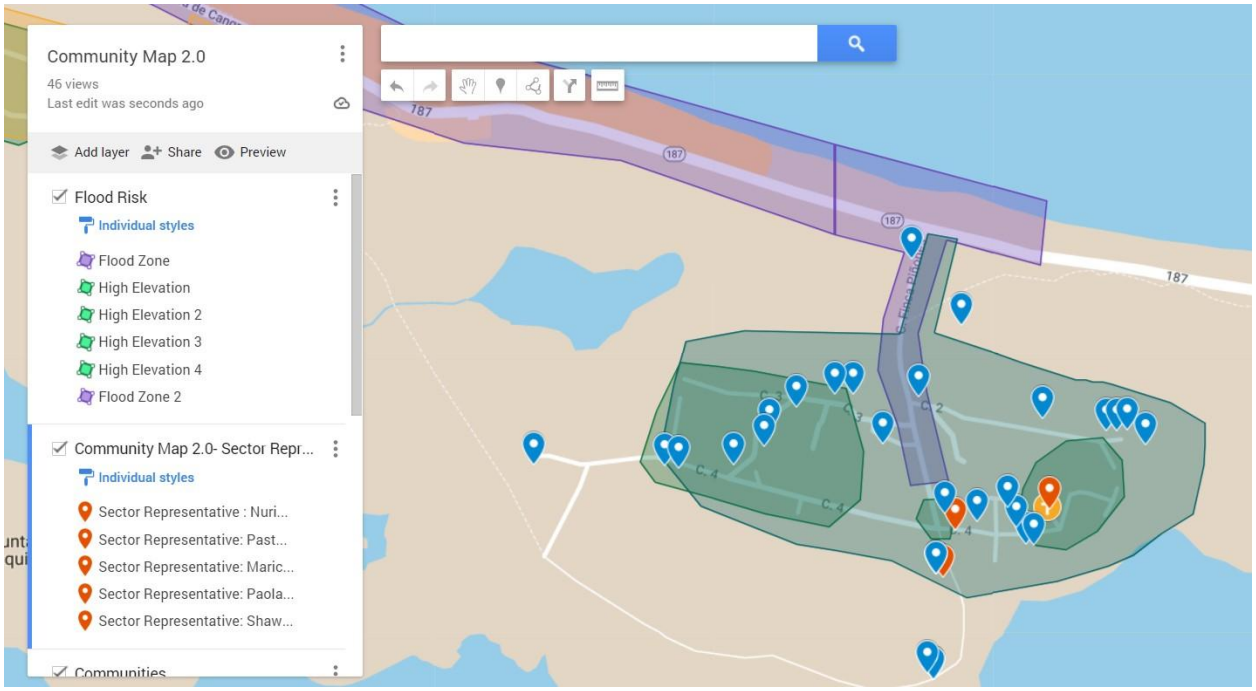



**Figure K:** Screen capture of the technical mapping system with blue pins representing surveyed community members (Google My Maps, 2022).

With access to the mapping tool, Sector Representatives can view data from community members that volunteered their information for the BARA GUABEL program using the forms we created, as seen in **Appendix A**, by clicking on the blue pins.

### Addressing Challenges Within the Technical Mapping System

The addresses in Piñones are not specific, with contradicting street names and no numbers on houses. Even when community members receive mail, they are forced to travel to a neighboring town to retrieve it from a community P.O. box because the houses in Piñones are not marked with addresses. To overcome this obstacle, we used coordinates when inputting data into the technical mapping system. We took note of the coordinates at each household we surveyed while in the field, and used these to pinpoint the location of the residencies.

## 4.3 April 6th Blackout

During our stay in Puerto Rico there was a massive power outage triggered by a fire on April 6 at the Costa Sur power plant, more than 1.5 million people were impacted across Puerto

Rico. The outage caused schools and businesses to close. Disruption to the rapid transit system and water supply was also initially reported. There was no timeframe given for when the repair efforts would be completed. There were protests in San Juan due to the continued outages and rise in electricity rates. Electricity was finally restored 5 days after the initial outage *(Security Alert: Puerto Rico (US): San Juan: 19 April*, 2022).

We were able to maintain power from our hotel's generator in San Juan, but Piñones residents were not as fortunate. Progress on our project the week of the blackout was delayed. One of our interviews with Giomar had to be rescheduled, and our co-researchers canceled one of our field research sessions because they had no power at home.

