

On the Path to Creating a Stronger & More Resilient Puerto Rico After Hurricane María

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Sustainable
Solutions
Lab

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On the Path to Creating a Stronger & More Resilient Puerto Rico After Hurricane María

RE↑MAG↑INA
Puerto Rico

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Relmagina Puerto Rico

UMASS
Climate Adaptation Forum
Nov. 30, 2018

A satellite image of a hurricane, showing the characteristic eye and spiral cloud bands. The image is in grayscale, with the clouds appearing in shades of gray against a darker background.

IMMEDIATE DAMAGE OF HURRICANE MARÍA: OVERVIEW

Hurricane María impacted Puerto Rico from east to west on Sept. 20, 2017

- 10th most intense Atlantic hurricane on record & 3rd costliest hurricane in US history
- Entire island without electricity resulting in the U.S. state-level power outage of longest duration
- Most communication channels were down
- Damaged thousands of housing units, telecommunication towers, roads & bridges, critical infrastructure and 80% of island's crop value

Problems faced for immediate recovery:

- Collapse of communication and electricity systems & faulty coordination efforts hindered recovery coordination & logistics and caused delays in emergency response and relief efforts
 - We were forced to communicate the old fashioned way– in person
 - 2 critical ports and main international airport suffered damages and disrupted services making it difficult to receive equipment and essential goods (food, medicines and batteries)



IMMEDIATE DAMAGE OF HURRICANE MARÍA: OVERVIEW

POWER

- Over 25% of transmission line towers and poles were damaged with up to 80% of circuits needing repair.
- 100% of the power grid was inoperable.

WATER & WASTEWATER

- 100% of PRASA customers lacked drinking water.
- Affected 70% of Puerto Rico's potable water treatment and distribution systems.

COMMUNICATIONS

- 95% of the cell towers were out of service.
- 91% of private telecom infrastructure was damaged.
- 1 submarine cable supported off-Island communications for about 40 days after the primary cable landing station for many major telecom carriers flooded.

FUEL SUPPLY

- Gasoline supplies became depleted, and roughly 2/3 of gas stations were closed due to the storm.

*Reference: Transformation and Innovation in the Wake of Devastation: An Economic and Disaster Recovery Plan for Puerto Rico

A satellite image of a hurricane, showing the characteristic eye and spiral cloud bands, in shades of grey and white against a dark background.

IMMEDIATE DAMAGE OF HURRICANE MARÍA: OVERVIEW

HOUSING

- 527,000 households that registered with FEMA indicated they had property damage.

PUBLIC SCHOOL SYSTEM

- 38–44 schools were closed permanently due to structural damage.

NATURAL RESOURCES

- 23-31M trees may have been severely damaged or destroyed, according to preliminary estimates.
- 41,000 landslides across a significant portion of Puerto Rico.

TRANSPORTATION

- Just 400 miles of road could be accessed/ transited (out of 16,700 miles).
- 100% of Tren Urbano (metro) service was suspended.
- Bus service in San Juan was nonexistent for two weeks.
- Air travel was suspended for 2 days, then there were only 10 flights per day for a week.

*Reference: Transformation and Innovation in the Wake of Devastation: An Economic and Disaster Recovery Plan for Puerto Rico Report, August, 2018.



MONTHS AFTER HURRICANE MARÍA: OVERVIEW

POWER*

- By the end of January 2018, from 450,000 to 460,000 houses were still without electricity.
- At the beginning of July 2018, PREPA informed that they had restored power to 99.9% of its subscribers.

WATER SYSTEMS**

- By January 4, 2018, PRASA informed that they had restored the service to 58.1% of subscribers.

COMMUNICATIONS***

- On January 2018, the FCC reported that 9.5% of the cell sites were out of service and that Vieques had more than 50% of its cell sites out of service.

*Information from *El Nuevo Día*, published on January 22, 2018.

**Information from *Telemundo*, published on January 4, 2018.

***Information from the “Communications Status Report for Areas Affected by Hurricane María” of September 21, 2017 and January 3, 2018 reported by the FCC.



