Long-term disaster recovery planning as transformative change: Insights for sustainability transitions

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National Academies of Science, Engineering, and Medicine Workshop on Benefits, applications, and Opportunities of Natural Infrastructure

May 10-11, 2022

Academic Profile

- **2002** — **Certificate in 'Applied Social Research', Center for Applied Social Research (CISA), University of Puerto Rico – Mayagüez**

- **2003** — **Certificate in 'International Population and Development', Population Fellows Program, University of Michigan –Ann Arbor, MI.**
  - Field Placement: Mayan Biosphere Reserve, Petén, Guatemala, C.A.

- **2004** — **B.A. Magna Cum Laude, Sociology, University of Puerto Rico-Mayagüez**

- **2007** — **M.A. Sociology, University of Delaware, Newark, DE**
  - Disaster Research Center, Hurricane Katrina Quick-response Research Initiative
  - Research Assistant, Population Composition, Geographic Distribution, and Social Vulnerability to Disasters in Puerto Rico. PI: Havidán Ródríguez
  - Research Assistant, NSF Engineering Research Center on Collaborative Adaptive Sensing of the Atmosphere (CASA). PI: David McLaughlin, End-User Research Lead: Brenda Philips
    - Field Research and Phone Survey focused on Public Response to Tornado Warnings
  - Thesis: Development, Vulnerability and Disasters in the West Coast of Puerto Rico. Committee: Havidán Rodríguez (Chair), Joanne Nigg, Anne Bowler, Walter Díaz
  - Alumna of the **Disaster Research Center (DRC**

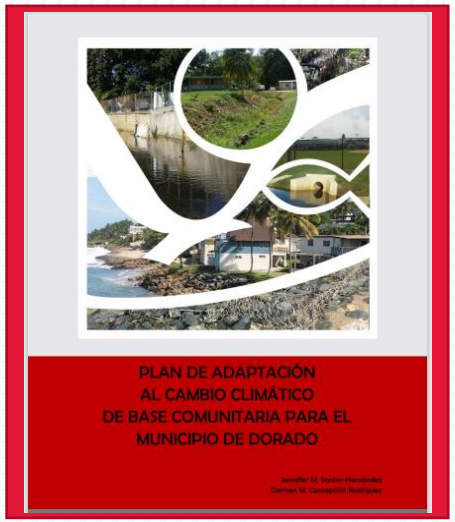
- **2010** — **Certificate in 'Weather and Society Integrated Studies (WASIS)'. Societal Impacts Program, National Center for Atmospheric Research (NCAR). Boulder, CO.**

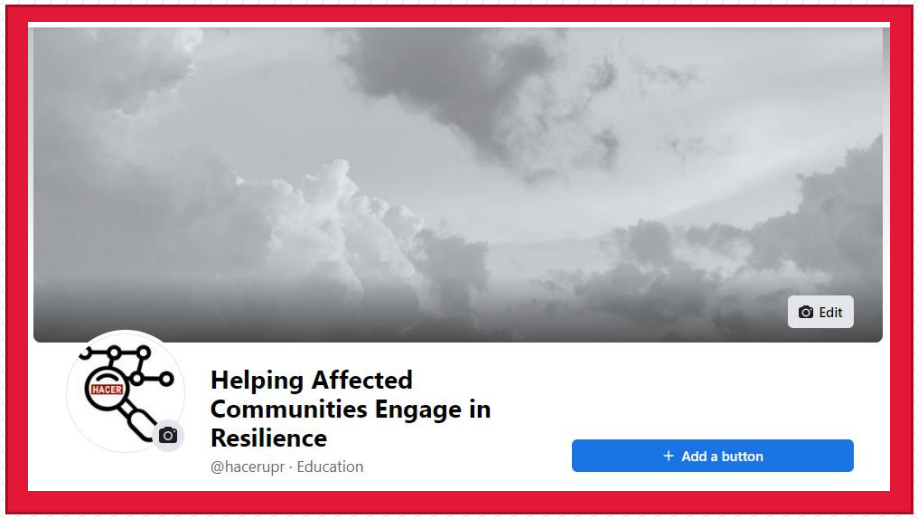
- **2013** — **Ph.D. Sociology, University of Delaware, Newark, DE**
  - Comprehensive Exams Areas:
    - Collective Behavior, Social Movements, and Disasters – Chair: Benigno Aguirre
    - Race and Ethnicity – Chair: Carole Marks
  - Dissertation: Integrating Perspectives on Social Vulnerability and Emergency Management in Puerto Rico Committee: Benigno Aguirre (Chair), Tricia Wachtendorf, Joanne Nigg, Joseph Scanlon
  - Disaster Research Center, 2010 Earthquake in Haiti Quick-response Research Initiative
  - Alumna of the **Disaster Research Center (DRC)**
  - Research Associate at **Oak Ridge National Laboratory (ORNL)**

