Centro Caribeño de Aumento del Nivel del Mar

Afiliado al: RISING SEAS INSTITUTE
SMART SOLUTIONS FOR FUTURE FLOODING

Un programa del: Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

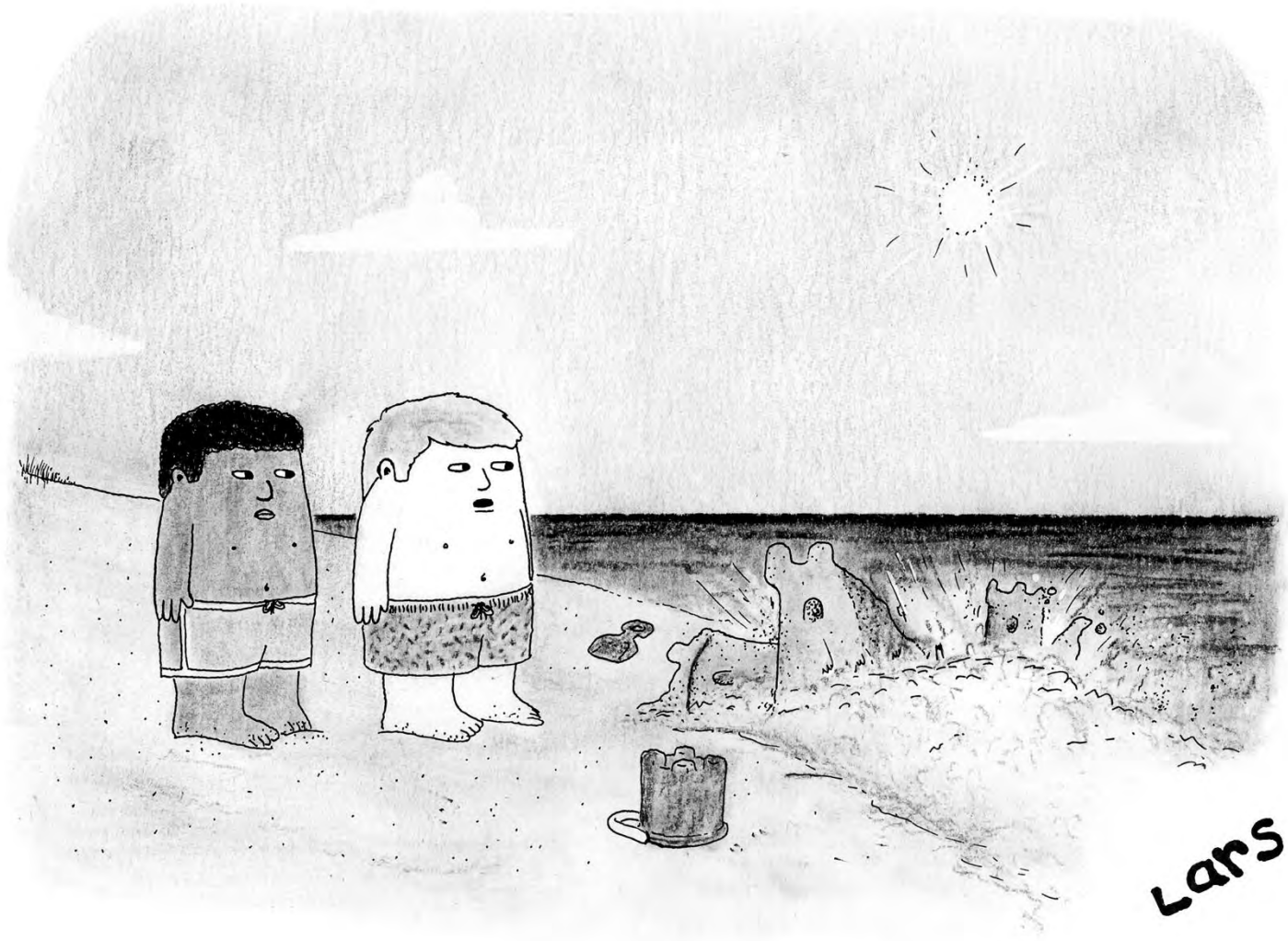
Golpe en Cámara Lenta con el Aumento del Nivel del Mar

Fernando Pabón Rico AIA, CAAPPR, Director

Centro Caribeño de Aumento del Nivel del Mar

Afiliado al: RISING SEAS INSTITUTE
SMART SOLUTIONS FOR FUTURE FLOODING

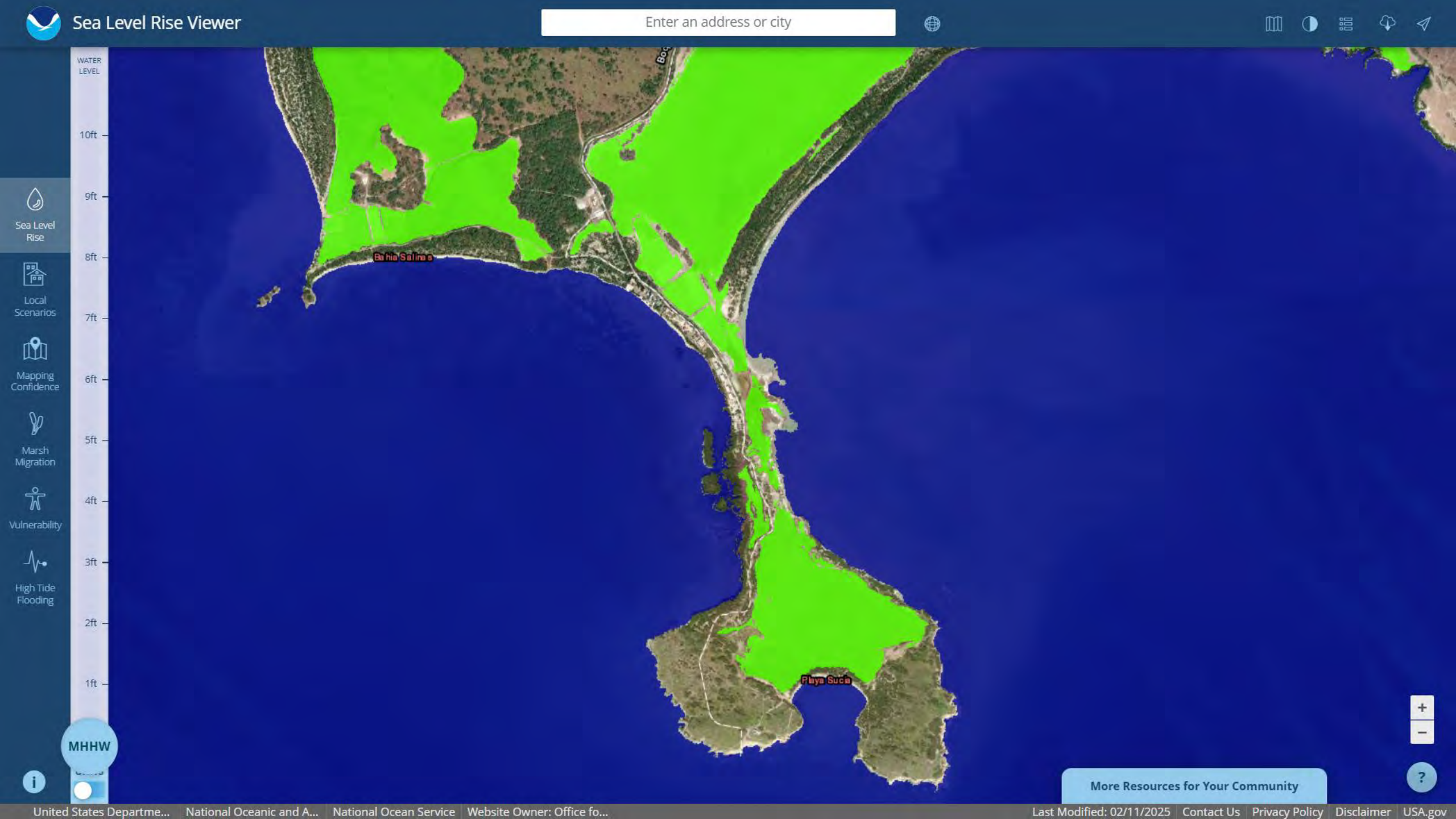
Un programa del: Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

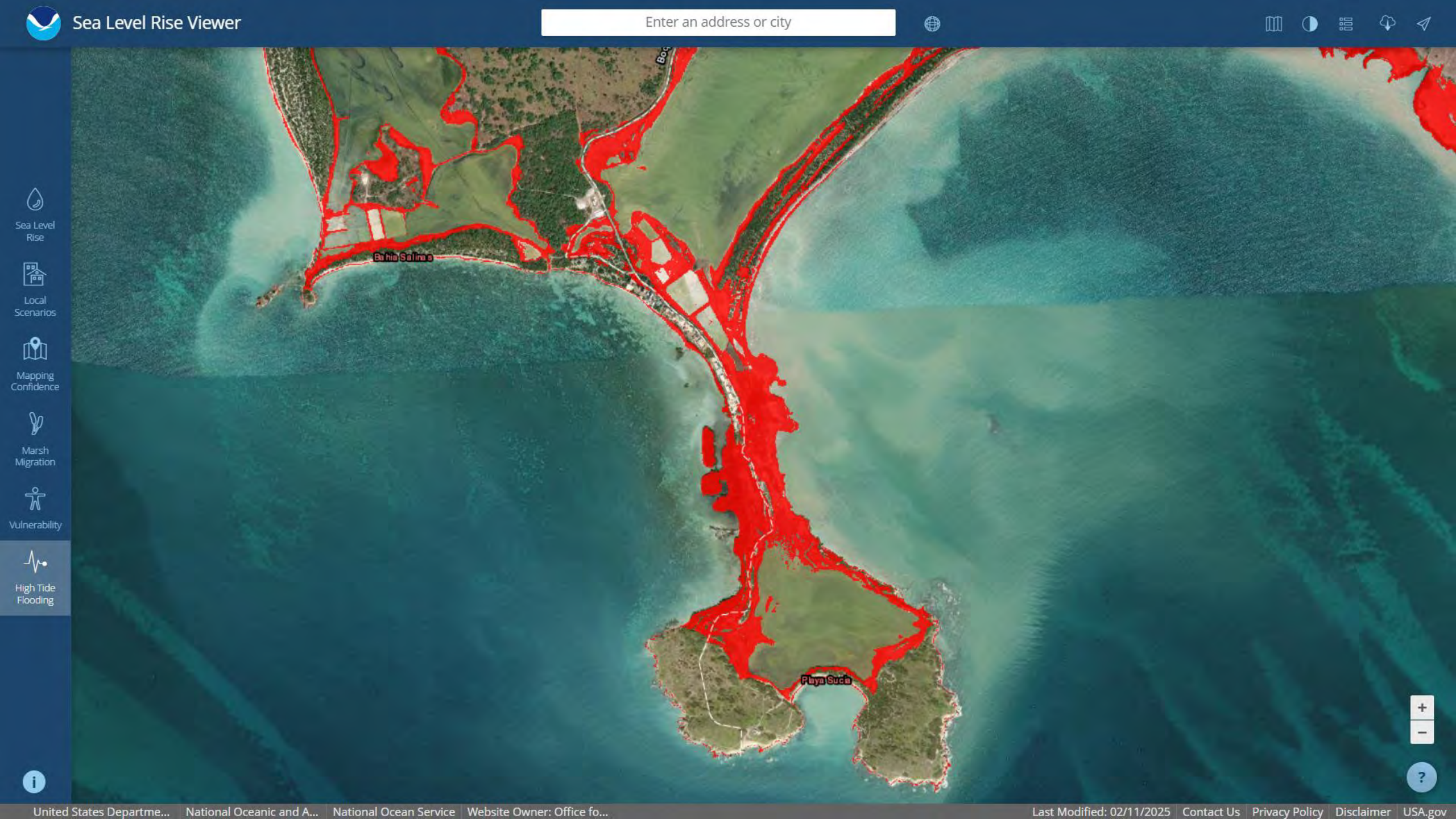


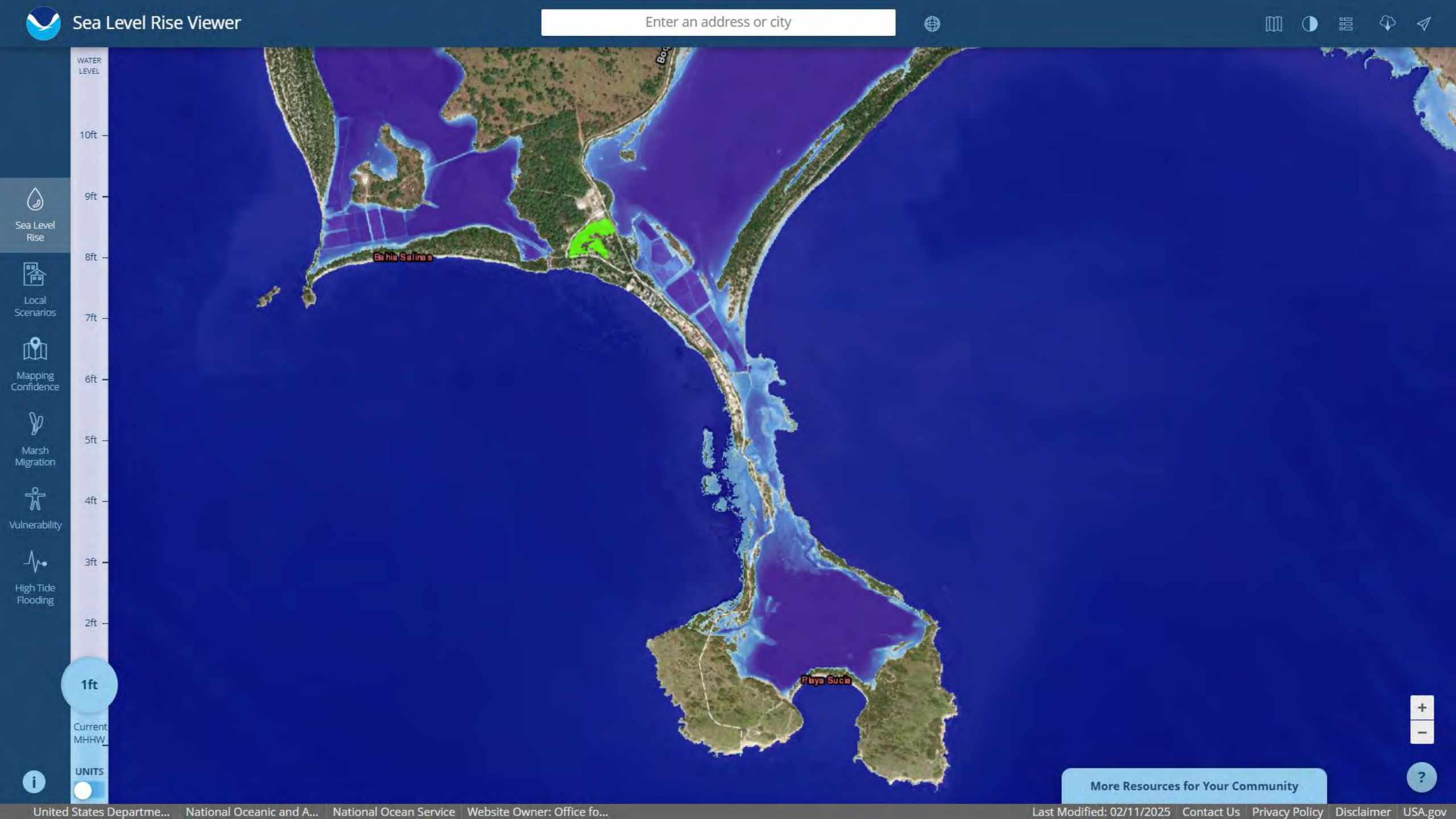
“Era inevitable, dado que el reino ignoró las advertencias de sus científicos.”