**FOCUS ON
RECONSTRUCTION:
OVERVIEW**

These power and communication disruptions caused cascade effects by limiting availability, distribution, and management of food, medicine & essential supplies and diesel to operate trucks, construction equipment and auxiliary generators to power hospitals, treatment plants, storm water pumps, communication towers and nursing homes.

FOCUS MOVING FORWARD:

Puerto Rico's reconstruction efforts should focus on developing resilient critical infrastructure systems that provide equitable access to essential goods and services.

Two months after the passing of Hurricane María

RE↑MAG↑INA

Puerto Rico

Resilient Puerto Rico Advisory Commission

WHO

FUNDER

S
FORD
FOUNDATION

THE
ROCKEFELLER
FOUNDATION

OPEN SOCIETY
FOUNDATIONS

COMMISSION

CO-CHAIRS

COMMISSIONER
S

EXECUTIVE
DIRECTOR +
SECRETARIAT

CONSULTANTS

100 RESILIENT
CITIES

CENTER FOR A
NEW ECONOMY

RESILIENT PUERTO RICO ADVISORY COMMISSION

REIMAGINA PUERTO RICO

Independent

Non-governmental & non-partisan

Locally led

Inclusive



REIMAGINA PUERTO RICO PROJECT



GOAL

Promote a stronger more resilient Puerto Rico as it embarks on reimagining its development and reconstruction with more public participation and transparency in the recovery processes where the people of Puerto Rico take an active role in forging the vision of the Island.