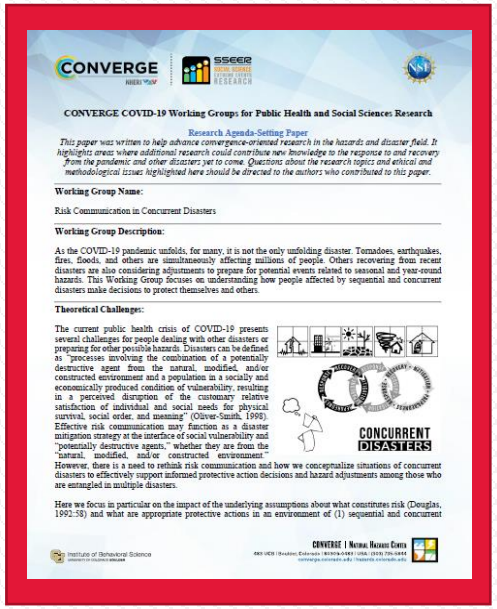
- **2013-Present** — **Research Professor in Sociology of Disasters, Centro de Investigaciones Sociales, College of Social Science, Universidad de Puerto Rico – Río Piedras.**

- **2018** — **Certificate in 'Climate Studies'. American Meteorological Society. Washington, DC.**

Recent and ongoing research in Puerto Rico







Risk Communication in Concurrent Disasters

Jenniffer Santos-Hernandez, University of Puerto Rico-Río Piedras
Lorna Jaramillo Nieves, University of Puerto Rico-Río Piedras
Sara McBride, U.S. Geological Survey
Nnenia Campbell, University of Colorado Boulder
Jeiselynn Ríos Rivera, University of Puerto Rico-Río Piedras
Leslie Martínez Román, University of Puerto Rico-Río Piedras

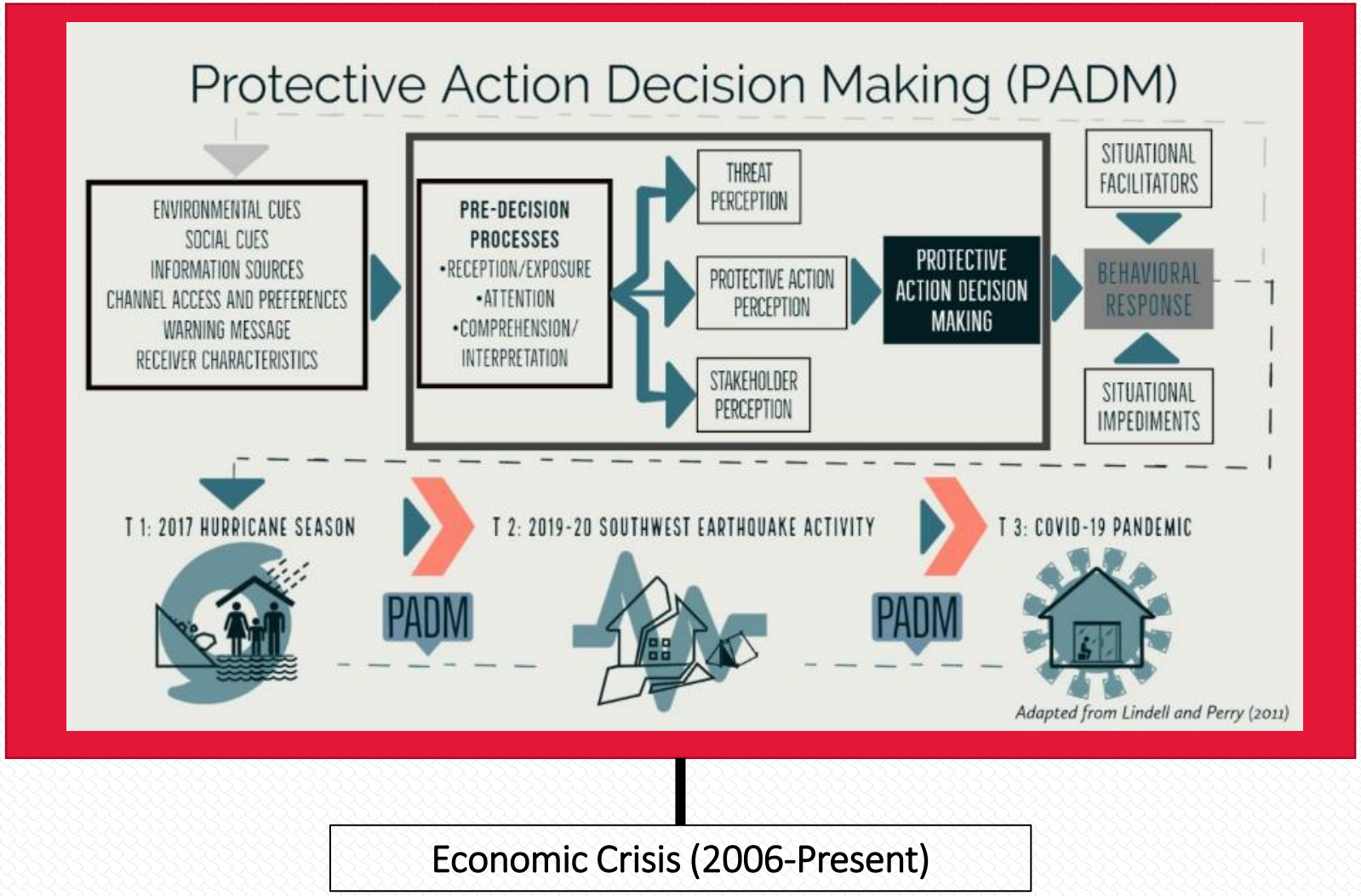
In the last three years, residents of Puerto Rico have been affected by hurricanes Irma and María, the 2020 earthquake sequence, and the COVID-19 pandemic. This project seeks to (1) understand the risk perception of diverse users of earthquake risk communication information in Puerto Rico, (2) how available risk communication products (e.g., aftershock forecasts), experience with other unfolding disasters, as well as their social characteristics and individual and familial situation, may inform hazard reduction and protective action decision making, and (3) co-design visualizations that allow governmental and non-governmental organizations to effectively and efficiently convey current and future earthquake risk.