Fuente: Lars Kenseth / The New Yorker Collection/The Cartoon Bank

Fuente: El Nuevo Día, 2019


Sea Level Rise Viewer
Enter an address or city
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
MHHW
Bahia Salinas
Playa Sucia
More Resources for Your Community
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 02/11/2025
Contact Us
Privacy Policy
Disclaimer
USA.gov


Sea Level Rise Viewer
Enter an address or city
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Bahia Salinas
Playa Sucia
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 02/11/2025
Contact Us
Privacy Policy
Disclaimer
USA.gov


Sea Level Rise Viewer
Enter an address or city
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
1ft
Current MHHW
UNITS
Bahia Salinas
Playa Sucia
More Resources for Your Community
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 02/11/2025
Contact Us
Privacy Policy
Disclaimer
USA.gov

Puerto Rico Science Technology & Research Trust

An Introduction to the Trust

Puerto Rico
Science, Technology
& Research Trust

Oso Blanco's
Historical Remnants

Science City

Environmental
Research
Laboratory

Forward Center

Innovation
Center

Board of Trustees

Our Board is composed of distinguished professionals who support and oversee our work, providing guidance to ensure that the Trust is managed within its mission and vision.

Daniel Colón Ramos, Ph.D

Frances Santiago-Schwarz, Ph. D.

Esther Alegria, Ph.D

Félix Negrón

Alfredo Casta

Gualberto Medina, Esq. & CPA

Sebastián Negrón

Ubaldo Córdova, Ph.D

Edith Pérez, MD

Michael Caligiuri, MD

Antonio Ramos Guardiola

Puerto Rico Science, Technology & Research Trust

Puerto Rico Science, Technology & Research Trust

Puerto Rico
Science, Technology
& Research Trust

Transformation Through Innovation

2004

The Trust is constituted under Public Law 214 as an autonomous entity.

2015

Eng. Luz A. Crespo is appointed as Chief Executive Officer (CEO).

New programs: Research Grants, Center for Tropical Biodiversity, Research & Innovation Meetups.

Facilities transformation: Science City is initiated.

2016

Expansion in research and entrepreneurship programs.

New programs: Technology Transfer Office, Brain Trust for Tropical Disease Research & Prevention, parallel18, Colmena66, PR Consortsium of Clinical Research and PR Vector Control Unit.

2017

Amendment of deed designating the Public Health Institute and Educational Organization as bona-fide fiscal agent of the Government of P.R.

New programs: Cultural Heritage Innovation

2018

Expansion of programs in agriculture, education, community response and access to business funding.

New programs: Recuperación Agrícola, STEM & Workforce Development, SBIR/ STTR Federal Grants, Pre18, Puerto Rico Hurricane Hub and ASHTO

2019

Expansion of recovery, economic development and public health programs.

New programs: Resiliency Business Innovation, Response Innovation Lab, Puerto Rico Public Health Trust y ProdTec

2020

Strengthening of all programs in strategic pillars

Growth in collaborations (51MOUs)

New programs: Re-Grow PR, Telemedicine (PRPHT)

2021

- Signing of amendment to the deed of creation of the Trust.
- Public Health Leadership: Enhanced COVID-19 response with telemedicine, expanded community health programs, led genomic surveillance, expanded vector control management and increased investment in clinical trial research.
- Entrepreneurship Growth: Supported +2k entrepreneurs, generated $189M in revenues, awarded $11.6M in grants and expanded programs.
- Education & Workforce Impact: Expanded stem efforts and workforce capacity building.
- New programs: Caribbean Center for Rising Seas, Research Institute, Fase 1 , Telemedicina para Adultos Mayores, Laboratorio Genómico de COVID-19, Community Health Promoters Capacity building program, Red de Pacientes, Academia del Cacao, Puerto Rico Ready.

2022

- 199 collaboration agreements signed (MOUs)
- $13.8M, with ROI of $37M by Research Grants.
- 22 patents filed and 7 issued by Technology Transfer Office, contributing to Puerto Rico's high ranking in patent applications.
- Over 84 clinical trial protocols by PRCCI.
- Colmena66 Top-ranked in US Source Link network for entrepreneur assistance.

2023

- Awarded the NSF Engines Development Award to the Trust to foster regional collaboration and growth in the biopharmaceutical sector.
- Trust recognized as 1 of 31 Tech Hubs in the United States under the Biden-Harris administration's EDA Tech Hubs program, an initiative that promotes the biotechnology sector with allies such as DDEC, UPR and private companies.
- Selected by the New York Department of Commerce as host in P.R. for the life sciences exchange with IndieBio NY, promoting the development of biotech startups.

2024

- Science City expansion: Opening of the Forward Center building and new headquarters of parallel18.
- Trust designated as the financial advisor to the PR Economic Development Bank for the Venture Capital Access Program, providing a $30M allocation from the U.S. Department of Treasury for investment in emerging and expanding companies.
- Hexagon 3D printing studio opening in Ponce (STEM & Workforce program)
- Cohorts for Empresas B en Formación (Meetups Program)

With the leadership of our CEO, Engineer Lucy Crespo, the Trust continues to develop Puerto Rico's innovation capacity today for the future.




RESEARCH & DEVELOPMENT

- RESEARCH GRANTS PROGRAM — FUNDS TO GROW
- TTO TECHNOLOGY TRANSFER OFFICE
- Caribbean Center for Rising Seas
- CENTER FOR TROPICAL BIODIVERSITY
- PRSTRT RESEARCH INSTITUTE

ENTREPRENEURSHIP PROGRAMS

- Colmena66 — Tu Camino Empresarial
- Fase 1
- parallel18
- SBIR/STTR Federal Grants

PUBLIC HEALTH

- Puerto Rico Public Health Trust
- Puerto Rico Vector Control Unit
- PRCCI — Puerto Rico Consortium for Clinical Investigation

EDUCATION PROGRAMS

- STEM EDUCATION & WORKFORCE DEVELOPMENT
- PR RESEARCH & INNOVATION Meet-ups
- Science City

Puerto Rico Science, Technology & Research Trust

Nuestras Metas

Cambiar las prácticas de desarrollo urbano.

Actualizar los códigos de construcción, zonificación y reglamentos de uso de suelo.

Redefinir el conocimiento y la comprensión profesional del aumento del nivel del mar e inundaciones.

Normalizar la incertidumbre mediante Investigación.

Fuente: https://systemssolutions.org/systems-thinking/

Centro Caribeño de Aumento del Nivel del Mar

Nuestro Equipo

Fernando Pabón AIA, CAAPPR
Director

Gilberto Guevara, MBA
Gerente Senior

John Englander
Oceanógrafo y Consejero Ejecutivo

Carlos Gómez, BSME
Especialista en Ingeniería

Francisco Aquino, Esq.
Gerente de Política Pública y Legislación

Centro Caribeño de Aumento del Nivel del Mar

La Ciencia del Aumento del Nivel del Mar

Centro Caribeño de Aumento del Nivel del Mar

Afiliado de Rising Seas Institute

Un programa de Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

Antártida = 186 pies de ANM

Fuente: Google Earth, SIO, NOAA, US NAVY, NGA, GEBCO, US Department of State Geographer, Image Landsat/Copernicus, Image IBCAO, Image USGS

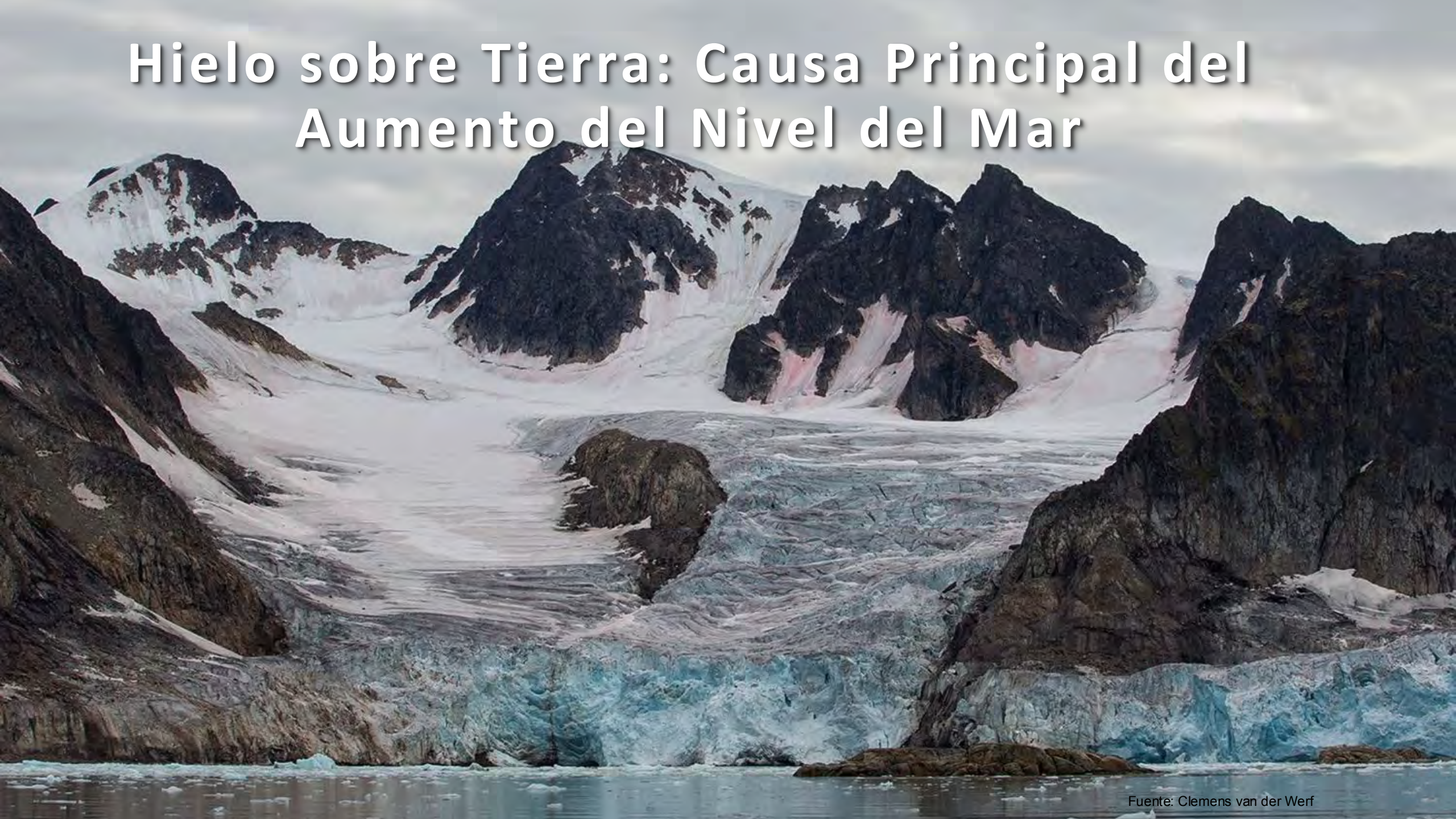
Centro Caribeño de Aumento del Nivel del Mar

Groenlandia = 24 pies de ANM

Fuente: Google Earth, SIO, NOAA, US NAVY, NGA, GEBCO, US Department of State Geographer, Image Landsat/Copernicus, Image IBCAO, Image USGS

Centro Caribeño de Aumento del Nivel del Mar

Hielo sobre Tierra: Causa Principal del Aumento del Nivel del Mar



Fuente: Clemens van der Werf

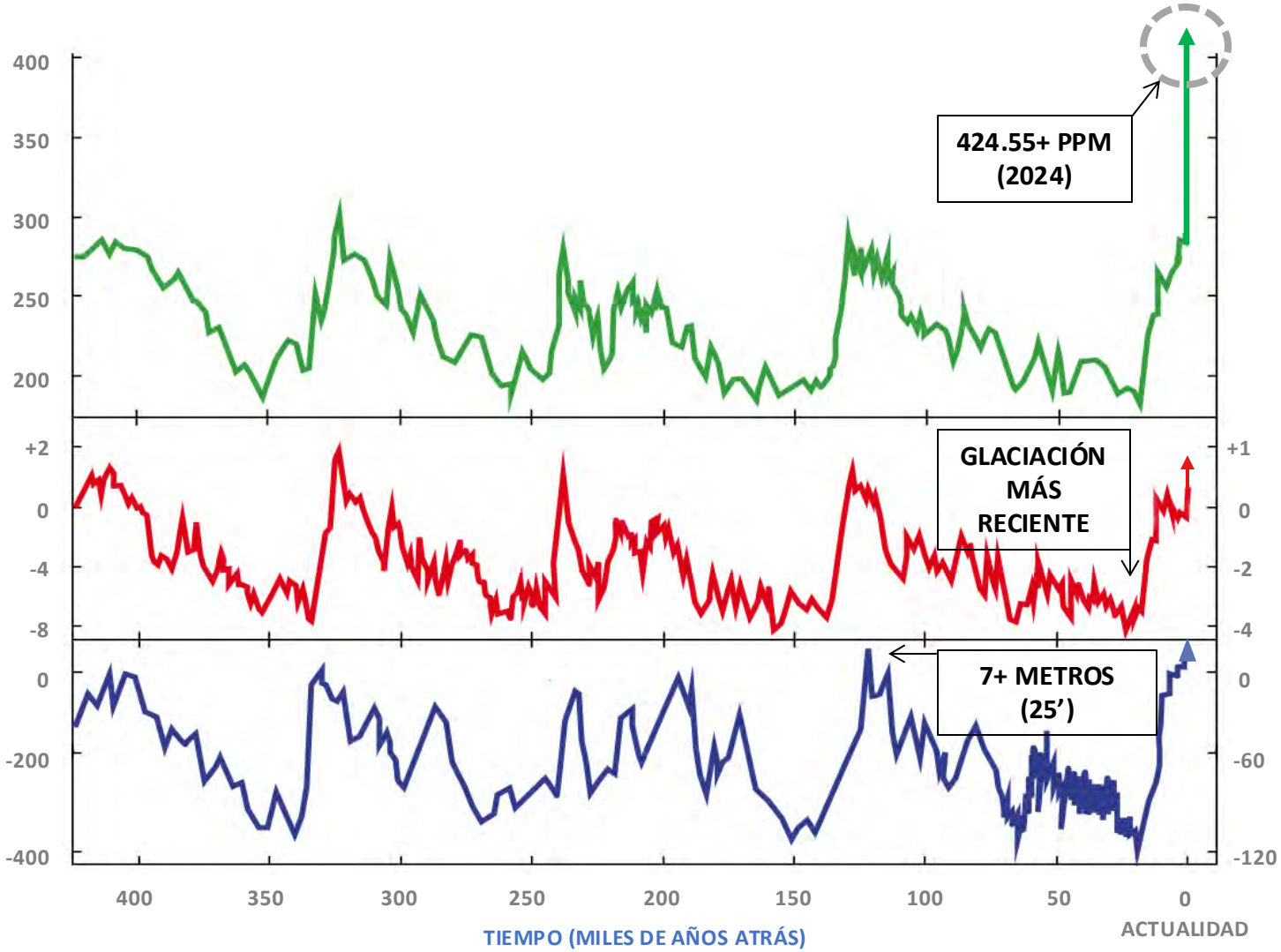

RISING
SEAS
INSTITUTE

Dióxido de Carbono, Temperatura y Nivel del Mar

Partes por Millón de Dióxido de Carbono (CO_2)