## 4.4 Interviews with Giomar Cruz

**Interview on 3/29**

During the second week in Puerto Rico, our team hosted a zoom meeting with Giomar Cruz accompanied and translated by co-researchers Shawn Halliburton and Paola Rolon Diaz. Mr. Cruz is a leader in Piñones who's recognized for the work he's doing across Loíza. He organizes recreational events for the children in Piñones and gets the youth involved in art programs, musical programs, horseback tours, food and clothing drives, and other various community-driven activities. We spoke with Gio about a potential location for a Piñones hub, seen in **Figure L** below.


**Figure L:** Potential Hub located across from the park in Piñones on Calle 4 (March 17, 2022).

The initial plan included this community center as our first established hub. The building belongs to the local residents and is known for holding small gatherings. The location of this

building was ideal for storing essential emergency supplies that are easily accessible by BARA GUABEL participants.

During our interview with Giomar Cruz, the team was informed that community members had other plans for this building. Although it was disappointing to discover that we could not use the building in **Figure L** as a hub in the BARA GUABEL program, the team was enlightened to learn about a vacant school in Piñones that is actively being renovated into a community center, called Centro Comunitario Emiliano Figueroa Torres, seen in **Figure M**.

Mr. Cruz was particularly interested in our work with the technical mapping of the Piñones community and the cohesive network that informs residents of incoming natural disasters and upcoming community events. He told the team that our program would be a great addition to the organizations working through the school. During this interview, our team did not get much more information about Centro Comunitario Emiliano Figueroa Torres.


**Figure M:** The Centro Comunitario Emiliano Figueroa Torres which is currently being renovated to serve as the new community center. (April 2022).

We also asked Giomar Cruz to take on a leadership role in the BARA GUABEL program, and he complied. He agreed to be a Sector Leader and Outreach/Resource Recruiter for BARA GUABEL.

**Interview on 4/13**

Our second interview with Giomar Cruz had a singular purpose. We wanted to know the names and contacts for the eight organizations that are a part of Centro Comunitario Emiliano Figueroa Torres, and discuss whether it would be possible to set up a meeting with all of them at once. We were able to get the names and contact personnel for the following organizations:

- Cultura ActivaPR
- P.A.Y.E - Piñones Aprende y Emprende
- Salud Para Piñones
- Ohana
- Mandejo De Emergencias
- Naturales (Forest Work)
- Iglesia (Church Volunteers)
- Pro Artes Visuales
- LimPiaR

Giomar Cruz set up a meeting with the leaders of all the organizations on May 3rd. At this meeting, we will explain BARA GUABEL's goals and purpose. We will also express how we believe the community center would benefit from a centralized way to promote its events and goals.

## 4.5 Interview with Shawn Halliburton

We asked co-researcher Shawn Halliburton about the distrust community members showed regarding outsiders inquiring about their community. Shawn responded with the following points:

- The locals of Piñones were, and still are, familiar with their land. It wasn't until industrialization came from the states that the land started to become unrecognizable to the people.
- When the industrialization movement was promoted in Puerto Rico in the late 1940s, the people did their best to adapt. They believed the promises that it was for their benefit. They worked hard to build the modern infrastructure of the Metropolitan area of San Juan and Carolina, but were left without credit. During the 30-50 years they spent building the

"new" San Juan, they watched their way of life get annihilated. The rest of Puerto Rico had been advanced through industrialization while Piñones was left behind.

- When Piñones community members reach out for help or try to improve their standard of living, they receive little to no support from the government. This is the same government who promised them that industrialization would benefit their community.

## Conclusions

The main goal of this project was to create a network within the Piñones community to improve communication and help its residents prepare for personal and community-wide emergencies. In the process of doing so, our team learned that Piñones already possesses the resources and information to better prepare for natural disasters and everyday emergencies within their community. The missing step that Piñones has not yet accomplished is getting its residents to work together - both in times of prosperity and in times of need.

While the community is self-sufficient, its reliance on self-sufficiency makes it challenging to advance the community as a whole. Residents do not feel as though they should seek outside help from their neighbors if they are capable of dealing with situations themselves. The level of self-sufficiency results in community members staying in Piñones for much of their time each day. This limits the speed of communication and inhibits the forming of new connections. Economic growth and emergency preparedness will take place in the community as it is, but at a slow rate as a result. The greater number of connections made between organizations, government agencies, and neighbors will increase the growth rate and facilitate action throughout the community.

With COPI at the helm of this program, their efforts will continue to get community members to engage with each other. They recognize that the success of BARA GUABEL depends on the frequency at which it gets utilized. By promoting community events and services available to Piñones residents, they can establish and maintain the strengthened connections between them.