Participatory Planning and Co-Design

- Urban Resilience to Extremes Sustainability Research Network (UREx SRN) – 2015-2021
  - **Interdisciplinary network** of researchers and professional that study urban sustainability, social vulnerability and resilience to extreme events. Promotes the participatory planning through the development of medium and long term sustainability scenarios.
- The **EPA College Underserved/Community Partnership Program (CUPP)** at Centro de Investigaciones Sociales supported the creation of the **Helping Affected Communities Engage in Resilience (HACER)** to provide technical assistance to disadvantaged communities. (2018-2020)
  - CUPP presented an opportunity to engage communities in long-term recovery planning to advance desirable futures; a missing link in UREx.
- Transformative scenarios served as a reflexive participatory tool through which stakeholders engage in developing a collective synthesis of the situation, think about what could happen, and explore what could be done, and what could be their role in the process.
- A platform for university/community/government collaboration that became useful to the U.S. Geological Survey after the 2020 Southwest Puerto Rico Earthquake Sequence, leading to the collaboration **'Risk Communication in Concurrent Disasters'** to co-design risk communication products to convey the aftershock forecast.

Risk Communication

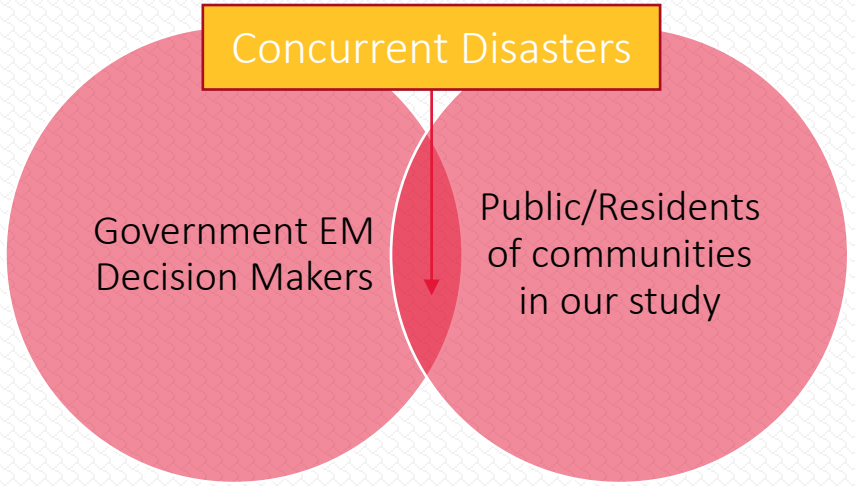
Social amplification of risk in Puerto Rico