Temperatura Global Promedio (ºF)

Nivel del Mar (Pies)

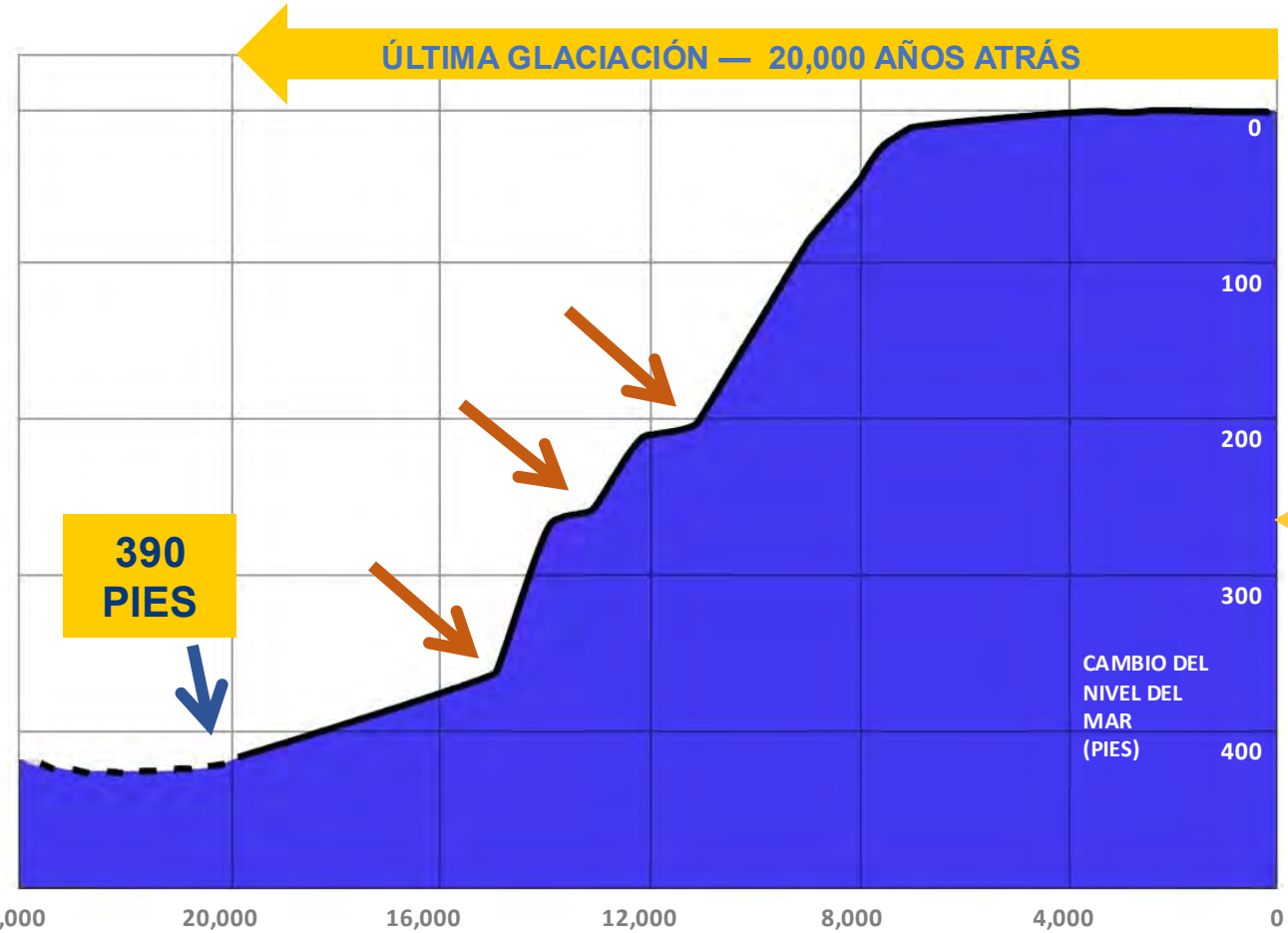


Temperatura Global Promedio(ºC)

Nivel del Mar (Metros)

Adaptado de: Drs. James E. Hansen & Makiko H. Sato / csas.earth.Columbia.edu

NIVEL DEL MAR DESDE LA ÚLTIMA GLACIACIÓN



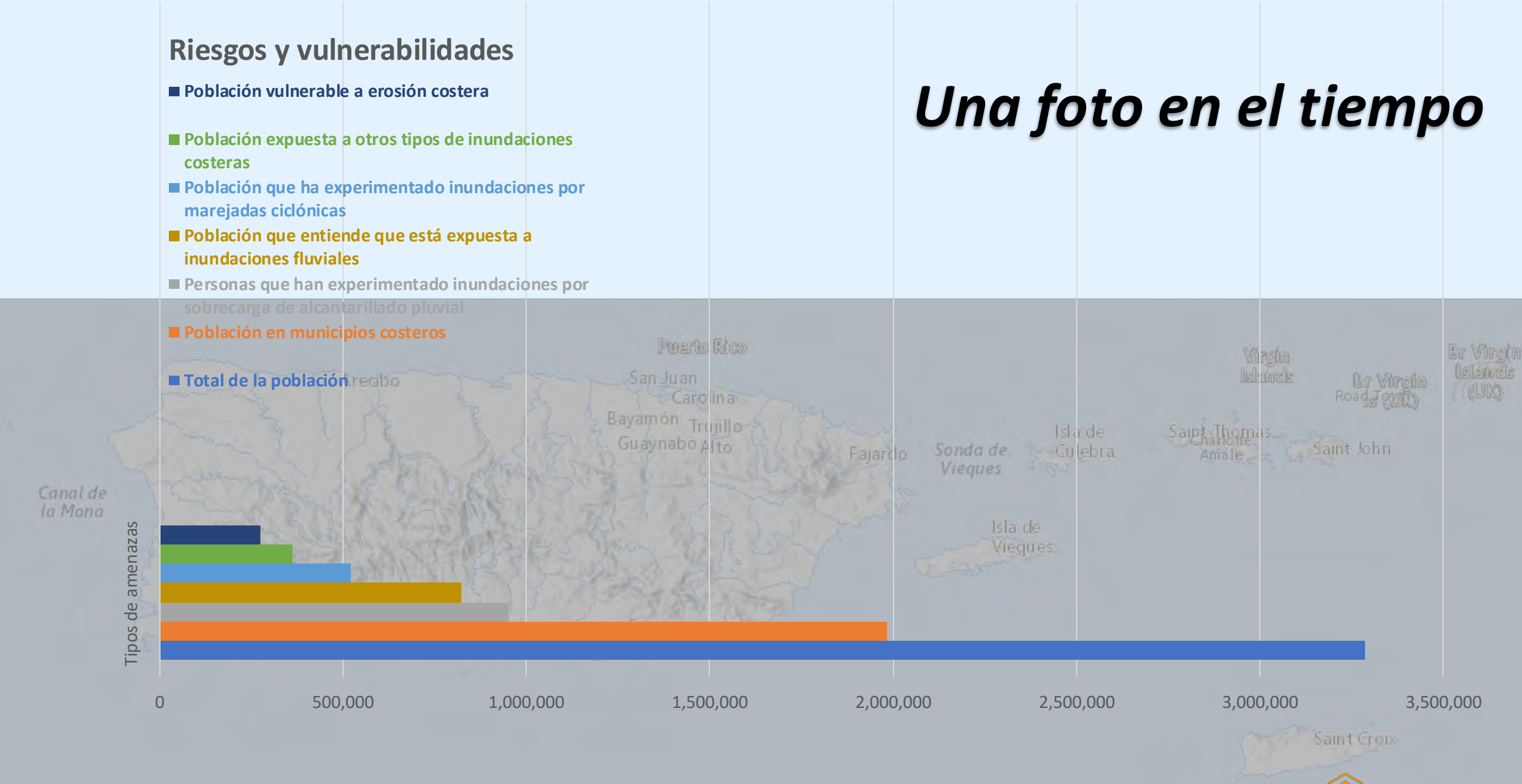
Sede del Banco Popular

Centro Caribeño de Aumento del Nivel del Mar

Fuente: *Moving to Higher Ground*, https://en.wikipedia.org/wiki/File:Bancopopularheadquarters.jpg Coolcaesar CC BY-SA 3.0

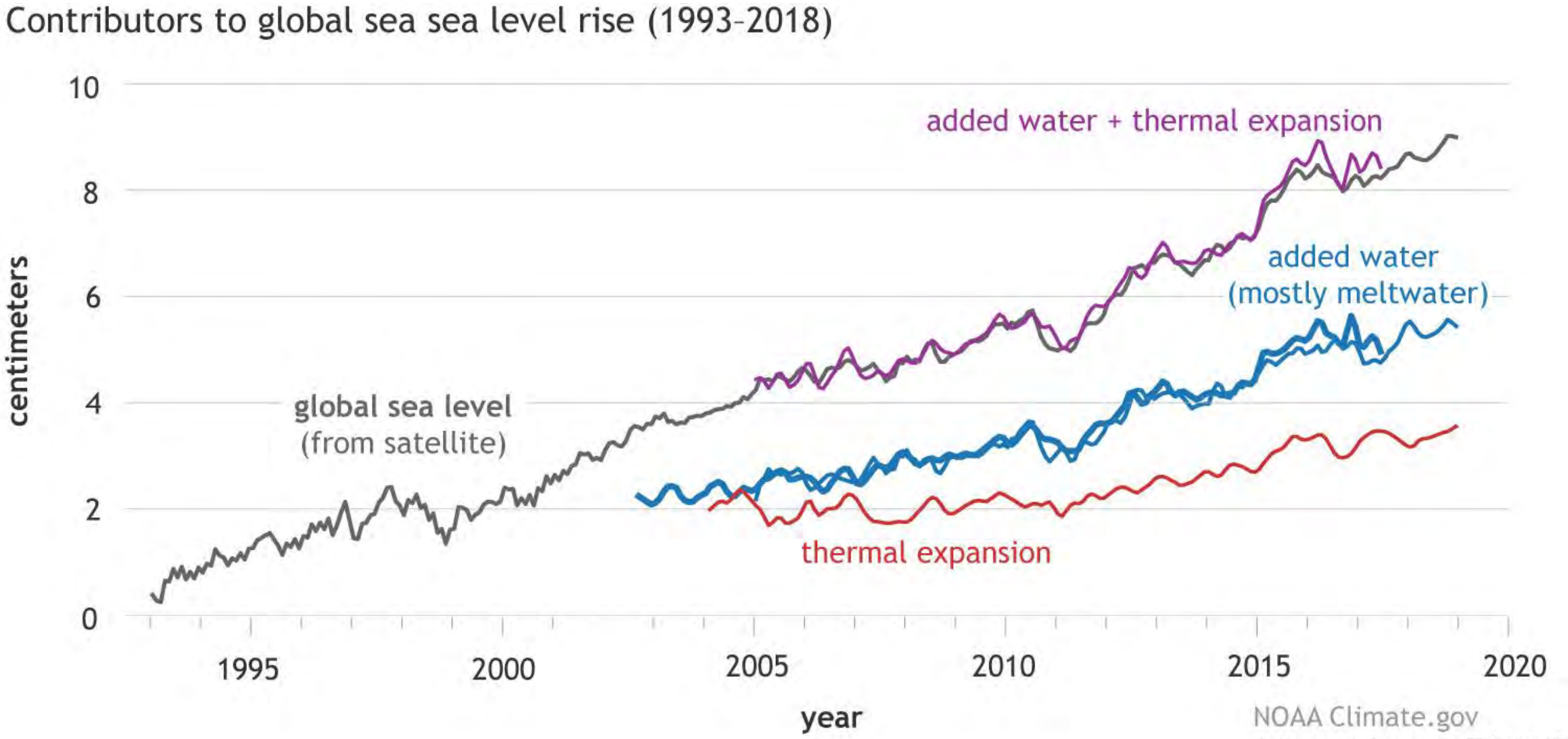
Datos Recientes

Una foto en el tiempo



Centro Caribeño de Aumento del Nivel del Mar

Fuente de imágen: NOAA. Fuente de Datos: Estudios Técnicos

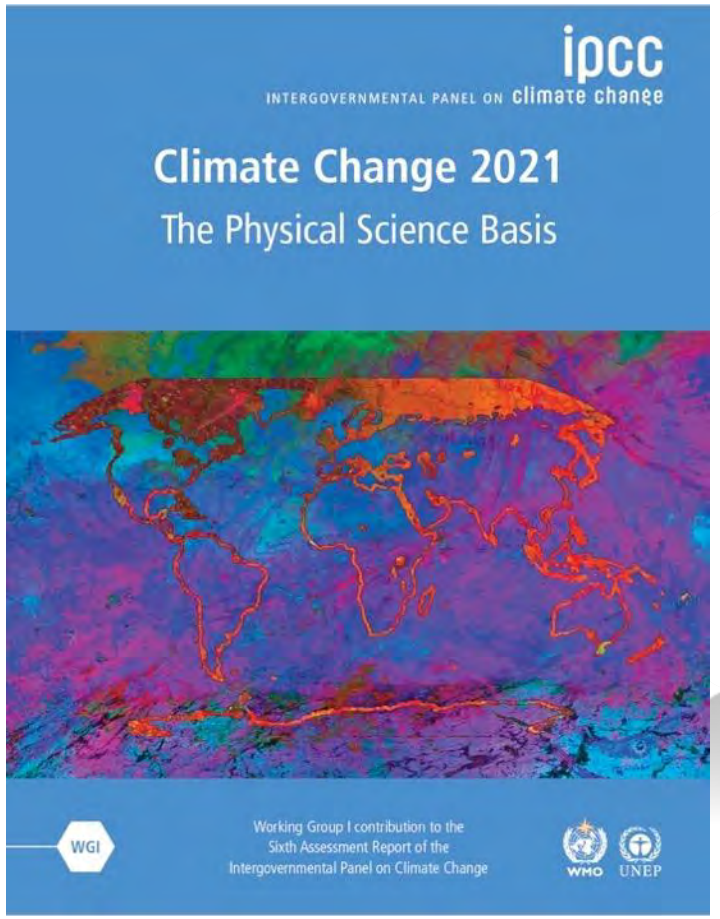

Contributors to global sea sea level rise (1993–2018)
10
8
6
4
2
0
centimeters
added water + thermal expansion
added water
(mostly meltwater)
global sea level
(from satellite)
thermal expansion
1995
2000
2005
2010
2015
2020
year
NOAA Climate.gov
Adapted from SOTC 2018