# Recommendations

## 5.1 Recommendations: The BARA GUABEL Program

- The BARA GUABEL program should show the community the progress it makes on a weekly or monthly basis to continue the growth of the program. The Piñones community does not trust recovery and resiliency programs to follow through on their promises. Keeping the community updated will show them that the BARA GUABEL program is different.
- There are active organizations with the goal of improving the Piñones' resiliency to disasters and economic status. The Centro Comunitario Emiliano Figueroa Torres non-profit groups should come together to create a centralized platform to promote their causes. A single platform where community members can locate the resources they need, become aware of when and where events promoting the community are happening, and share progress amongst one another would help connect the residents to the organizations working around them.

## 5.2 Recommendations: The Piñones Community

- Community members should reach out to each other in both times of prosperity and in need. If the community is connected to each other in times of prosperity, helping each other in times of need will come more naturally. The community should interact with each other and respond to each other even if the issue does not directly influence an active or ongoing issue.
- Replace gas powered generators with solar powered ones. The closest gas station to Piñones is 3 miles away. Traffic along the single, two-lane road in Piñones and gasoline shortages/rising prices makes obtaining gasoline difficult. The addition of power outages and natural disasters only increase these difficulties. Storing gas can be difficult and may result in contamination of groundwater and soil if not stored properly. These contaminations pose health risks to both humans and animals. Solar powered generators would eliminate the need for gasoline and rely on readily available, renewable energy.

## 5.3 Recommendations: The Next IQP Team

- We found it challenging to get involved in the conversations between our co-researchers and the community members. The conversations were not scripted. When it was our turn to speak we did not know what the co-researcher had already said since everyone we interviewed spoke only in Spanish. We suggest the next IQP group discuss a plan with the co-researchers prior to conversations, so the students can have a greater impact in the conversations with residents.
- Create a network to regularly update the community on BARA GUABEL's progress.
- Create a Facebook or Whatsapp group with all of the organizations that are a part of Centro Comunitario Emiliano Figueroa Torres. At their monthly meetings, they can compare their schedules and talk about their planned events which can then promote the month's events on the centralized platform to the community.

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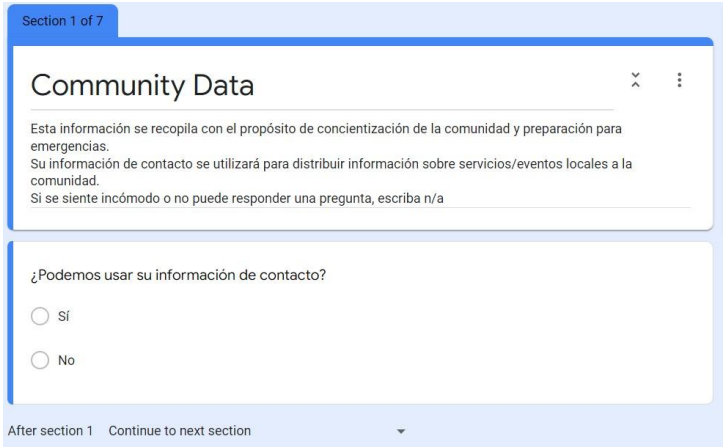
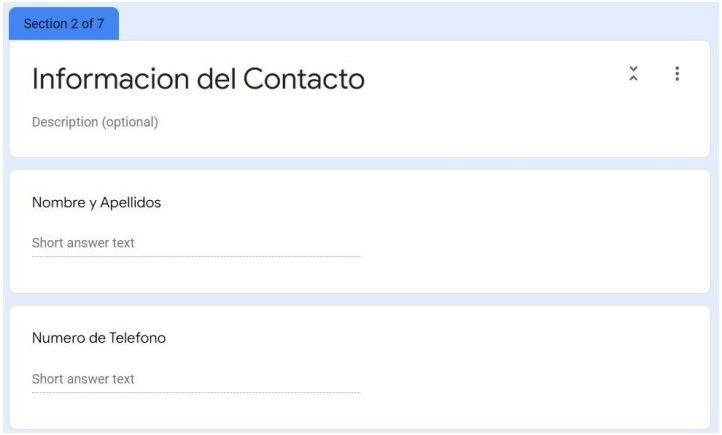
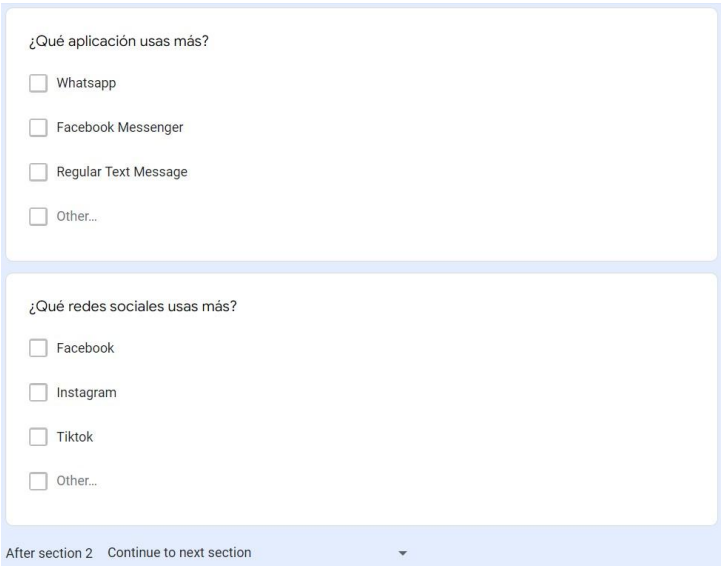
# Appendices