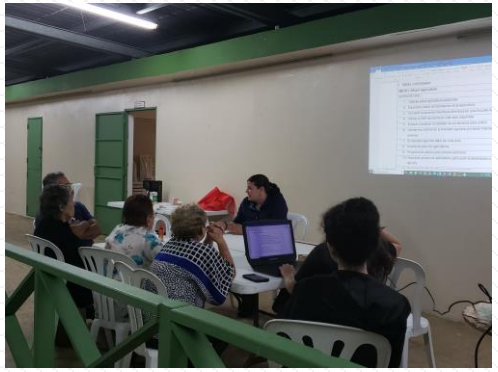
Economic Crisis (2006-Present)

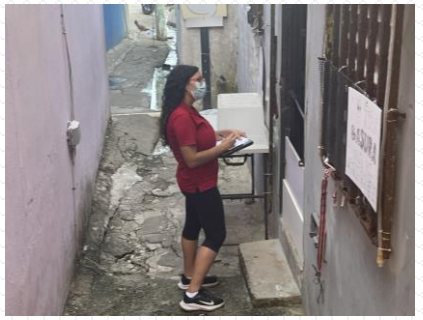
Otros retos / Other challenges

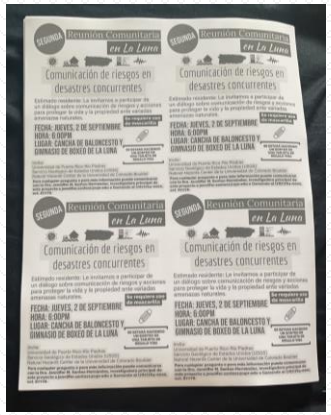
- Debt Adjustment Plan
- Unemployment and underemployment
- Elimination of services
- Population loss – aging
- Circular migration
- School closures and limited access to education
  - Escuelas como refugios o centros de servicios de emergencia / Schools as shelters o emergency centers
  - Escuelas certificadas destruídas / Schools certified as shelters destroyed
- Zika, Chicungunya
  - Reduced number of health professionals
- Political stability: Government corruption, summer of 2019 protests



Field research in Puerto Rico







Why rethinking recovery is **VITAL**?

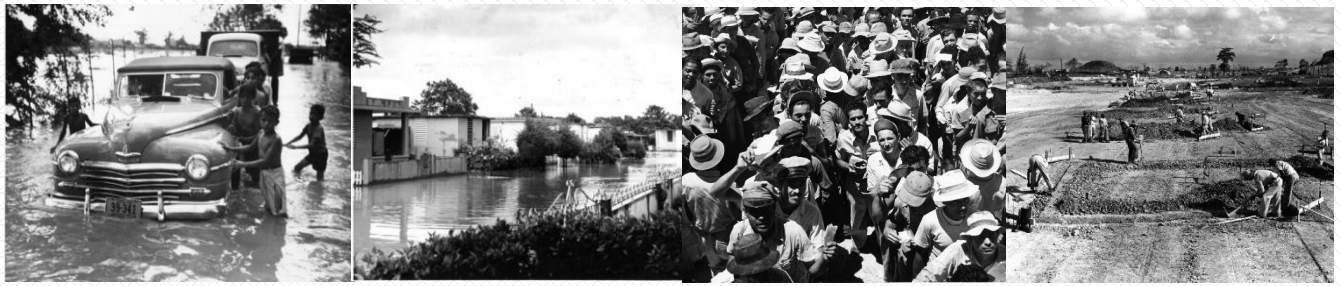
Dynes and Quarantelli (2008). **A Brief Note on Disaster Restoration, Reconstruction and Recovery: A Comparative Note Using Post Earthquake Observations.**

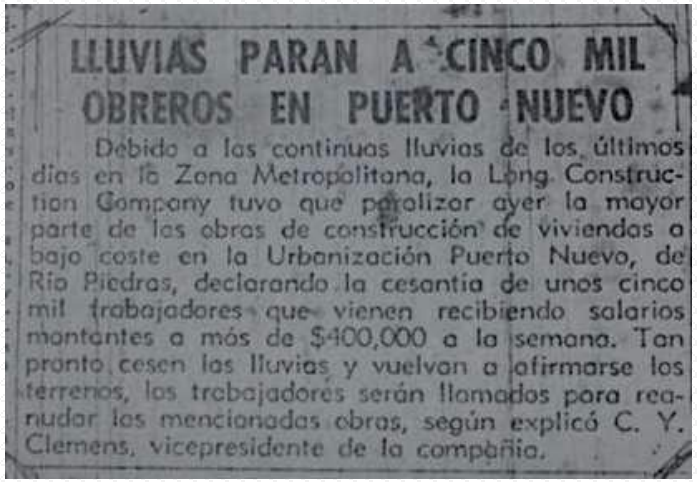
- Restoration
- Reconstruction
- **RECOVERY**

Why are we failing?

