

Federal Support and Local Action

Recovery & Resilience in Puerto Rico and the U.S. Virgin Islands

June 2, 2020

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Recovery & Resilience Puerto Rico



Puerto Rico 02 JUN 2020 Ernesto L. Díaz, MS, MEM Coordinator PRCCC



Overview

- The Puerto Rico Climate Change Council (PRCCC) and the U.S. Global Change Research Program: Fourth National Climate Assessment (NCA4)
- The State of Puerto Rico's Climate: Effects, Impacts, and Social-Ecological Vulnerabilities
- Puerto Rico's Climate Policy: Mitigation, Adaptation and Resilience (Law 33, 2019)
- Hurricanes Irma and Maria (2017): Response and Damage Assessments, Public Assistance (§428, §06), Hazards Mitigation (§ 404), CDBG-DR
- Recovery: The new generation of Coastal and Islands' infrastructure



Puerto Rico Climate Change Council

Mission

...assess the state of Puerto Rico's climate, using the best science and knowledge available, understand Puerto Rico's social-ecological vulnerabilities and develop adaptation strategies to build a resilient society.

Membership: 150+





Sea Level

Ocean Acidification

Storms

Temperature Precipitation



Guía de Estrategias para la Adaptación al Cambio Climático en Puerto Rico









http://www.pr-ccc.org

FOURTH NATIONAL CLIMATE ASSESSMENT

201

👔 Fourth National (Climate Assessm 🗙 🔞 U.S. Caribbean - Fourth National 🗙 🕂	$ \square$ $>$
← → C 🏻	https://nca2018.globalchange.gov/chapter/20/	☆ ○ 3
ABOUT	▼ CHAPTERS ▼ DOWNLOADS ▼	CH 20: U.S. CARIBBEAN 🔍
	The U.S. Caribbean islands face many of the same <u>climate change</u> related challenges as Hawai'i and the U.SAffiliated Pacific Islands (<u>Ch. 27: Hawai'i &</u> <u>Pacific Islands</u>), including • isolation and dependence on imports, making islands more vulnerable to	
	climate-related impacts;	SECTIONS
	 critical dependence on local sources of freshwater (<u>Ch. 27, KM 1</u>); 	Executive Summary
	 temperature increases that will further reduce supply and increase demand on 	Background
	freshwater <i>(Ch. 27, KM 1)</i> ;	KM 1: Freshwater
		KM 2: Marine Resources
22	 vulnerability to drought in ways that differ from mainland regions (<u>Ch. 27, KM</u> 	KM 3: Coastal Systems
	<u></u>	KM 4: Rising Temperatures
	 a projected significant decrease in rainfall in all (Caribbean) or parts (Hawai'i 	KM 5: Disaster Risk Response to Extreme Events
	and Pacific Islands) of these regions (<i>Ch. 27, KM 1)</i> ;	KM 6: Adaptive Capacity

• sea level rise, coastal erosion, and increasing storm impacts that threaten

Traceable Accounts



Puerto Rico's coastal uses and assets at risk



ECONOMICS

HOUSING









HEALTH AND
SOCIAL SERVICES

TRANSPORTATION

EDUCATION

Schools (36)

GDP: \$105 billion/year (PRPB2016) Tourism \$2.5 Billion/year (7%) Built up Areas/Coastline: 24% Industrial Parks (81) Commercial/Recreational Fisheries

Public Housing (15) Individual Housing (xx)

Airports (11) Ports (12) Bridges, Culverts, Piers Miles of Primary Roads (17,387mi/27,982km)

Hospitals (3) Treatment Centers (xx)



Coastal population: 2.3 million (61%) at 44 coastal municipalities

Territorial waters: 9 nm (A=5,078 mi²)

Coastline: 799 mi/1,225 beaches

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Puerto Rico's coastal uses and assets at risk







WATER

ENERGY

COMMUNICATIONS





NATURAL AND CULTURAL RESOURCES Power generation systems (5 public, 2 private) Substations Distribution and transmission lines

Fiber Optic Cables (15) Internet Infrastructure Public comm systems

PRASA infrastructure at coastal zone:
200km potable water
260km sanitary infrastructure
6 water systems
Pump stations
Wastewater Treatment Plants (28)

Protected Areas (Land) DRNA 8.7% (2015) – PA-CAT 16% (2016) Protected Areas (Marine) 27.2% Shallow coral reefs and associated communities designated as MPA: 49% Historical Properties (20+)