Reporte del PICC (2021)

- Calentamiento actual es **+1.2° C (2.2° F)**

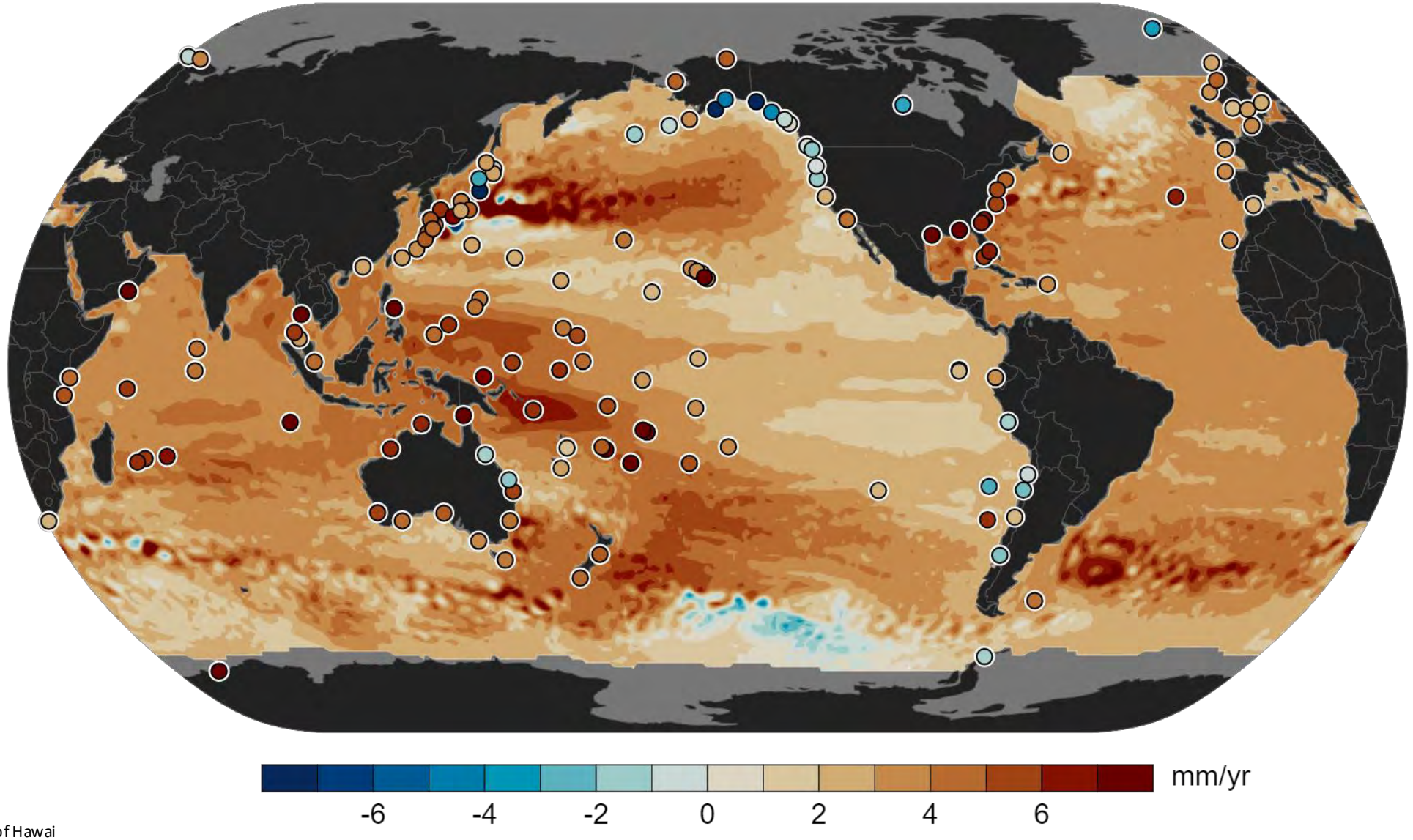
Sintetizando…

- **1.5° C = 20%** de incremento en calentamiento puede ocurrir **antes del 2030.**
- Los compromisos internacionales parecerían encaminar las temperaturas a **2.7° C (4.8° F)** = ¡La ruta en que vamos!
- Los esfuerzos para detener la liberación de gases de efecto invernadero han **fracasado**.



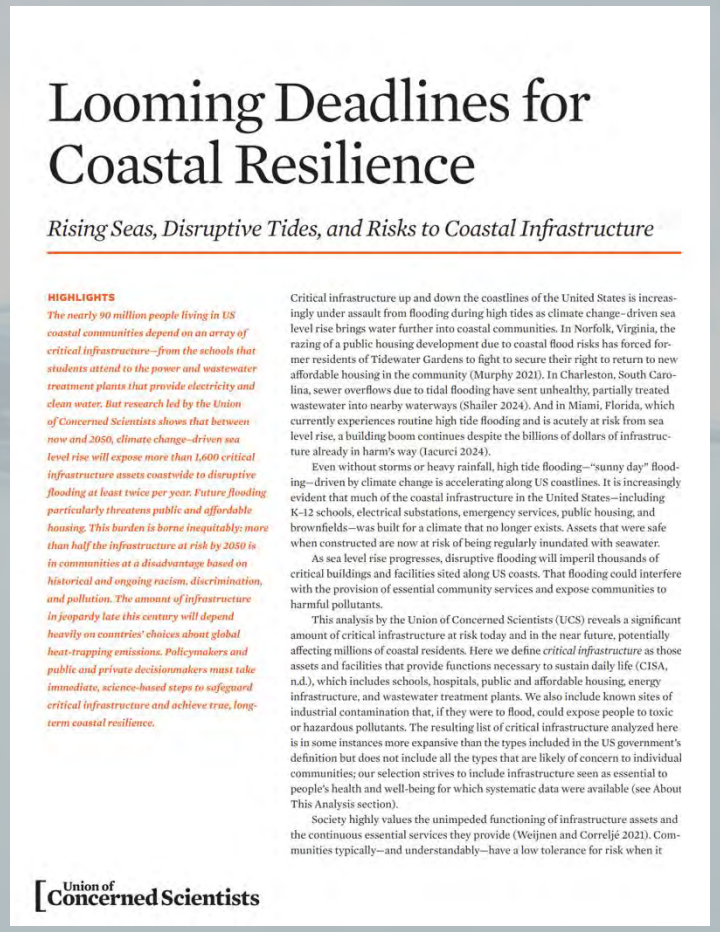
Centro Caribeño de Aumento del Nivel del Mar

Cambio en el Nivel del Mar (1993-2023)



Fuente: University of Hawai

Union of Concerned Scientists: Looming Deadlines for Coastal Resilience (2024)



Looming Deadlines for Coastal Resilience

Rising Seas, Disruptive Tides, and Risks to Coastal Infrastructure

HIGHLIGHTS

The nearly 90 million people living in US coastal communities depend on an array of critical infrastructure—from the schools that students attend to the power and wastewater treatment plants that provide electricity and clean water. But research led by the Union of Concerned Scientists shows that between now and 2050, climate change–driven sea level rise will expose more than 1,600 critical infrastructure assets coastwide to disruptive flooding at least twice per year. Future flooding particularly threatens public and affordable housing. This burden is borne inequitably: more than half the infrastructure at risk by 2050 is in communities at a disadvantage based on historical and ongoing racism, discrimination, and pollution. The amount of infrastructure in jeopardy late this century will depend heavily on countries' choices about global heat-trapping emissions. Policymakers and public and private decisionmakers must take immediate, science-based steps to safeguard critical infrastructure and achieve true, long-term coastal resilience.

Critical infrastructure up and down the coastlines of the United States is increasingly under assault from flooding during high tides as climate change–driven sea level rise brings water further into coastal communities. In Norfolk, Virginia, the razing of a public housing development due to coastal flood risks has forced former residents of Tidewater Gardens to fight to secure their right to return to new affordable housing in the community (Murphy 2021). In Charleston, South Carolina, sewer overflows due to tidal flooding have sent unhealthy, partially treated wastewater into nearby waterways (Shailer 2024). And in Miami, Florida, which currently experiences routine high tide flooding and is acutely at risk from sea level rise, a building boom continues despite the billions of dollars of infrastructure already in harm's way (Iacurci 2024).

Even without storms or heavy rainfall, high tide flooding—"sunny day" flooding—driven by climate change is accelerating along US coastlines. It is increasingly evident that much of the coastal infrastructure in the United States—including K–12 schools, electrical substations, emergency services, public housing, and brownfields—was built for a climate that no longer exists. Assets that were safe when constructed are now at risk of being regularly inundated with seawater.

As sea level rise progresses, disruptive flooding will imperil thousands of critical buildings and facilities sited along US coasts. That flooding could interfere with the provision of essential community services and expose communities to harmful pollutants.

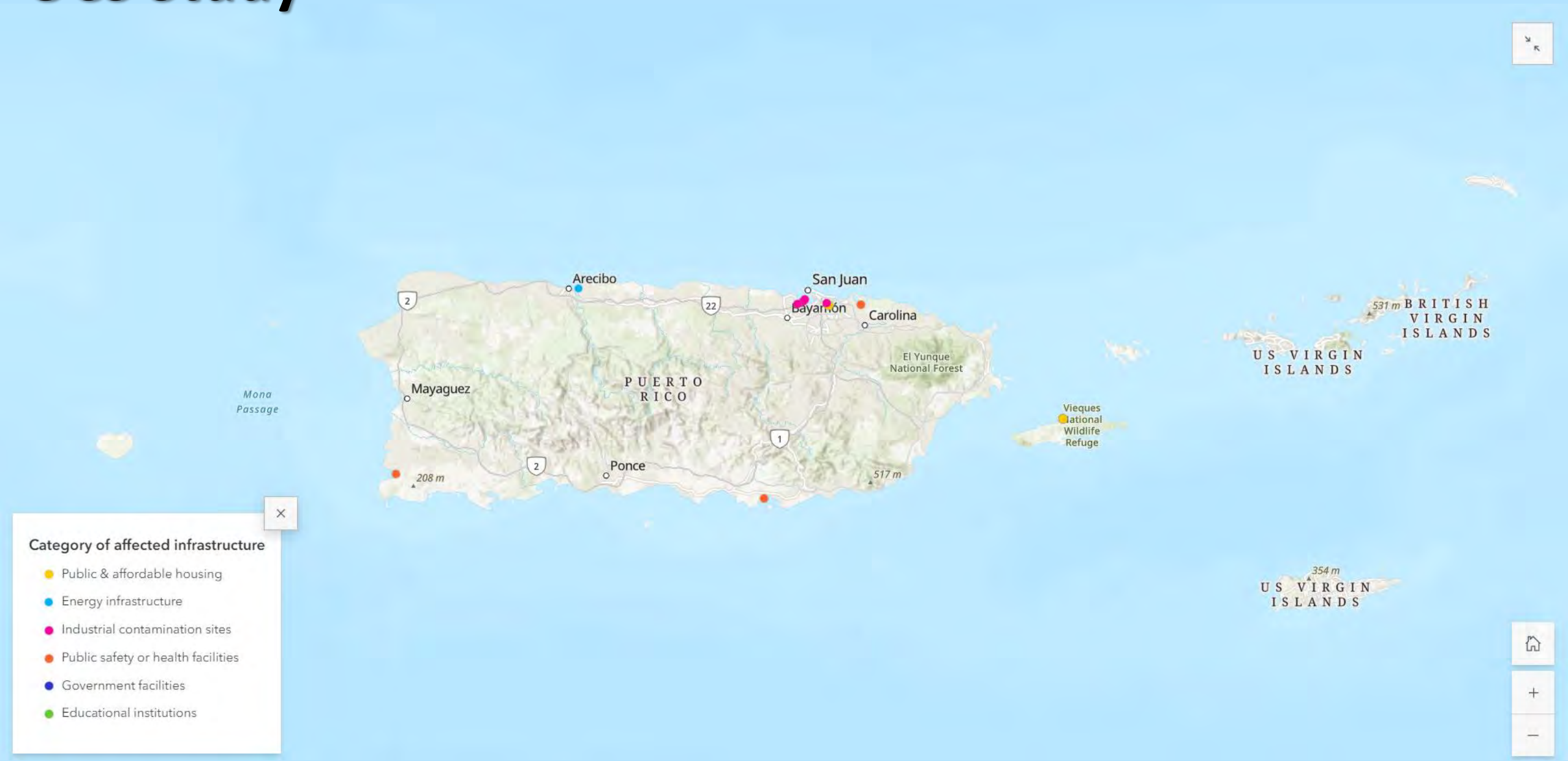
This analysis by the Union of Concerned Scientists (UCS) reveals a significant amount of critical infrastructure at risk today and in the near future, potentially affecting millions of coastal residents. Here we define *critical infrastructure* as those assets and facilities that provide functions necessary to sustain daily life (CISA, n.d.), which includes schools, hospitals, public and affordable housing, energy infrastructure, and wastewater treatment plants. We also include known sites of industrial contamination that, if they were to flood, could expose people to toxic or hazardous pollutants. The resulting list of critical infrastructure analyzed here is in some instances more expansive than the types included in the US government's definition but does not include all the types that are likely of concern to individual communities; our selection strives to include infrastructure seen as essential to people's health and well-being for which systematic data were available (see About This Analysis section).