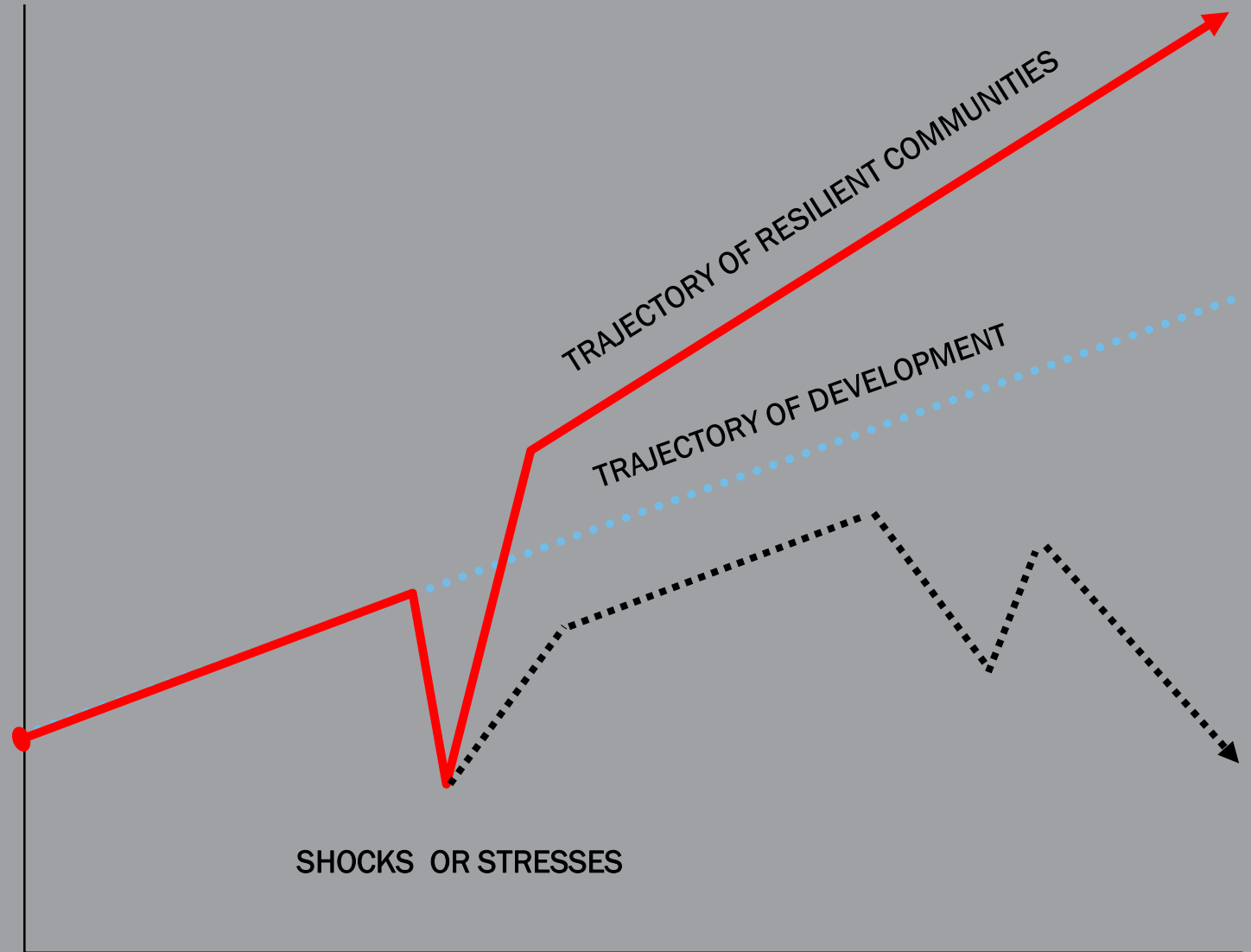


OBJECTIVE

Produce an actionable and timely set of recommendations for how to use philanthropic, local government, and federal recovery funds to help rebuild Puerto Rico in a way that makes the Island stronger – physically, economically, and socially – and better prepared to confront future challenges.

RESILIENT Planning

Shocks and stresses can present opportunities so that communities thrive and in some circumstances they can transform.