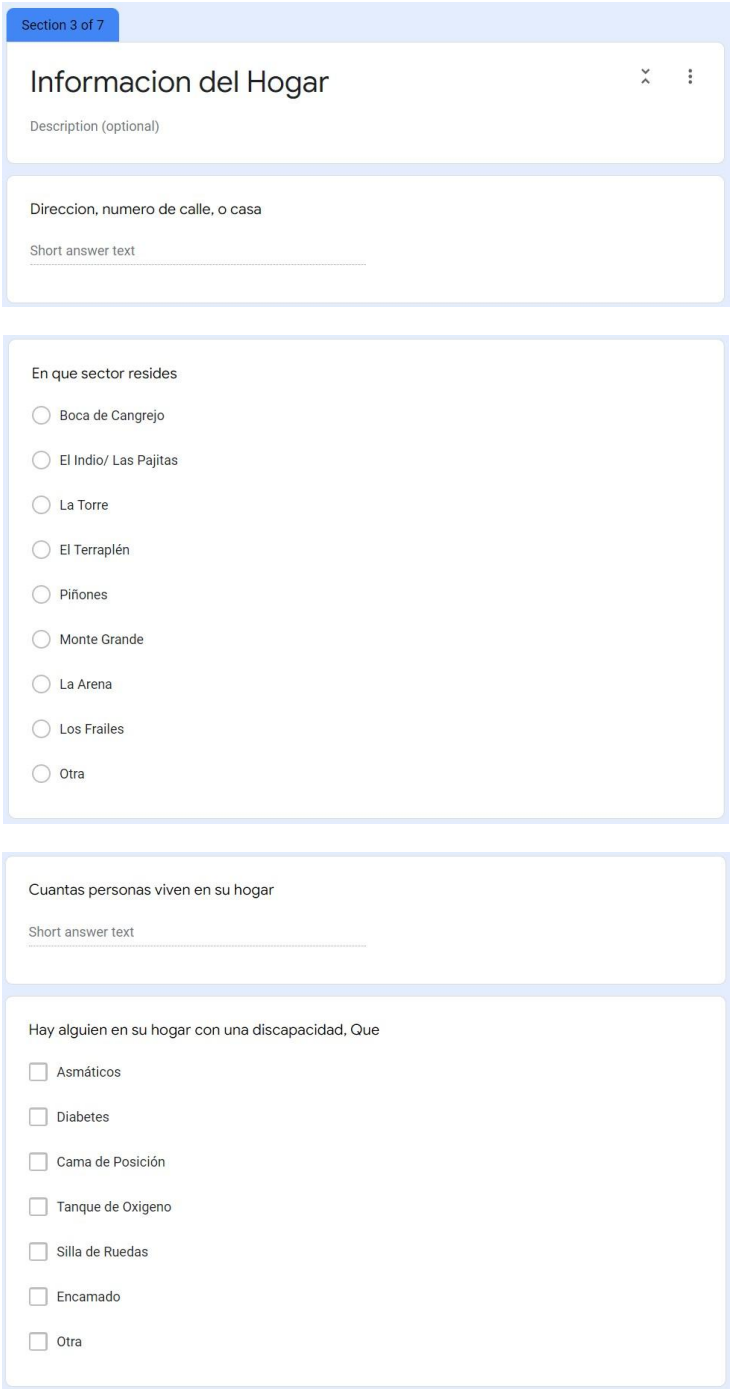
## Appendix A: Survey Forms

The images below display the forms that we asked community members to fill out. As explained above, we gathered personal information, specific needs, household information, and services that community members could provide during a natural disaster.