Non-sustainable regimes

"Natural" hazards in Puerto Rico?





LLUVIAS PARAN A CINCO MIL OBREROS EN PUERTO NUEVO

Debido a las continuas lluvias de los últimos días en la Zona Metropolitana, la Long Construction Company tuvo que paralizar ayer la mayor parte de las obras de construcción de viviendas a bajo coste en la Urbanización Puerto Nuevo, de Río Piedras, declarando la cesantía de unos cinco mil trabajadores que vienen recibiendo salarios montantes a más de $400,000 a la semana. Tan pronto cesen las lluvias y vuelvan a afirmarse los terrenos, los trabajadores serán llamados para reanudar las mencionadas obras, según explicó C. Y. Clemens, vicepresidente de la compañía.

- "Debido a las continuas lluvias de los últimos días… la Long Construction Company tuvo que parar la mayor parte de las obras de construcción de viviendas a bajo costo en Puerto Nuevo, declarando la censantía de unos 5,000 trabajadores. Tan pronto cesen las lluvias y vuelvan a afirmarse los terrenos, los trabajadores serán llamados para reanudar las mencionadas obras, según explicó C.Y. Clemens, vicepresidente de la compañia." (El Imparcial, 6 de agosto de 1948)
- "The mayor of Río Piedras (Augusto Alvarez) indicated that… the residents of Puerto Nuevo who have bought houses in the lower part of Puerto Nuevo complain that to get from that part to the main road, they have to wade through a mudflat."(El Mundo, 31 de diciembre de 1948)
- The discussion about channeling the Río Piedras river began in 1948.

Fast forward: October 13, 2021

Communities in which we have worked recently

San Juan

- La Perla
- Viejo San Juan
- Puerto Nuevo
- Buena Vista
- Cantera
- Villa Nevarez
- Río Piedras Heights
- Caimito
- Las Curías
- Playita

Guánica

- La Luna

Guayanilla

- Indios

La Perla, San Juan, Puerto Rico

Community vision: A community with essential services accessible, a clean coast, a community garden where residents have assigned plots and a kitchen soup, with more edible or food producing plants.

Community Sustainability Goals

- Sustainable water managerment
- Effective wasterwater management in Old San Juan
- Efficient solid waste management
- Healthy community
- Renewable energy for every household
- Increase green cover
- Improve access to services and infrastructure

Villa Nevarez

Visión a nivel comunitario: We aspire to a community that is not gated with green areas that are maintained, that do not flood, that do not pollute, where streams and creeks are maintained. We aspire to a community with a safe linear park along the river in harmony with nature. Also, we aspire a community with access to collective transportation, with a well-designed and maintained infrastructure; with paved and safe streets. We aspire to become a cohesive community where residents follow regulations, with appealing landscapes, supportive, tolerant and reciprocal neighbors, self-sufficient and zero waste.

Sustainable Community Goals

- A healthy, self-sufficient, safe community
- Increased green cover and access to green areas
- Community cohesion and solidarity
- A community in harmony with nature
- Access to collective transportation
- Flood-safe community
- Reduced pollution
- Better streets that do not exacerbate flooding

Current proposal: The opportunity to rethink flood mitigation in San Juan “remains”

Project Description

2.1 Project Description

The Rio Puerto Nuevo project was authorized for construction by the Flood Control Act of 1970 Section 204 (PL 91-611) and the Water Resources Development Act of 1986 Section 401 (PL 99-662). The project is located in San Juan, Puerto Rico. The Rio Puerto Nuevo Basin drains 24 square miles, 75 percent of which is highly developed with a population of 250,000 persons. The plan of improvement protects against the 100-year flood by the construction in the Puerto Nuevo River and its tributaries of 1.7 miles of earth lined channel, 9.5 miles of concrete lined channel (5.1 miles of which are high velocity), and two debris basins. The plan will also require the construction of five new bridges, the replacement of 17 bridges, and the modification of eight existing bridges, refer to Figure 1.