Coastline: 799 mi/1,225 beaches

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COES-EAST RAINBOUL TR CH 4 - SER 10 17 16:15 UTC









HURRICANE MARIA RESPONSE

ESF 10 SUNKEN VESSELS REMOVAL









Status of Puerto Rico's Coral Reefs in the Aftermath of Hurricanes Irma and Maria

Assessment Report Submitted by NOAA to the FEMA Natural and Cultural Resources Recovery Support Function



MAX WAVE HEIGHT @ SJ / CAROLINA- HURRICAANE MARÍA (SEP 20.2017)





Hurricanes Cat 4 & 5



Figure 3.3. (a) Pentad total of the number of hurricanes that achieved a maximum ntensity of each category grouping as delineated by the Saffir–Simpson scale. (b) As n (a), but for the percentage of total hurricanes achieving each category grouping. Klotzbach and Landsea (2015)

Puerto Rico Climate and Ocean Trends and projections



https://nca2018.globalchange.gov/chapter/20/

Ch. 20 | U.S. Caribbean

Fig. 20.6: Observed and Projected Sea Level Rise

Observed sea level rise trends in Puerto Rico and the U.S. Virgin Islands reflect an increase in sea level of about 0.08 inches (2.0 mm) per year for the period 1962–2017 for Puerto Rico and for 1975–2017 for the U.S. Virgin Islands. The bottom panels show a closer look at more recent trends from 2000 to 2017 that measure a rise in sea level of about 0.24 inches (6.0 mm) per year. Projections of sea level rise are shown under three different scenarios of Intermediate-Low (1-2 feet), Intermediate (3–4 feet), and Extreme (9– 11 feet) sea level rise. The scenarios depict the range of future sea level rise based on factors such as global greenhouse gas emissions and the loss of glaciers and ice sheets. Sources: NOAA NCEI and CICS-NC.



SEA LEVEL RISE SCENARIOS

International Airport San Juan, Puerto Rico



Puerto Rico Law 33 (2019) Climate Change Mitigation, Adaptation and Resilience

Art 3.- Public Policy

- PR Power grid progressively uses less fossil fuels
- Coal phase out
- Promote clean energy
- Improve energy efficiency
- Lower GHG emissions from other land uses and activities
- Promote the use of electric cars
- Reforestation and ecosystem services

Art 6.- Expert Advisory Committee

- Art 7.- Mitigation, Adaptation and Resilience Plan
- Art 10.- GHG Inventory (regularly update)
- **Artículo 14.- Funding mechanisms**

Artículo 15.- Creation of a Joint PR Senate-House of Representatives Commision

Art 20.- Renewable Energy Goals: 100% by 2050 (20% by 2022, 40% by 2025, 60% by 2040)



Building Coastal Resilience

Planning and design:

- Land use plans, zoning regs, building codes
- Dynamic Setback/Coastal Construction Line
- Increase freeboard requirements (best BFE)
- Adaptive design
- Information, outreach and education

New generation of PR infrastructure:

Hybrid and Nature-based alternatives integrating structural and nature-based solutions (Coral reefs, Wetlands, Beach and Dunes, Swales, Horizontal levees, etc.)

B-C Analysis:

- Lower or similar cost
- Rapid return on investment
- Lower O&M (Operations and Maintenance)
- Longer design life
- Aesthetically attractive, tourism and recreation

FEMA 428, 406 and 404 projects

1	BEACHES AND DUNES	5/3/2019 6:25 AM	File folder
1	CORAL INTERVENTIONS	3/20/2019 1:51 PM	File folder
1	CORAL REEFS	7/9/2019 10:55 AM	File folder
	DUNE TEAM	5/3/2019 6:26 AM	File folder
	MPA CREATION	5/3/2019 6:25 AM	File folder
	SJ METRO INTERVENTIONS	8/1/2019 6:21 PM	File folder
	WETLANDS	5/3/2019 6:26 AM	File folder



Policy Advisory

Title: Coral Reef facility eligibility

Keywords: Coral Reef, facility, eligibility, planting, beach,

Project Description: Coral Reef Restoration

Requestor: Puerto Rico Department of Natural and Environmental Resources (DNER) Sector: NCR Subrecipient: Puerto Rico DNER Project Category: G Project Size: \$31,000,000

Policy Issue or Question: Is the restoration of a coral reef by the Puerto Rico DNER eligible for Public Assistance?

Hurricanes Irma and María (2017) · Earthquakes (2020)





\$85+ Billion

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