ORGANIZE RESOURCES

7 QUALITIES OF
RESILIENT
SYSTEMS

FLEXIBLE

REDUNDANT

RESOURCEFUL

ROBUST

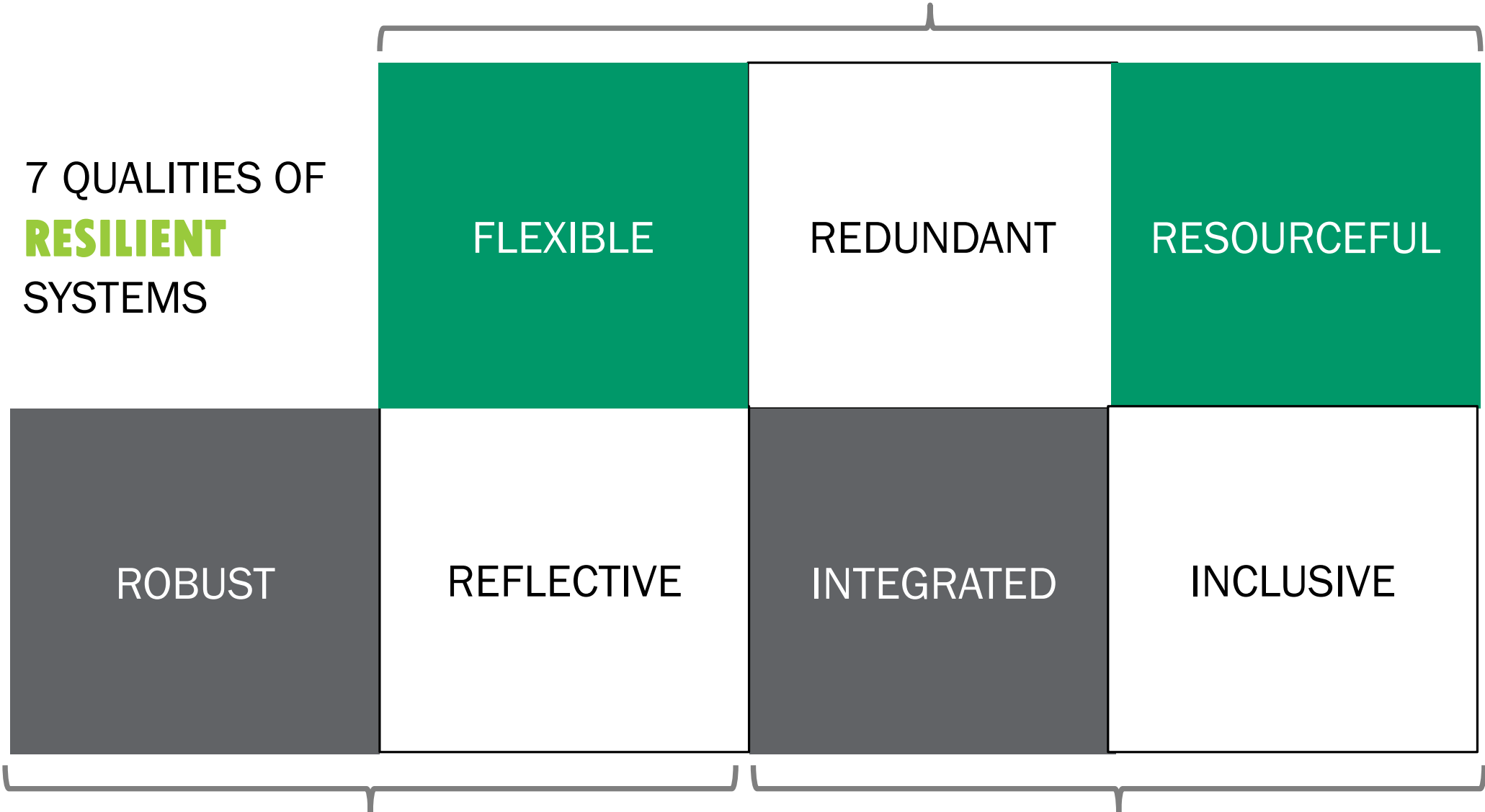
REFLECTIVE

INTEGRATED

INCLUSIVE

ACCEPT CHANGE

INCLUDE OTHER SYSTEMS



RESILIENCE: CONTEXT OF PUERTO RICO

URBAN & RURAL
DIVISION ON
ISLAND



SMALL ISLAND
SURROUNDED BY
WATER



VARIETY OF SENSITIVE
ECOSYSTEMS
WITH OPPORTUNITIES &
CHALLENGES EACH
PRESENTS



EXPOSURE TO
RECURRING
CLIMATE EVENTS



HIGH
INFRASTRUCTURE
COST IN
COMPARISON TO
SMALL TAX BASE

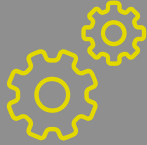


DEPENDENCE ON
TOURISM,
MANUFACTURING,
PHARMACEUTICALS &
IMPORTS

EXCESSIVE
DEPENDENCE ON
LIMITED NATURAL
RESOURCES



WORKING GROUPS



ECONOMIC DEVELOPMENT



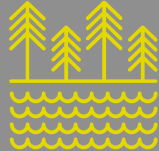
EDUCATION, HEALTH, & SOCIAL SERVICES



ENERGY



HOUSING



NATURAL INFRASTRUCTURE



PHYSICAL INFRASTRUCTURE

- KEY ECONOMIC SECTORS FOR RECOVERY

- FISCAL SUSTAINABILITY

- HUMAN CAPITAL & WORKFORCE DEVELOPMENT

- EDUCATION SERVICES

- HEALTHCARE ACCESS & PROVISION

- ESSENTIAL SERVICES FOR VULNERABLE POPULATION

- GENERATION

- TRANSMISSION & DISTRIBUTION

- DEMAND

- FUEL

- TENURE SECURITY

- ACCESS & AFFORDABILITY

- SAFETY AND RISK REDUCTION

- COASTAL & MARINE RESOURCES