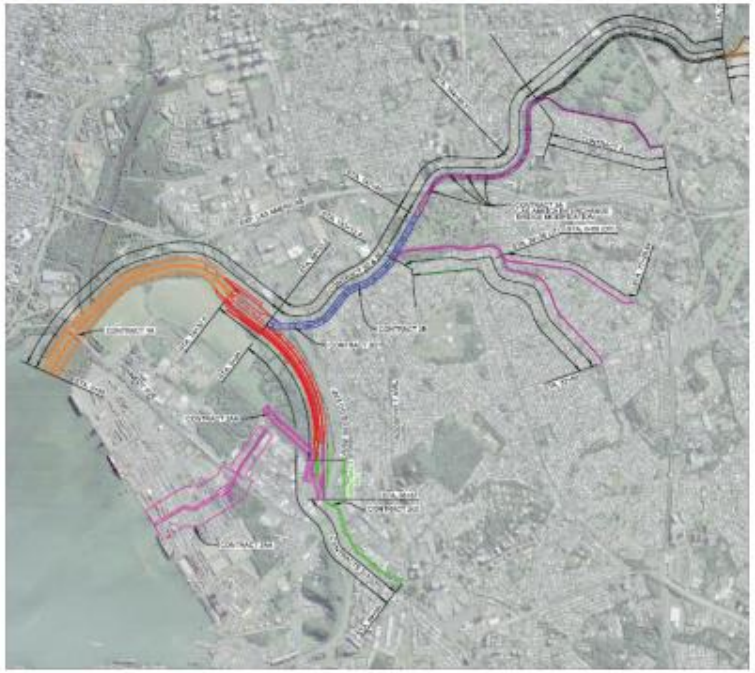
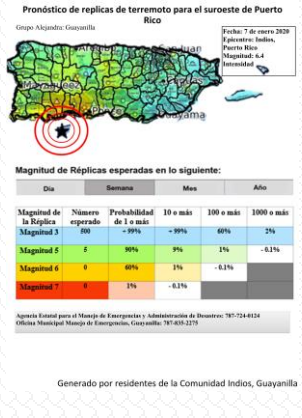


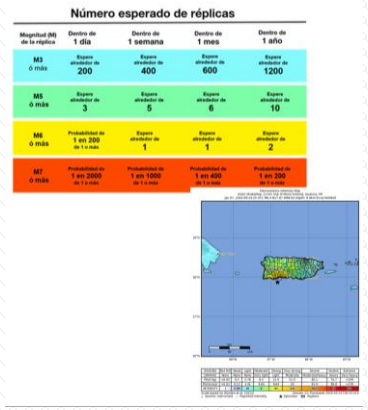
Figure 1: Rio Puerto Nuevo Contract Locations

Google Earth Plan View of the four Las Americas Bridges and Puerto Nuevo Channel Improvements from Station 147+40 to Station 176+50.

The power of participation:

What about representation?





Updating the Aftershock Forecast Template Product

Prepared by Sara K. McBride, Andrew Michael, Jeanne Hardebeck, and Jenniffer Santos-Hernandez

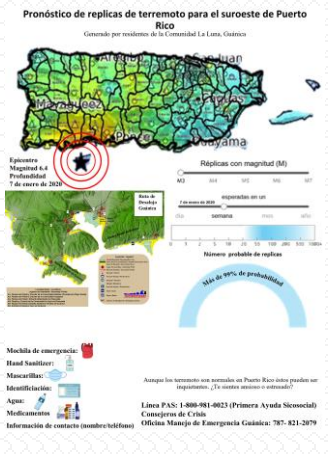
Summary

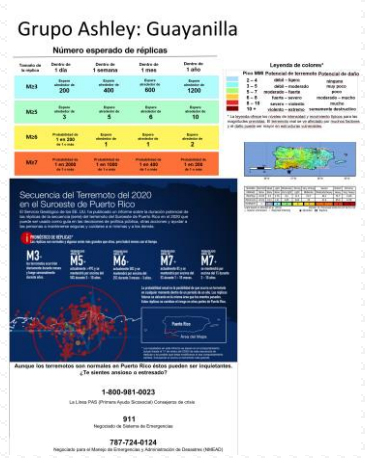
This document outlines the Aftershock Forecast template update, which was updated over a six month process. The changes were made incorporating feedback from users that was gathered since 2018, insights from the forecast development team and HAZDEV members, and early findings from social science research conducted in Puerto Rico. This update represents the text and software updates; visuals will start to be incorporated in Fall 2022, depending on staff availability.