Society highly values the unimpeded functioning of infrastructure assets and the continuous essential services they provide (Weijnen and Correljé 2021). Communities typically—and understandably—have a low tolerance for risk when it

[Union of Concerned Scientists

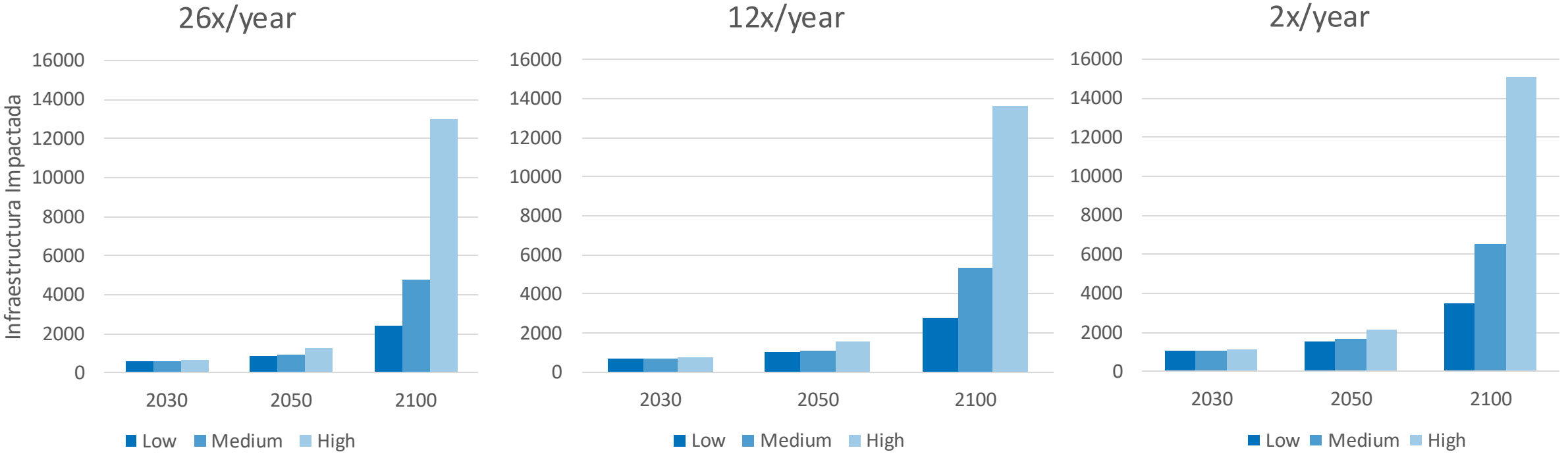
Fuente: Union of Concerned Scientists

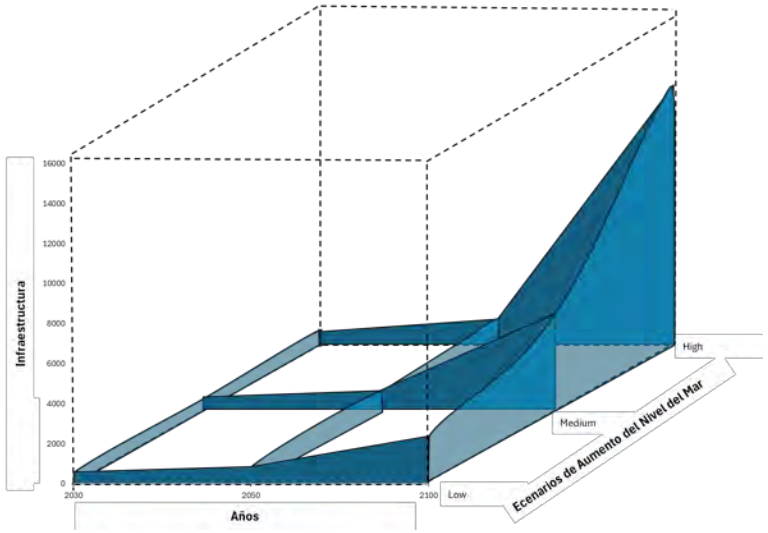
UCS Study

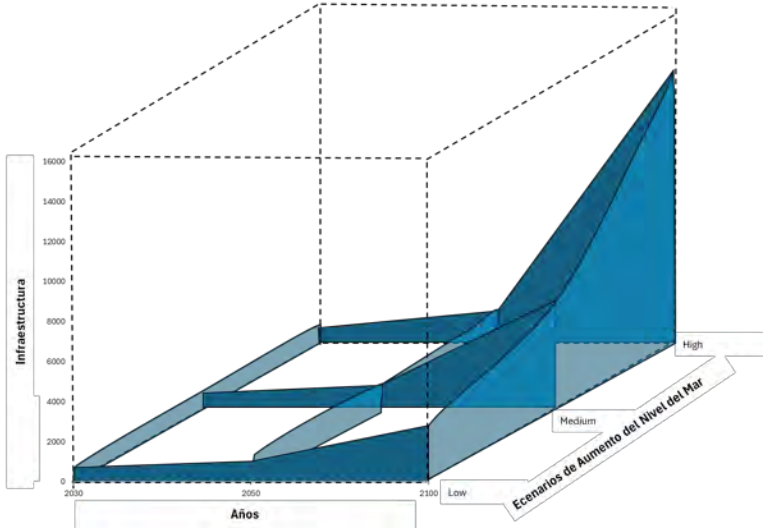


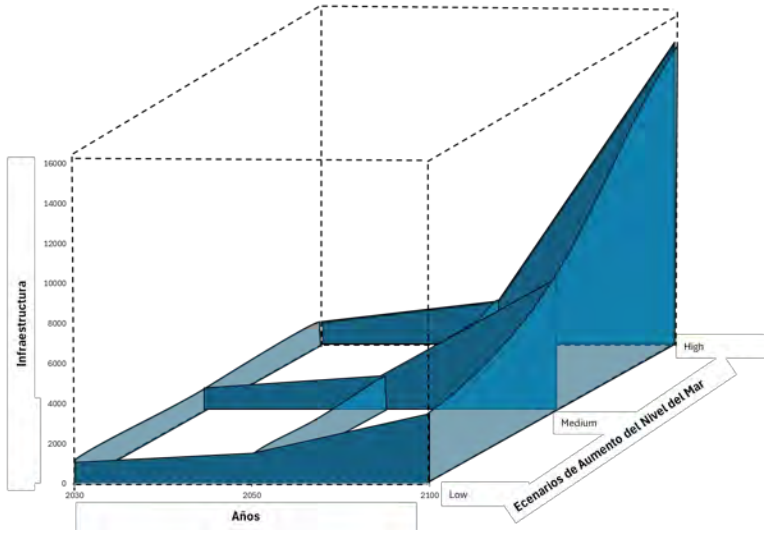
Fuente: Union of Concerned Scientists

UCS Study: 3 Variables









Fuente: Union of Concerned Scientists

Observed Flooding | Sea-Level Rise | Projected Flooding | About

Location:

San Juan, PR

Show map

Meters Feet

Flooding threshold:

10-year flood

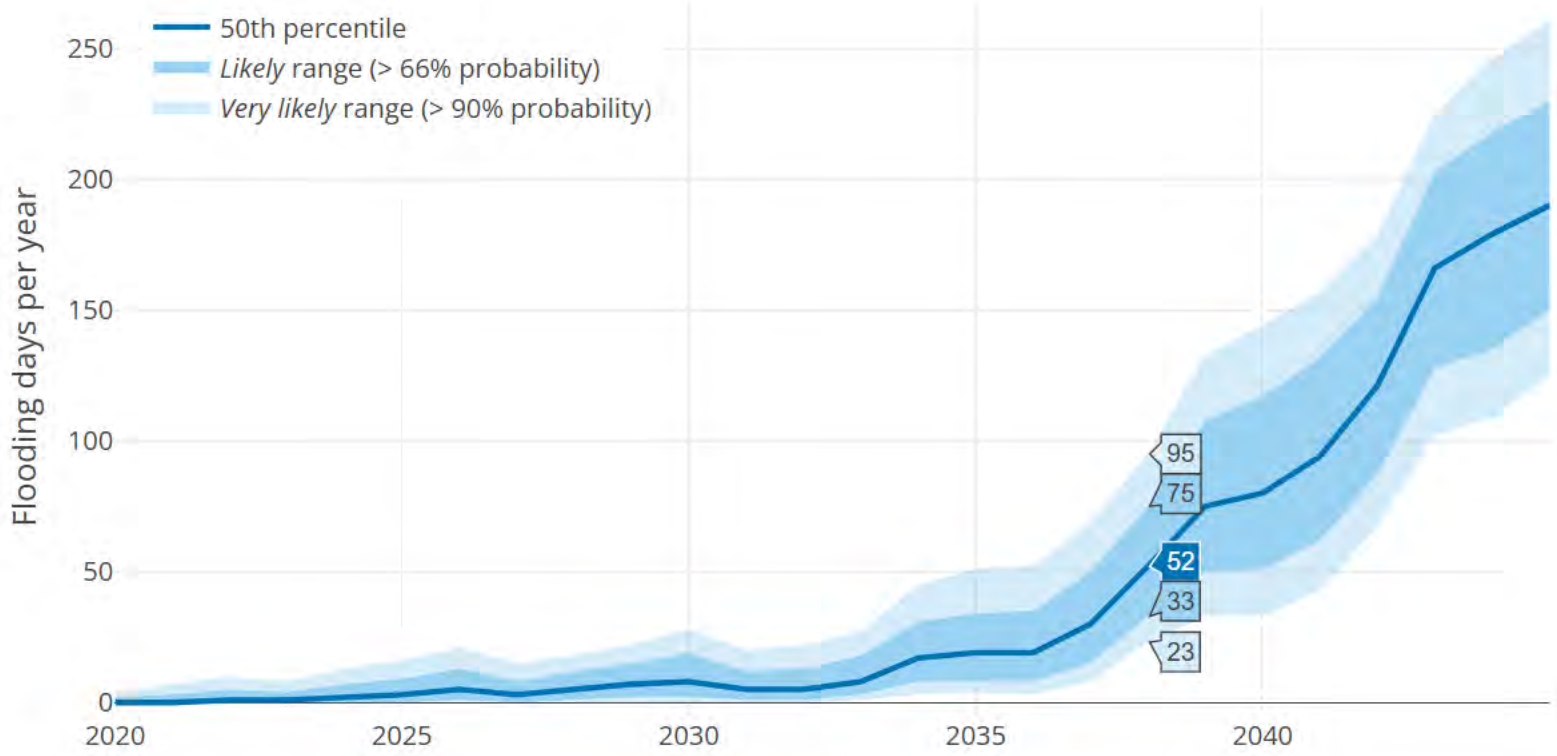
Threshold elevation
Above MHHW

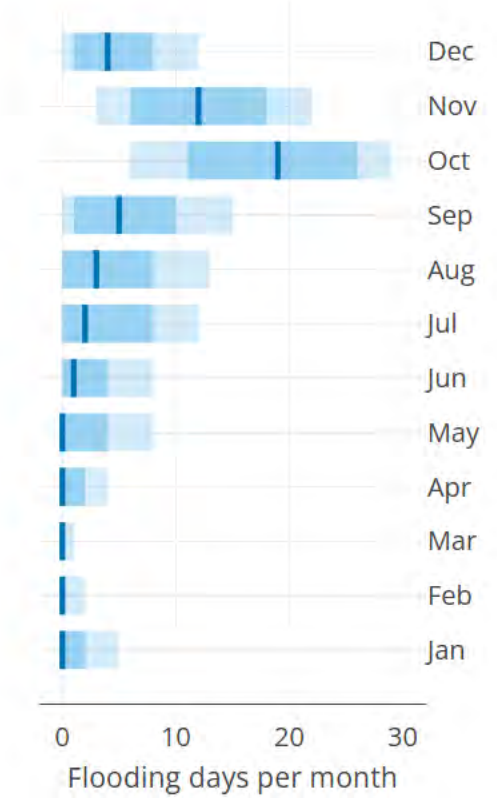
1.12 ft

U.S. Interagency scenario:

High

Sea-level rise by 2100 6.82 ft
Relative to 2000





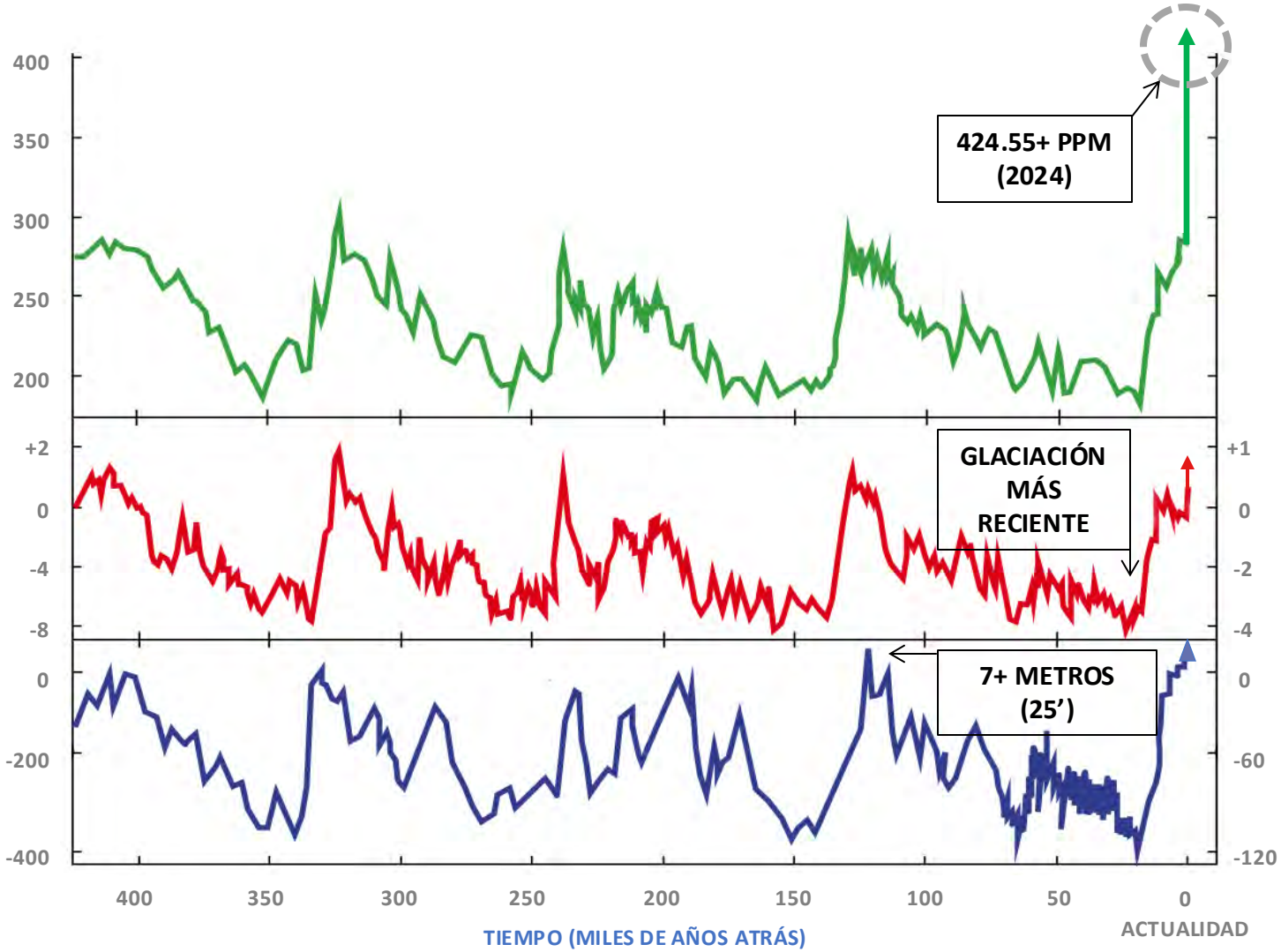
Fuente: NASA

Dióxido de Carbono, Temperatura y Nivel del Mar

Partes por Millón de Dióxido de Carbono (CO_2)