- FRESHWATER RESOURCES

- FORESTS AND AGRICULTURE

- TRANSPORT & COMMUNICATION INFRASTRUCTURE

- WATER & WASTEWATER INFRASTRUCTURE

- DAMS, BARRIERS & FLOOD CONTROL INFRASTRUCTURE

- WASTE MANAGEMENT INFRASTRUCTURE

REIMAGINA PUERTO RICO REPORT

Youth Participatory
Photography

Working Groups

Community Engagement &
Outreach Process

Public Sector
Advisory
Group

77 meeting and activities

748 participants

Academia

Nonprofit Organizations

Private Sector

Government of Puerto Rico

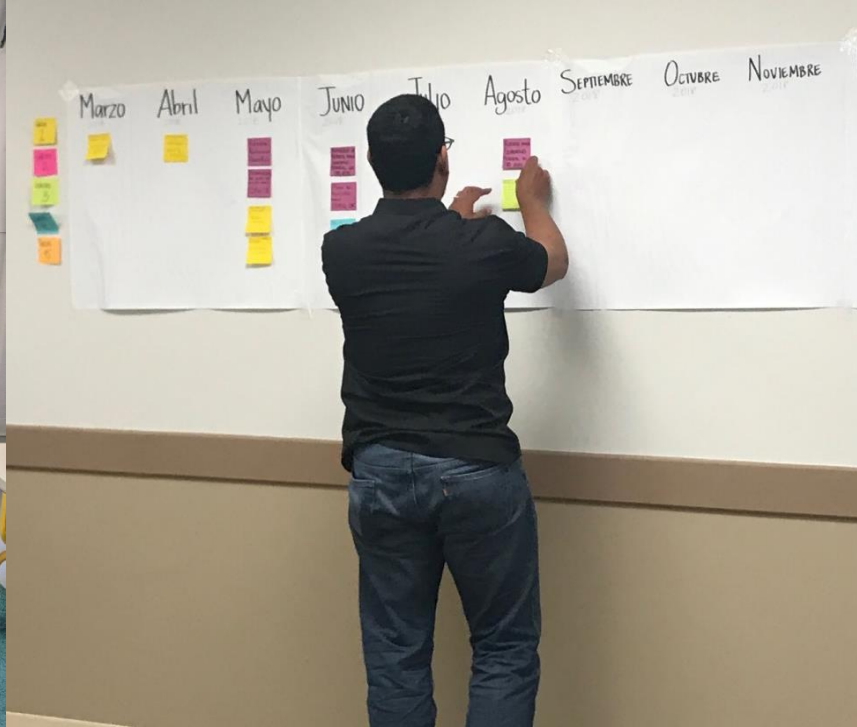
Government Consultants

Federal Government

Community-Based Organizations

NGOs

Social Defense Organizations



GUIDING RECOVERY PRINCIPLES



MAXIMIZE
SOCIAL
WELL-BEING
IN ALL
INVESTMENTS



ESTABLISH
EQUITY AND
INCLUSIVENESS
AS A PRIORITY



ENSURE
TRANSPARENCY
AT ALL
LEVELS OF
POLICYMAKING



EMPHASIZE
AND FOSTER
COORDINATION
AND
COLLABORATION

SECTOR-SPECIFIC RECOMMENDATIONS

A total of **97 recommendations** were developed within the six sectors. Each sector produced a report that presents a goal for the sector and specific actionable recommendations. The complete set of Sector Reports, which include background, sector context and action details, are included in our website.