Background

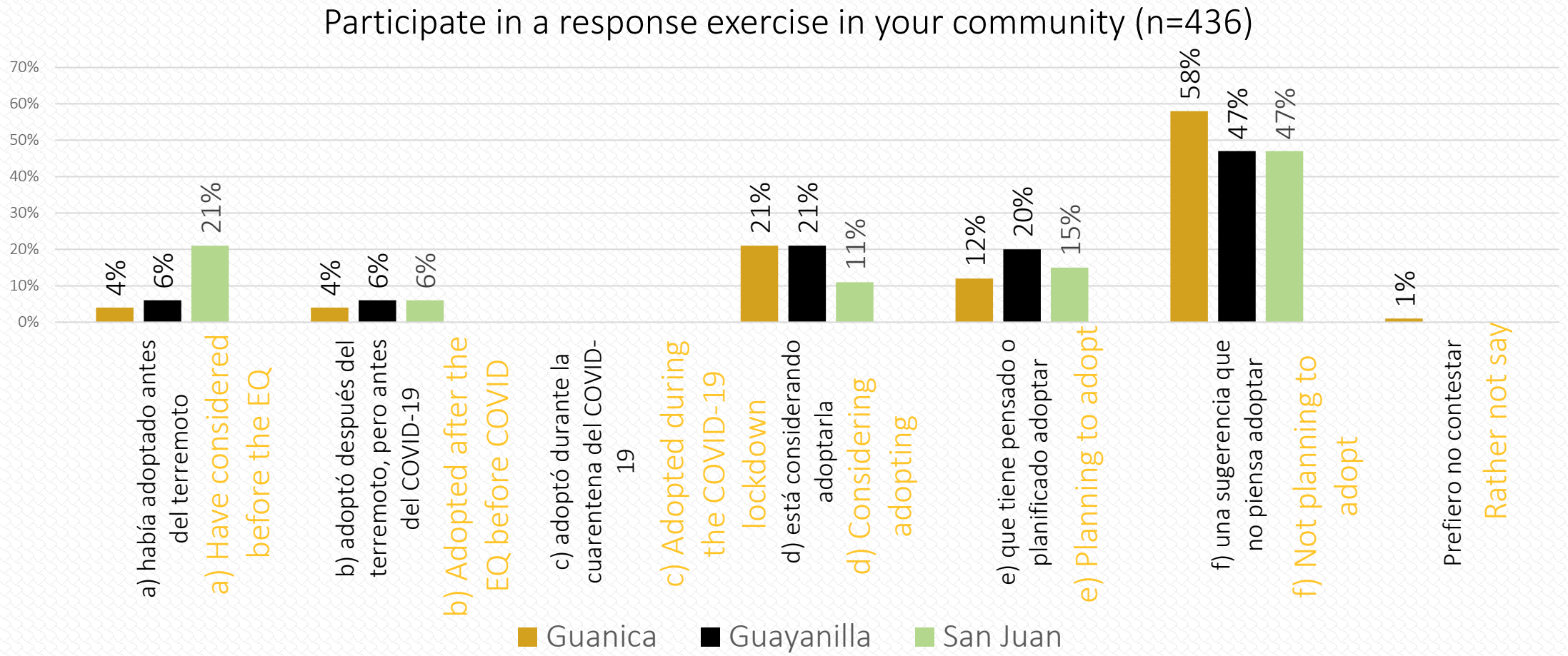
The Aftershock Forecast template was developed in 2017 and operationalized in 2018, in time for the M7.1 Anchorage Earthquake in November 2018. Media analysis of the effectiveness of this product indicates that it was frequently used in media stories about the earthquake, particularly in the weeks and months afterwards, as aftershocks continued (Michael et al., 2020). While the forecast was a relatively new product, it was one of the most used by the media (Thompson et al., 2020). The clarity of reporting of the forecasts was markedly improved from the 2016 Bombay Beach Swarm, as detailed in McBride et al. (2019), showcasing that the importance of quick dissemination of the forecast, use of Associated Press English, and a design based on presenting a hierarchy of information is critical to its success. However, users of the aftershock forecasts, particularly earth scientists, found some of the wording and flow difficult to use and made suggestions over the last two years. These suggestions from users were catalogued by the aftershock forecast team in a document, which also included ideas from the team.