Temperatura Global Promedio (ºF)

Nivel del Mar (Pies)

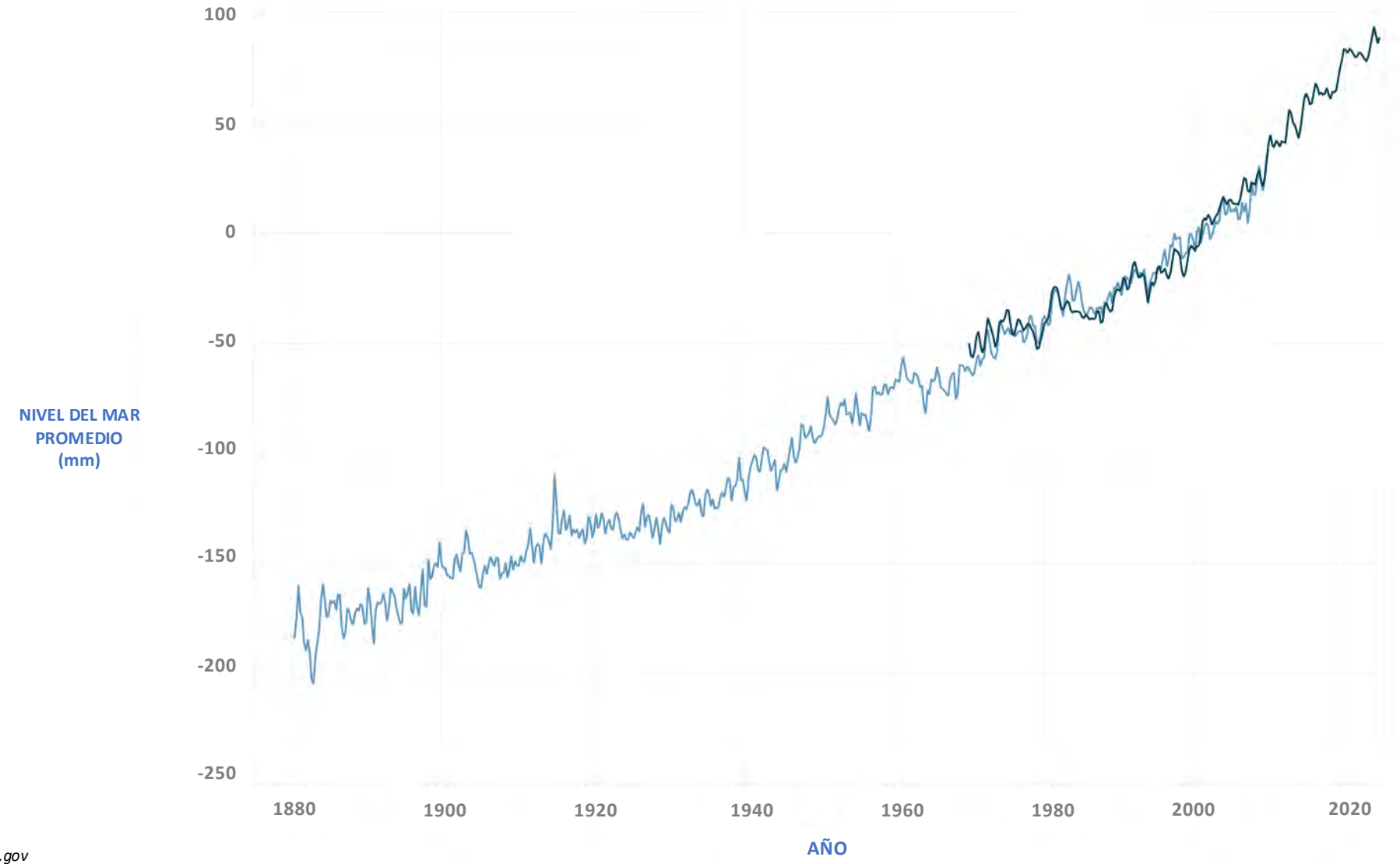


Temperatura Global Promedio(ºC)

Nivel del Mar (Metros)

Adaptado de: Drs. James E. Hansen & Makiko H. Sato / csas.earth.Columbia.edu

EL RITMO ESTÁ ACELERANDO

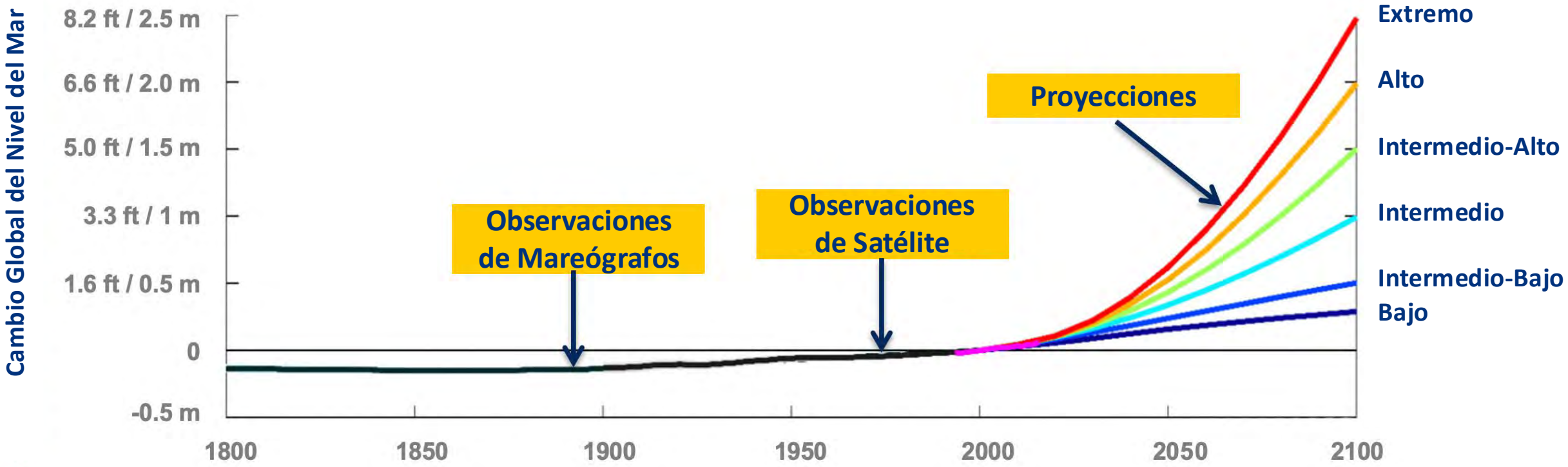


Fuente: Adaptado de *Climate.gov*

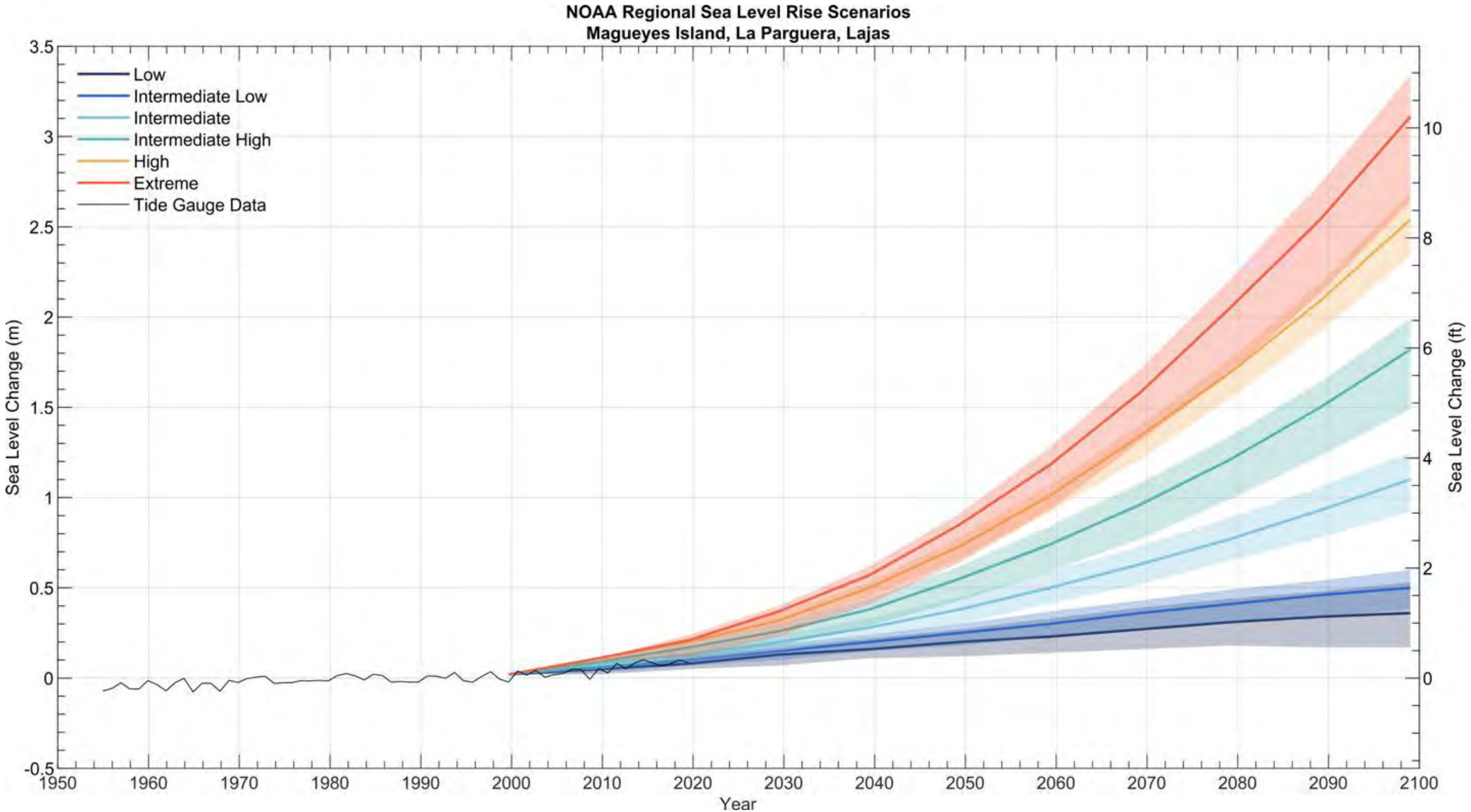
Centro Caribeño de Aumento del Nivel del Mar

Escenarios Globales de la NOAA

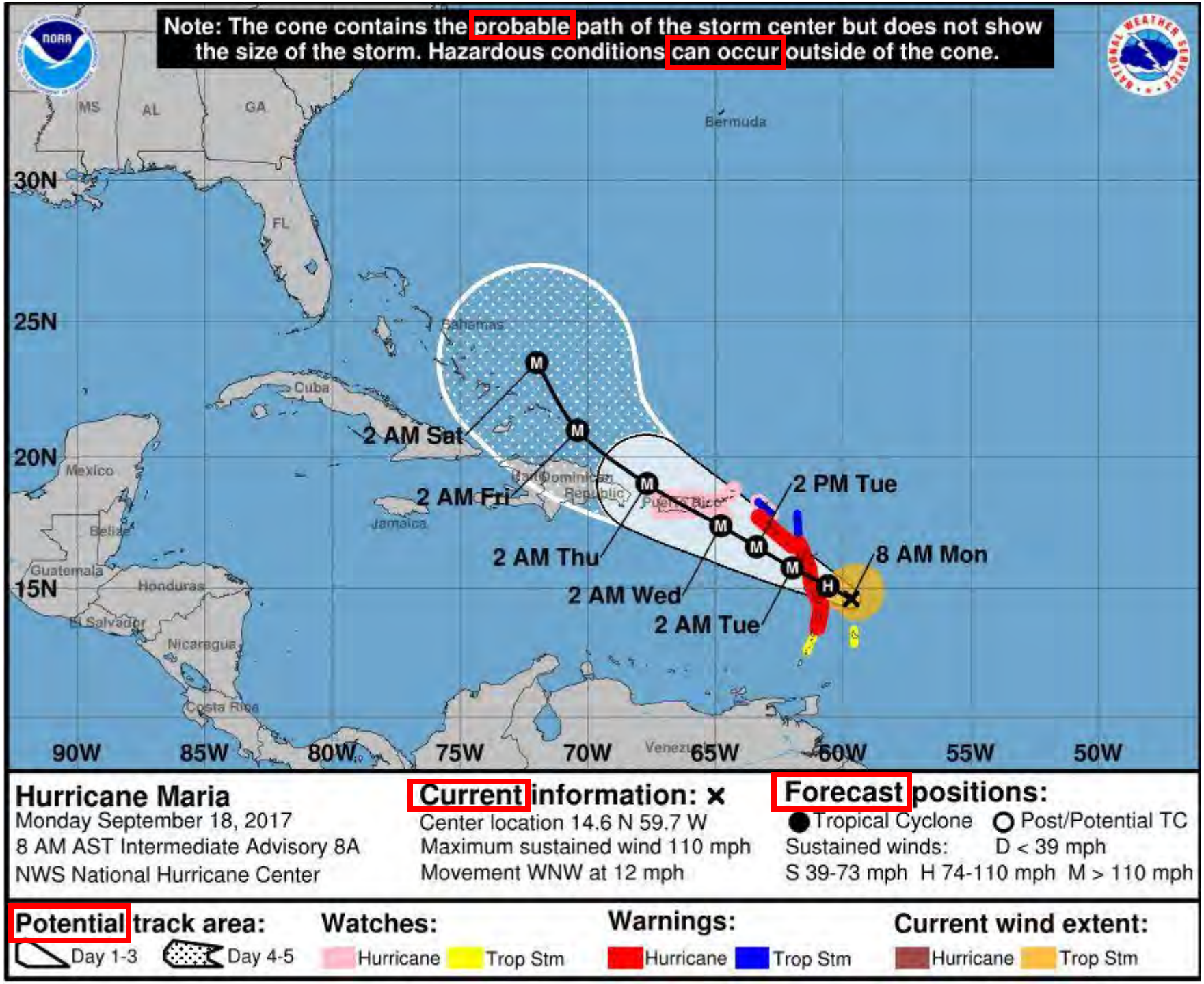
Las proyecciones típicas confunden y demuestran incertidumbre



Fuente: *Adapted from NOAA and Sweeet et al, 2017*



Fuente: *NOAA and Sweeet et al, 2017,* citado en *Puerto Rico State of the Climate 2014-2021*



Hurricane Maria
Monday September 18, 2017
8 AM AST Intermediate Advisory 8A
NWS National Hurricane Center