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ENERGY

16



NATURAL
INFRASTRUCTURE

30



PHYSICAL
INFRASTRUCTURE

12



ECONOMIC
DEVELOPMENT

18



HOUSING

9



EDUCATION,
HEALTH, SOCIAL
SERVICES

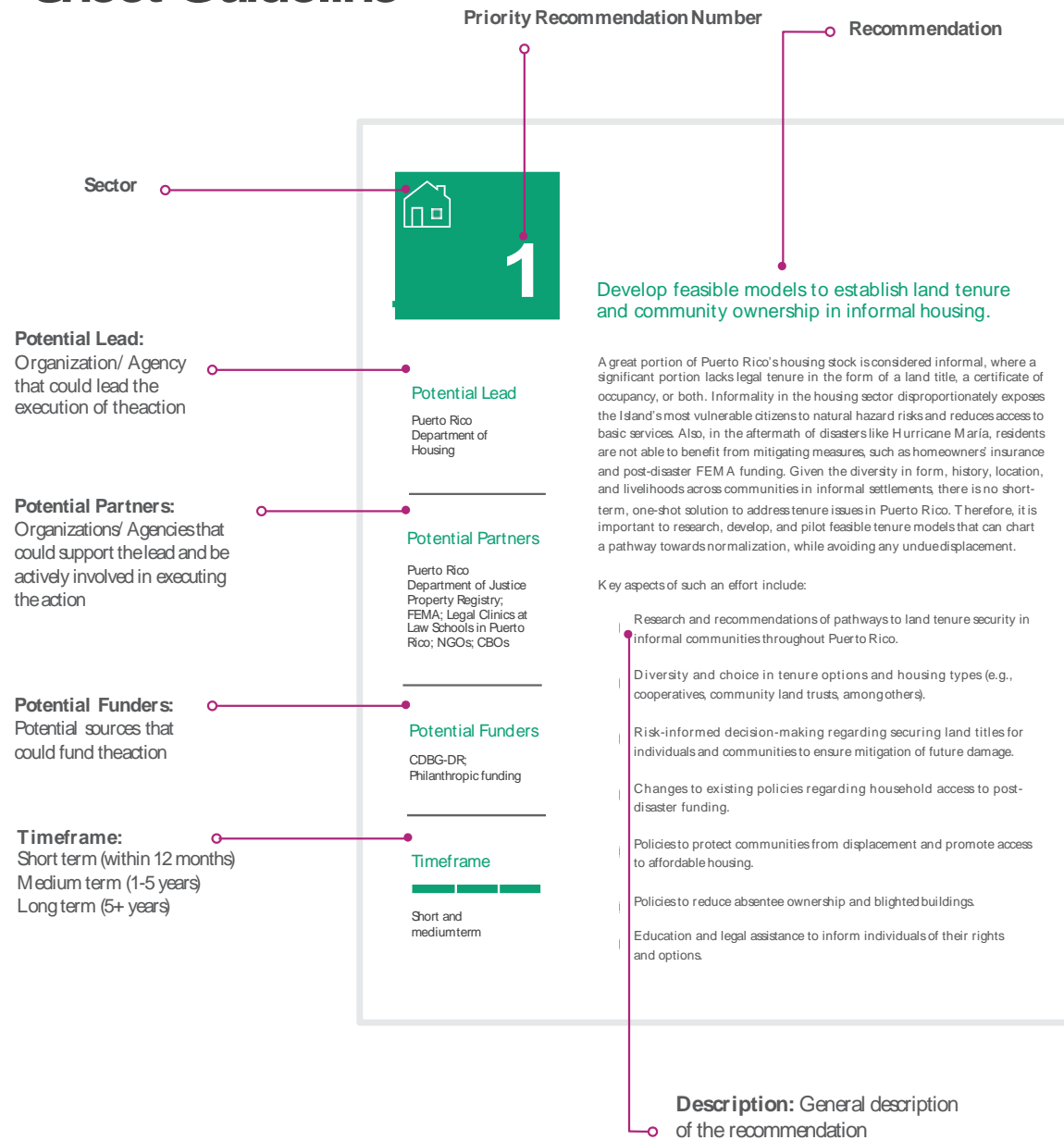


REIMAGINA Puerto Rico

Resilient Puerto Rico Advisory Commission

Reimagina
Puerto Rico Report

Priority Recommendations Sheet Guideline





Río Grande, PR. Sgt. Joshua L. DeMotts



Rebuild, harden and modernize the transmission and distribution system for a minimum of energy security and resiliency.

- Outdated & vulnerable T&D system due to lack of maintenance & underinvestment
- Integrate new local micro grids in T&D system
- Minimum value of 20% of distributed energy for energy security & resiliency



Establish reliable and diversified backup energy systems for vulnerable individuals and critical facilities, such as hospitals, schools, and emergency shelters and services facilities.