Other earthquakes occurred since 2018, notably the Southwestern Puerto Rico Sequence, with the most damaging earthquake occurring in January 2020 (van der Elst et al., 2022). During this sequence, scenarios were developed and a duration report was released publicly, with the support of the Federal Emergency Management Agency. All materials were translated into Spanish and contained visuals. Further, local social scientists were consulted on the development of the communication of these forecast products. After the initial response was over, Jenniffer Santos-Hernández from Centro de Investigaciones Sociales (CIS) at University of Puerto Rico-Rio Piedras worked with Sara McBride (USGS), Nnenia Campbell (Natural Hazards Center, University of Colorado

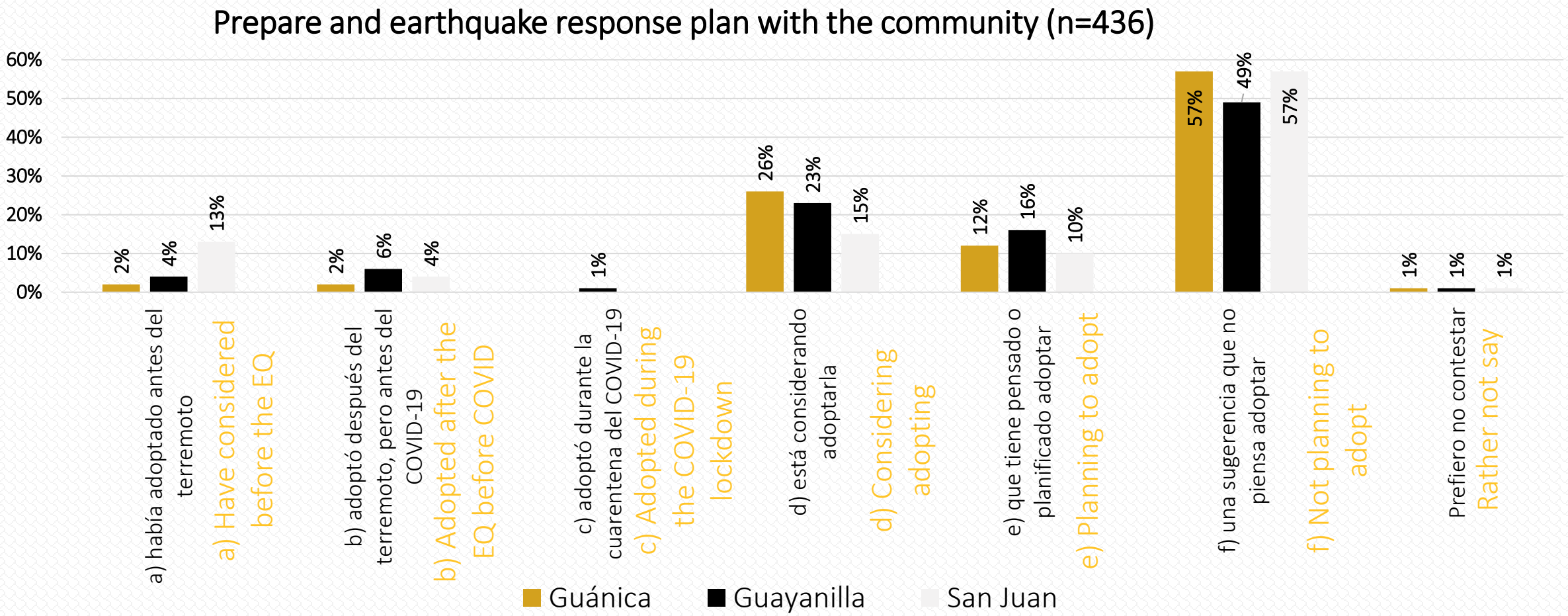




Preparedness: Planning for disaster reduction



Preparedness: Planning for disaster reduction

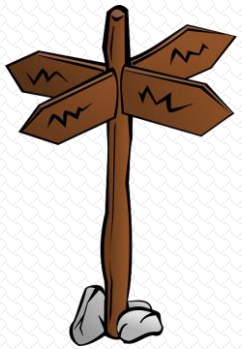


The future is **NOW**: Governance of long-term disaster recovery planning

- Transformative scenarios → **Transition management** → **Transformative change**
- **Transformative change –** non-linear systemic change that leads to fundamental, qualitative changes in societies' cultures, structures, and practices (Loorbach et al., 2017).
- Occurs across local contexts and is enhanced through translocal networks
- Transformative innovation advances through *growing, replicating, partnering, instrumentalizing, embedding.*
- *Transdisciplinary action researchers seek ways to adapt and learn, to inspire and mobilize or to translate concerns.*
- **Our youth is dealing with the uncertain future that we maintain and perpetuate.**

- ‘Failure of the United States to come to grips with the problem of colonies will invite catastrophe.

- W.E.B. Dubois, Color and Democracy: Colonies and Peace (1945)



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Thank you!

NSF Urban Resilience to Extremes Sustainability Research Network (San Juan)

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