Current information: ×
Center location 14.6 N 59.7 W
Maximum sustained wind 110 mph
Movement WNW at 12 mph

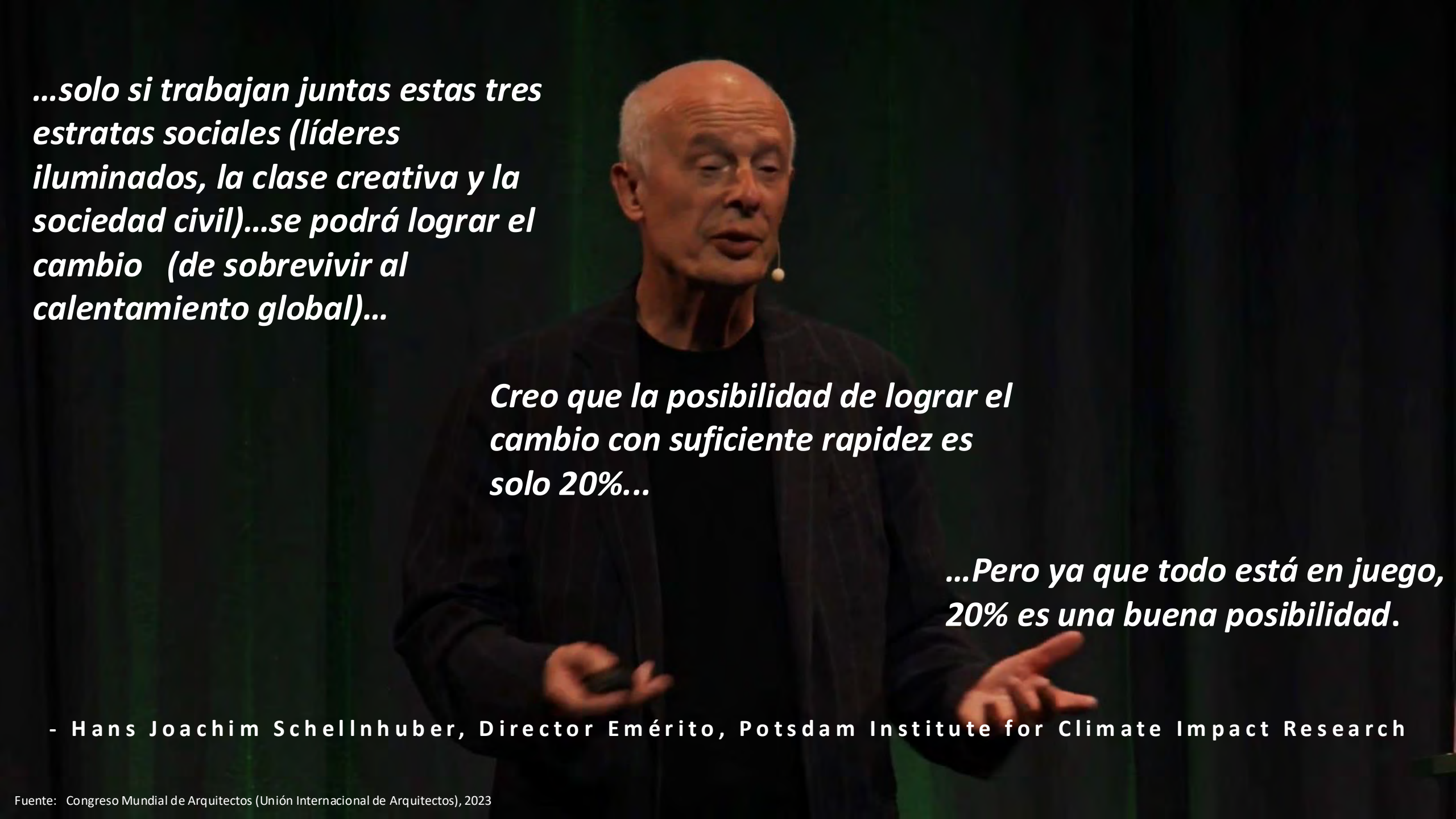
Forecast positions:
● Tropical Cyclone ○ Post/Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area:
Day 1-3 Day 4-5

Watches:
Hurricane Trop Stm

Warnings:
Hurricane Trop Stm

Current wind extent:
Hurricane Trop Stm



…solo si trabajan juntas estas tres estratas sociales (líderes iluminados, la clase creativa y la sociedad civil)…se podrá lograr el cambio (de sobrevivir al calentamiento global)…

Creo que la posibilidad de lograr el cambio con suficiente rapidez es solo 20%...

…Pero ya que todo está en juego, 20% es una buena posibilidad.

- Hans Joachim Schellnhuber, Director Emérito, Potsdam Institute for Climate Impact Research

Fuente: Congreso Mundial de Arquitectos (Unión Internacional de Arquitectos), 2023

Impactos Anticipados

San Juan, Puerto Rico

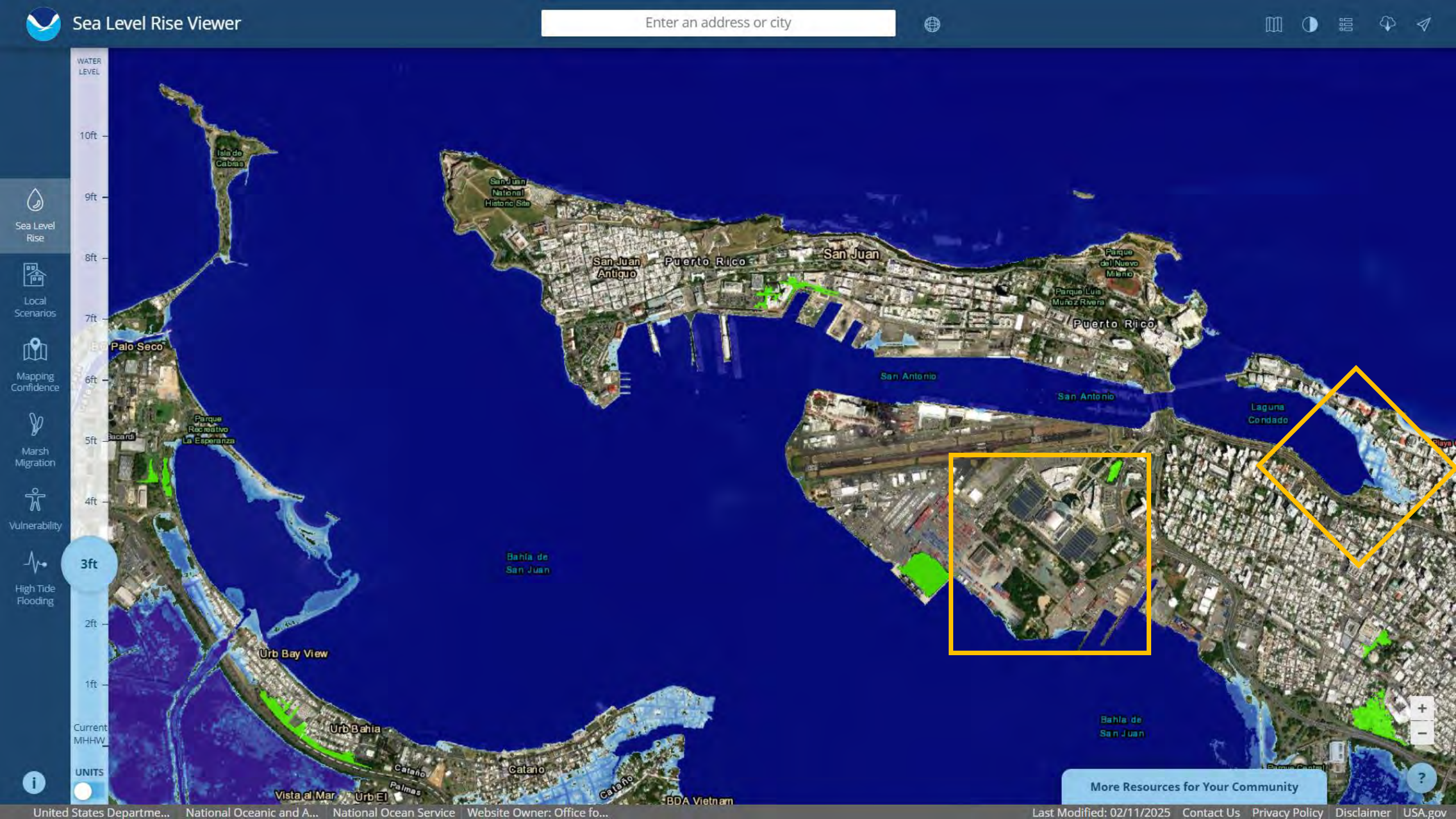
San Juan, Puerto Rico

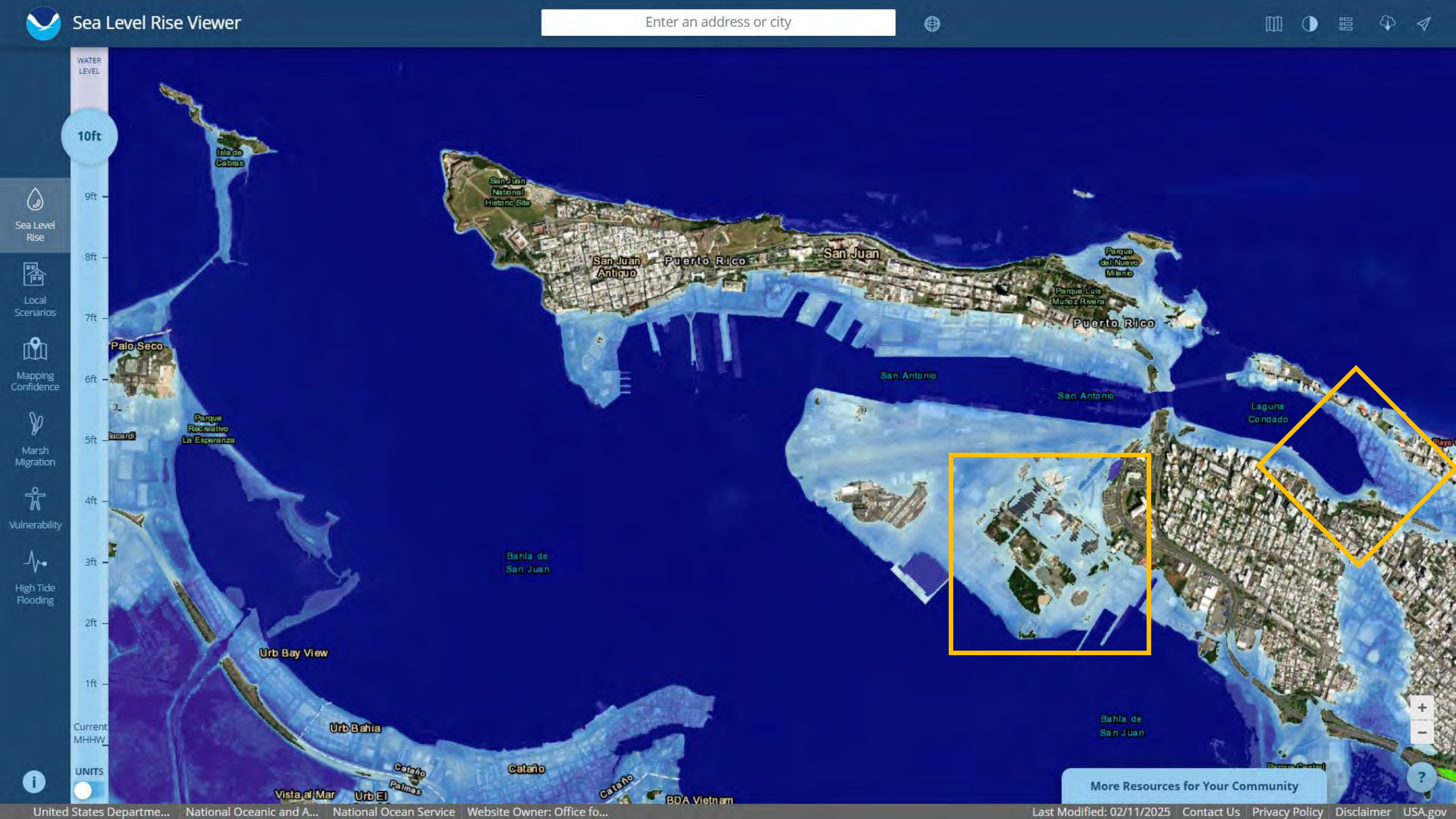
Las grandes incertidumbres ameritan preguntas profundas cuyas respuestas no necesariamente están atadas a una fecha precisa en el futuro: su mejor abordaje es mediante la planificación a largo plazo.

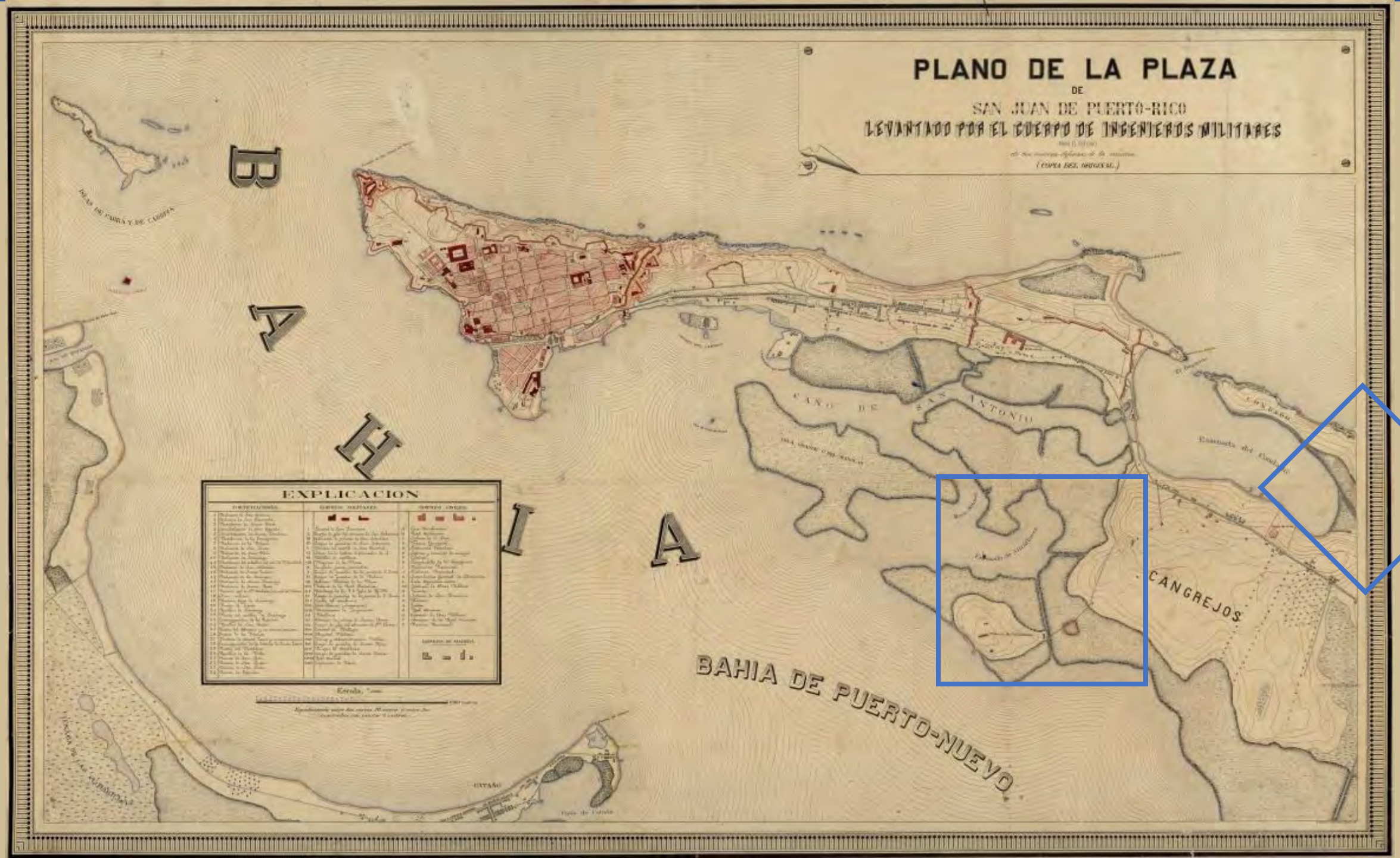
- Amy Webb, Harvard Business Review

Fuente de imágen: Fernando Pabón, September 2015.