Facilitate access to backup energy systems/equipment to fill remaining gaps in individuals' capacity to generate backup electric power for small businesses.



Develop an integrated critical infrastructure management strategy to guide resilient long-term reconstruction.

Develop a master integrated Continuity of Operations Plan (COOP) for critical infrastructures and providers.

Assess and reduce the vulnerability of critical infrastructure against landslides.



Reconstruct decentralized wastewater systems to strengthen their recovery capacities.

Increase robustness and flexibility of vulnerable wastewater treatment systems.

Protect existing drinking water sources and mitigate contamination in order to improve drinking water quality.

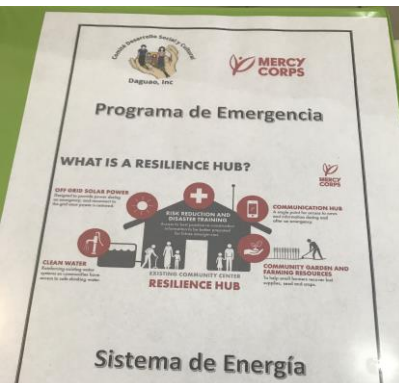


San Juan, PR. Para la Naturaleza



Invest in improvements to the physical infrastructure of healthcare facilities in order to improve the provision of services on a regular basis and in the face of multiple hazards.

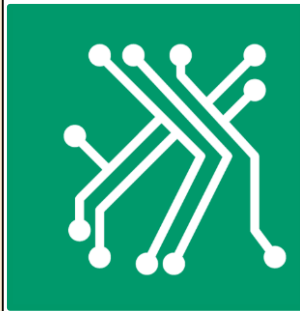
Increase the resilience of educational infrastructure to protect students in the face of disasters and provide enhanced benefits to students and their communities every day.



Comité Desarrollo Social & Cultural Daguao, Inc.

Naguabo, PR

Project: *Para La Naturaleza & Resilient Power Puerto Rico*



Develop Resilient Community Centers to improve the provision of services during emergencies and disaster relief.

- Back-up energy systems (generator, solar photovoltaic systems & batteries)
- Back-up water systems (cistern)
- Back-up communications equipment
- Emergency Preparedness Plan (Including Communication Plan)
- Refrigerators



CHALLENGES OF OUR RECONSTRUCTION PROCESS

MANAGING THE POPULATION'S EXPECTATIONS

OUTSOURCED CONTRACTING AND INTERVENTION FROM NON-LOCAL COMPANIES AND ORGANIZATIONS

LEADERS OVERWHELMED BY THE RECONSTRUCTION'S COMPLEXITIES

POLITICAL & SOCIAL PRESSURE TO SPEND THE MONEY

LIMITED INFORMATION, PLANNING & CONSULTATION WITH AFFECTED COMMUNITIES

RISKS RELATED TO POLITICAL CHANGES DURING THE RECONSTRUCTION PROCESS

IMPLEMENTATION FOCUS AREAS

ACCESS TO INFORMATION & EFFECTIVE MONITORING

ALLOW AN EFFECTIVE, EQUITABLE & INCLUSIVE
PARTICIPATION

COORDINATE EFFORTS & PROMOTE INNOVATION

LOCALLY LED RECONSTRUCTION

MOVING FORWARD

RE↑MAG↑NA
Puerto Rico



Communicate and promote the implementation of our recommendations.



Serve as a clearinghouse by identifying and mapping projects related to the reconstruction efforts, and connect implementers, funders, partners and government to coordinate and collaborate effectively on reconstruction efforts.



Monitor the implementation of our recommendations and the effectiveness of the recovery process.



Partner and collaborate with other organizations in developing tools and educational workshops and materials associated with effective implementation of our recommendations.



Serve as advisor and liaison to government entities and NGOs in charge of reconstruction efforts.

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www.reimaginapuertorico.org