Section 1 of 7
Community Data
Esta información se recopila con el propósito de concientización de la comunidad y preparación para emergencias.
Su información de contacto se utilizará para distribuir información sobre servicios/eventos locales a la comunidad.
Si se siente incómodo o no puede responder una pregunta, escriba n/a
¿Podemos usar su información de contacto?
Sí
No
After section 1
Continue to next section


Section 2 of 7
Informacion del Contacto
Description (optional)
Nombre y Apellidos
Short answer text
Numero de Telefono
Short answer text


¿Qué aplicación usas más?
Whatsapp
Facebook Messenger
Regular Text Message
Other...
¿Qué redes sociales usas más?
Facebook
Instagram
Tiktok
Other...
After section 2
Continue to next section


Section 3 of 7
Informacion del Hogar
Description (optional)
Direccion, numero de calle, o casa
Short answer text
En que sector resides
Boca de Cangrejo
El Indio/ Las Pajitas
La Torre
El Terraplén
Piñones
Monte Grande
La Arena
Los Frailes
Otra
Cuantas personas viven en su hogar
Short answer text
Hay alguien en su hogar con una discapacidad, Que
Asmáticos
Diabetes
Cama de Posición
Tanque de Oxigeno
Silla de Ruedas
Encamado
Otra

Si otra, Que

Short answer text

Cuantas personas tienen estas necesidades en su hogar

Short answer text

Section 4 of 7

## Recursos de la Comunidad

Description (optional)

Cual es tu Trabajo

Short answer text

Que habilidades o destrezas posees

- [ ] Fontanería
- [ ] Electricista
- [ ] Carpintero
- [ ] Mecánico
- [ ] Enfermería
- [ ] Construccion
- [ ] Doctor
- [ ] Paramédico

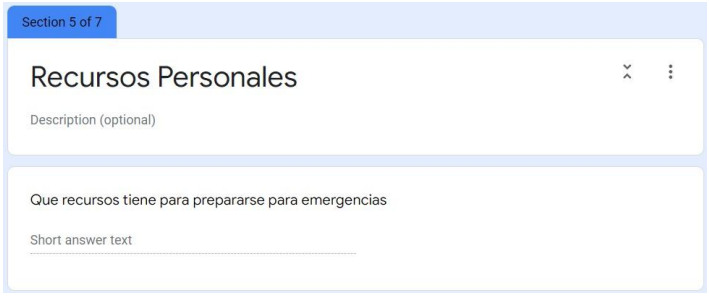
Si otra, Que

Short answer text

Tienes un Generador

- ( ) Sí
- ( ) Sí, y Funciona con Energía Solar
- ( ) No


Tiene Acceso a un Vehiculo
Barco
Coche
Camión
Autobús
Otra


Section 5 of 7
Recursos Personales
Description (optional)
Que recursos tiene para prepararse para emergencias
Short answer text


Section 6 of 7
Negocios?
Description (optional)
Tienes un negocio en la zona
Sí
No


Section 7 of 7
Negocios de la Communidad
Description (optional)
Cual es el nombre de su negocio
Short answer text
Cual es el numero de telefono de su negocio
Short answer text
Cual es la direccion de su negocio
Short answer text

# Appendix B: Pamphlet

### Que es PPRR?

El Programa de Preparación, Recuperación y Respuesta es un proyecto comunitario auspiciado por COPI, diseñado para incentivar los servicios de respuesta locales ante el evento de una emergencia natural o personal.

### ¿ Por qué debería involucarse?

Estudios muestran que cada año las tormentas y los maremotos seguirán ocurriendo con mas frecuencia. Respaldo y confianza comunitaria es sumamente importante en comunidades con dificultades de acceso como Piñones en casos de emergencias y asistencia tras la llegada de los desastres naturales. Creando una sistema para organizar y apoyar la comunidad, de manera profesional sino con responsabilidad, idealmente volverá a Piñones una comunidad más resistente enfrentando emergencias que afecta á todo nosotros.

