Puerto Rico has long suffered issues with electric and water supply consistency. However, these issues were not placed into the forefront of public attention until the disastrous Hurricanes Irma and Maria left the island in the dark for an exxcrutiating period of time. The effects were devastating on communities, buildings, utilities, and the economy. This paper determines key vulnerabilities of the water system in the western region of Puerto Rico through in-depth interviews with important stakeholders in varied industries and a survey to the community. These specific vulnerabilities are then evaluated to compensate for the effects of a changing climate. Recommendations are proposed for possible solutions to help improve the water system and mitigate the effects of climate change on important public utilities.

It is found that the water system in the study area is most vulnerable to: deteriorating infrastructure, political and economic instability, natural disasters and inefficient response efforts, overdependence on electricity, and changes in source water supply. Stronger storms and unpredictable weather patterns due to climate change add additional pressure to these vulnerabilities, and therefore the stress need for a more resilient water system. It is recommended that all major stakeholder organizations develop a climate change mitigation and resiliency plan in order to make significant progress.

Background & Objective

- Puerto Rico Aqueduct and Sewer Authority (PRASA) is the island’s public water utility.
- The western region (Figs. 1 & 2) has historically had higher percentages of service interruptions.
- After Hurricane Maria, some areas went months without reliable water service.
- Scientists predict more severe and unexpected weather patterns as a result of climate change.
- This project seeks to determine the vulnerabilities of the water system in the study area and the implications of these within a changing climate.

Study Area

- Aquaducts
- MOC
- San Sebastian
- Aguadilla
- Moongs
- Lajas
- Lares
- Montanó
- Mayaguez
- Ponce
- Coamo
- Mariana
- San German
- Guayama
- Cabo Rojo
- Lajas
- Puerto Rico

Results & Discussion

Vulnerability: Vulnerable To: Effects:

| Aging infrastructure | Heavy winds, wear and tear | Pipe bursts, leaks, broken water meters, water loss |
| Economic state | Corruption, debt, mismanagement | Lack of public services being carried out |
| Water supply | Water shortages | Water service disruptions |
| Overdependence on electric power | Disruptions in electric utility service | No electricity to fuel water pumps and/or high cost of fueling generators |
| Disasters and emergencies | Disorganized response efforts, communication issues | Delayed recovery |

Table 1: Vulnerabilities of the water system and effects as determined through interview communications, based on Lugo (2019).

- Conducted semi-structured interviews with stakeholders in the region, including specialists from:
  - Puerto Rico Aqueducts and Sewer Authority (PRASA)
  - Non-profit organizations
  - The University of Puerto Rico (UPR)
  - Federal Emergency Management Agency (FEMA)
- Distributed an IRB-approved online survey to the community to collect data about their personal experiences with their water service and perception of impending water issues.

Conclusions

- The vulnerabilities of the water system in Western Puerto Rico will amplify devastation from natural disasters (Table 1).
- Significant changes need to be made across the political, economic, and utility sectors in order to build resiliency against climate change.
- By working together and sharing resources, stakeholders can devise emergency response plans that can sustain power loss and fallen communication towers.
- The local government, PRASA, and community members can all benefit by making a few changes to their climate change approach (Fig. 4).

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References:


Fig. 1 (above): Map of the western region of Puerto Rico and its municipalities, derived from AcueductosPR.com. Fig. 2 (right): Empty water shelves 3 days after a 6.4 mag earthquake. This photo was taken in a grocery store in Aguadilla during a water service interruption. Taken by Alana V. Paccione 1/7/2020

FREQUENCY IN WATER SUPPLY CUT OFF

Survey Statistics:
- Over 50% have water interruptions once a month or more (Fig. 3).
- 100% of respondents are PRASA customers.
- 56 responses were collected.

Fig. 3: Frequency of water service interruptions in the western region of Puerto Rico. Data derived from survey.