### ¿ COMO PLANEAMOS LOGRARLO?

Estableciendo centros de emergencia donde puedan encontrar los siguientes suministros durante emergencias personales y comunitarias:

- Primeros auxilos
- Mochilas de emergencia
- Agentes de anti-mosquito
- Equipo de cocina de gas propano
- Agentes de arrancadores de fuego
- Almacenamiento de alimentos
- Generadores

Crear una base de datos donde se pueda plasmar la información de los residentes que de manera voluntaria idealmente en las siguientes áreas:

- Electricista
- Plomería
- Construcción
- Cuidado de salud
- Mecánico
- Manejo de Escombros
- Transportación

## Llene estas formas para registrarse

Esta información no se compartirá con ningún otro lugar y se utilizará únicamente en el plan PPRR.

## PPRR Programa de Emergencia

CORPORACIÓN PIÑONES SE INTEGRA

## PPRR Encuesta

Si se siente incómodo o no puede responder una pregunta, escriba n/a.

¿Que es tu nombre?

¿Cuál es tu número de teléfono o email?

¿Cuál es tu direccion?

¿Cuantas personas viven en tu casa?

¿Hay alguien en su casa con una discapacidad?

¿A qué vehículos tiene acceso?

¿Qué recursos necesita más después de un desastre?

¿Cual es tu Trabajo?

¿Qué habilidades/servicios puede proporcionar a la comunidad? (ejemplo: certificación médica, electricista...)

¿Tienes un negocio en la zona?

sí ☐ no ☐

En caso afirmativo, ¿cuál es el nombre, la información de contacto y la dirección?

**Appendix C: Proposal**

PPRR PROGRAM

# PROPOSAL

Prepared For :

Pinones Community Leaders

Holly Mason
Derek Childs
Jack Fredo

# PINONES PREPARACION RECUPERACION Y RESPUESTA PROGRAM

## WHAT IS PPRR?

Pinones Preparacion Recuperacion y Respuesta is a community project sponsored by COPI that is designed to incentivize local services and relief in the event of a natural or personal emergency.

## CHALLENGES

The notable lack of government funding and aid prior to and after disasters in Pinones has led to a combination of disorganization and little communication in the community. There are few clear incentives for community members to add reassurance of possible positive change. These outlined issues serve as the current obstacles the program must overcome.

## STRATEGIES TO OVERCOME THESE CHALLENGES

### COMMUNITY OUTREACH

Inform and involve residents on the PPRR program and explain the potential impact of a successful program

### GRANTS

Find grants that may be used to help cover the cost of hub supplies and resources

### PARTNERSHIPS

Partnership with COPI will help expedite supply distribution during climate disaster scenarios

## HOW DO WE PLAN ON DONG THIS?

Establish Emergency Hubs where residents can find the following supplies during both personal and communal emergencies:

- First Aid
- Emergency Backpacks
- Anti-Mosquito Agents
- Gas/Propane Cooking Equipment
- Fire-Starting Agents
- Food Storage
- Generators

Create a database where voluntary resident information can be displayed. Ideally, contact points of people with skills in the following areas:

- Electrician
- Plumbing
- Construction
- Healthcare
- Mechanic
- Debris Management
- Transportation

## PINONES HUB

This hub is located across from the park in Pinones on Calle 4. This community center will serve as our first established hub. The building belongs to the people of Pinones and is known for holding small gatherings, making this location ideal for storing essential emergency supplies that are easily accessible by PPRR participants.

## ROLES

**SECTOR LEADER**

Middleman/spokes person between community and COPI

**HUB/NETWORK MANAGER**

Responsible for maintaining the hub and database. Liaison between community and Service Providers

**OUTREACH/ RESOURCE RECRUITER**

Knows how to gather the community for organized activities

**SERVICE PROVIDERS**

Those who filled out the voluntary survey and offered a service

## WHY SHOULD YOU GET INVOLVED?

Studies show that Natural Disasters are becoming increasingly more common. Community connectedness is undoubtedly important in communities like Piñones since the area can be hard to reach and assist post-disaster. Creating a system to assist and organize the community in a formal and accountable way will ideally make Piñones a more resilient community following a community-wide emergency.

## FILL OUT THESE FORMS TO GET INVOLVED

Formulario miembro de la comunidad →

Formulario dueño de Establecimiento →

## Appendix D: Project Schedule

| Task | Week | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PQP | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Create Community Data Surveys | | | | | | | | |
| Establish Leadership Connections | | | | | | | | |
| Develop Mapping Tool and Database | | | | | | | | |
| Collect Community Data | | | | | | | | |
| Refine Program Interface | | | | | | | | |

## Appendix E: Additional Photos Captured During Field Research

All images in this section were captured by our team while in Piñones conducting field research (March & April 2022).