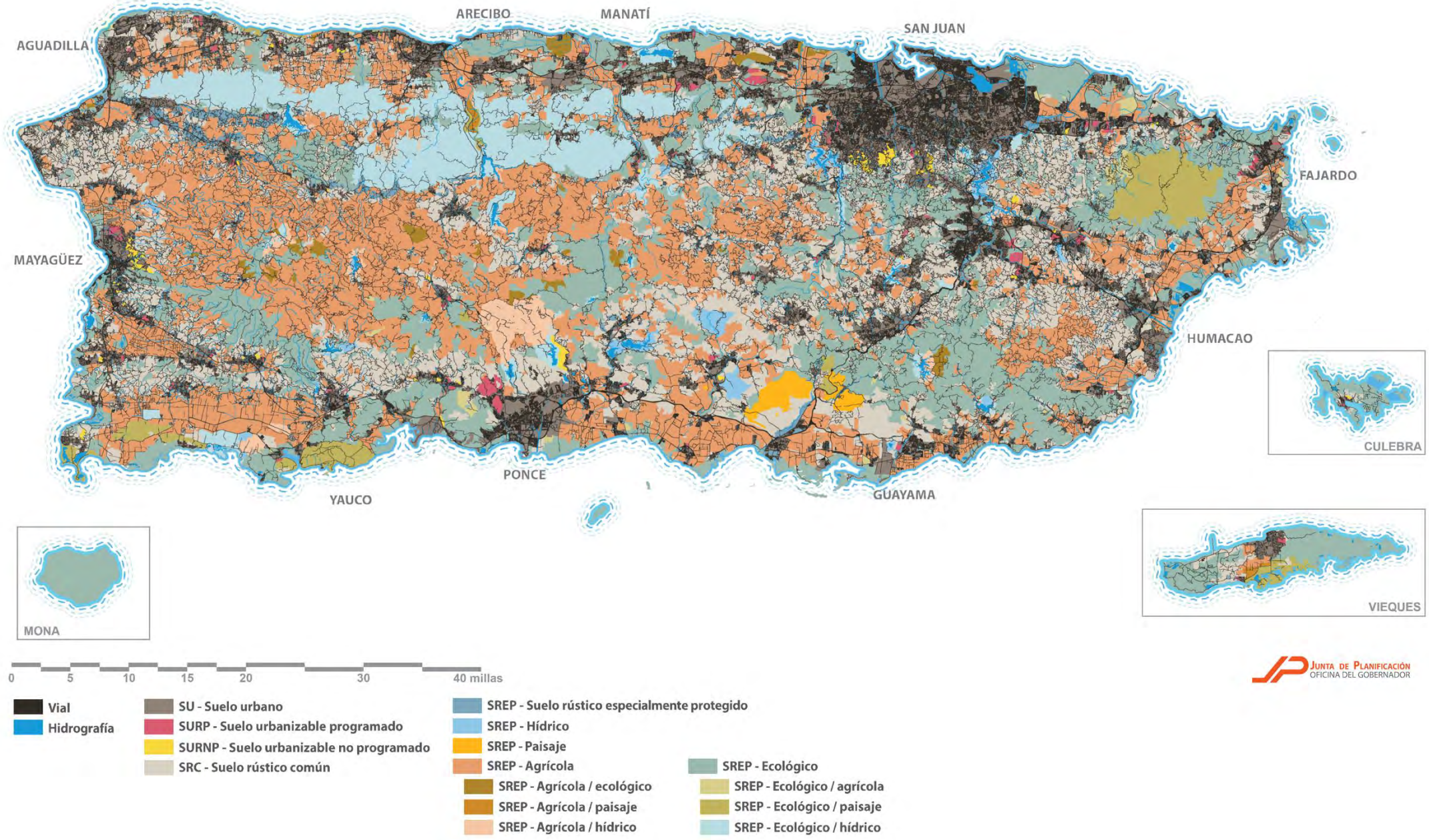
Centro Caribeño de Aumento del Nivel del Mar


Sea Level Rise Viewer
Enter an address or city
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Current MHHW
UNITS
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Isla de Cabras
San Juan National Historic Site
San Juan Antiguo
Puerto Rico
San Juan
Parque del Nuevo Milenio
Parque Luis Muñoz Rivera
Puerto Rico
Palo Seco
Parque Recreativo La Esperanza
Bacardi
San Antonio
San Antonio
Laguna Condado
Bahía de San Juan
Urb Bay View
Urb Bahía
Cataño
Palmas
Cataño
Vista al Mar
Urb El
Cataño
BDA Vietnam
Bahía de San Juan
More Resources for Your Community
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 02/11/2025
Contact Us
Privacy Policy
Disclaimer
USA.gov


Sea Level Rise Viewer
Enter an address or city
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Current MHHW
UNITS
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Isla de Cabras
San Juan National Historic Site
San Juan Antiguo
Puerto Rico
San Juan
Parque del Nuevo Milenio
Parque Luis Muñoz Rivera
Puerto Rico
Palo Seco
Parque Recreativo La Esperanza
Bacardi
San Antonio
San Antonio
Laguna Condado
Bahía de San Juan
Urb Bay View
Urb Bahía
Cataño
Cataño Palmas
Cataño
Vista al Mar
Urb El
BDA Vietnam
Bahía de San Juan
More Resources for Your Community
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 02/11/2025
Contact Us
Privacy Policy
Disclaimer
USA.gov


PLANO DE LA PLAZA
DE
SAN JUAN DE PUERTO-RICO
LEVANTADO POR EL CUERPO DE INGENIEROS MILITARES
(COPIA DEL ORIGINAL.)
B
A
H
I
A
EXPLICACION
CANO DE SAN ANTONIO
CANGREJOS
BAHIA DE PUERTO-NUEVO

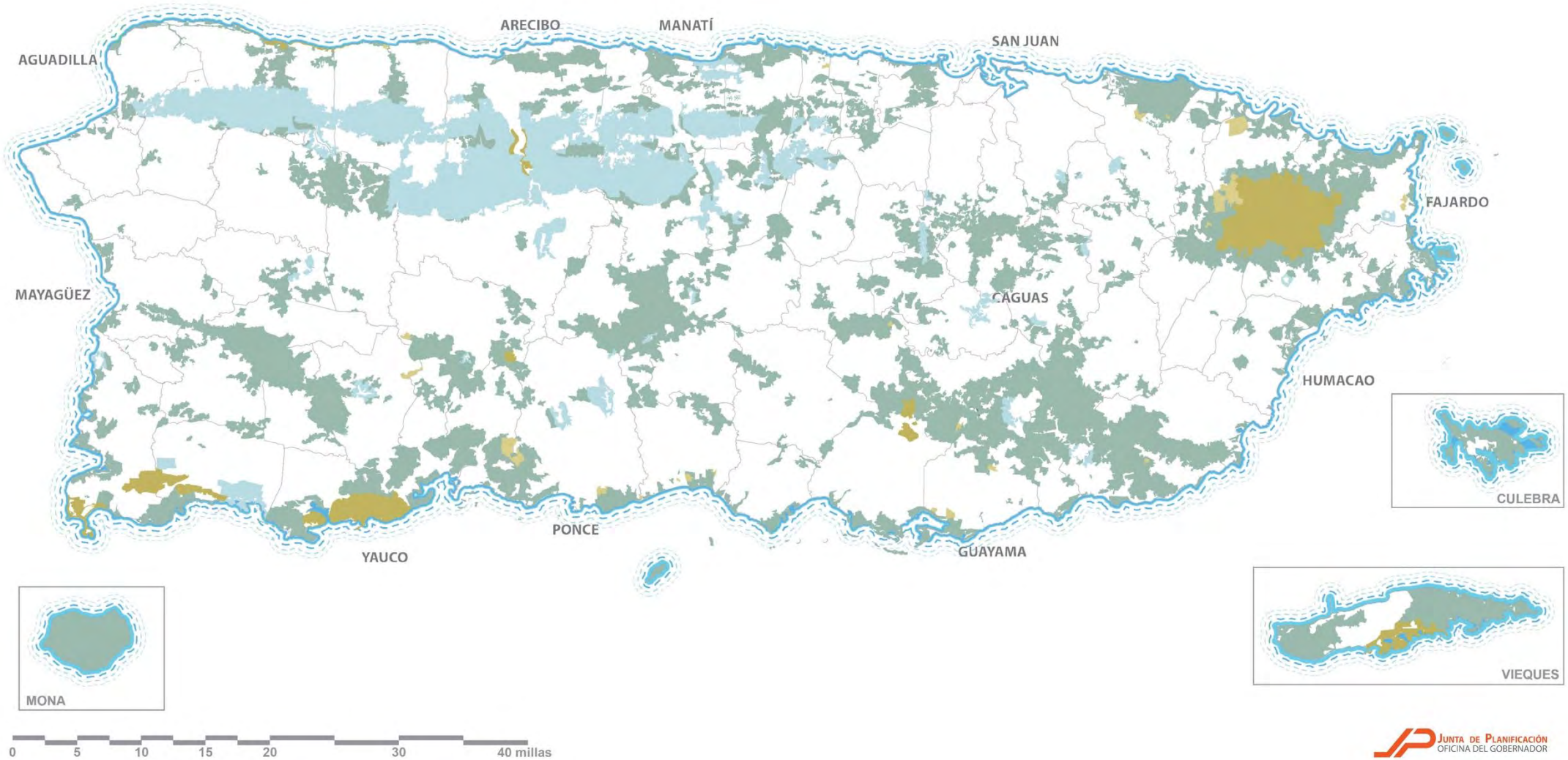
MAPA DE CLASIFICACIÓN DEL TERRITORIO



Junta de Planificación
Oficina del Gobernador

Fuente: Mapas diagnósticos – Memorial del Plan de Uso de Terrenos, Junta de Planificación 2015

MAPA 36. ÁREAS CON VALOR ECOLÓGICO



Junta de Planificación
Oficina del Gobernador

Fuente: Mapas diagnósticos – Memorial del Plan de Uso de Terrenos, Junta de Planificación 2015

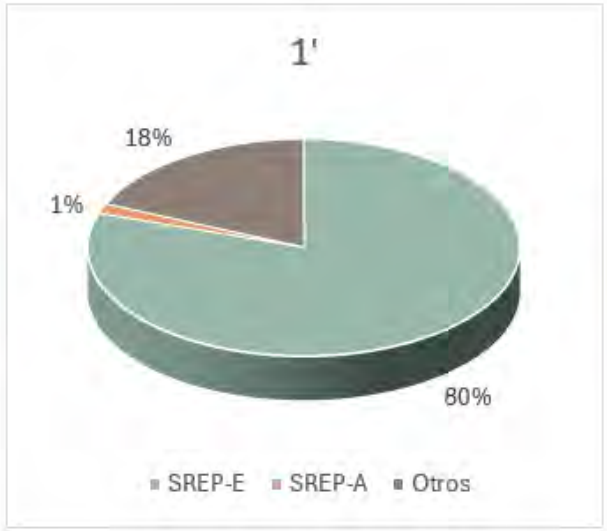
Impacto del ANM en el SREP - Ecológico

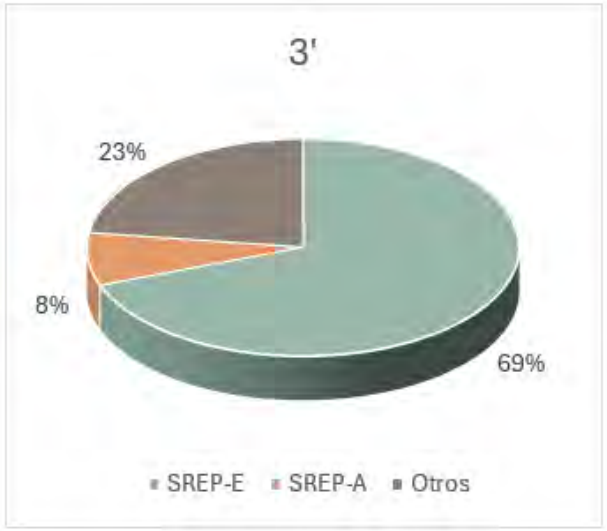
1'		
SREP-E	108	80%
SREP-A	2	1%
Otros	25	18%
Total	135	km2

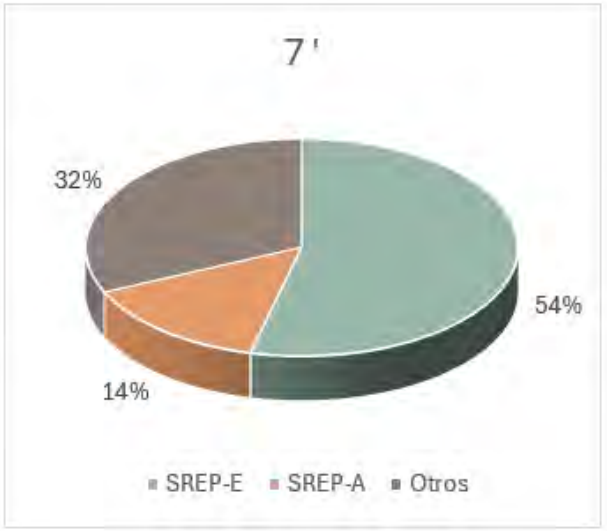
3'		
SREP-E	165	69%
SREP-A	19	8%
Otros	54	23%
Total	238	km2

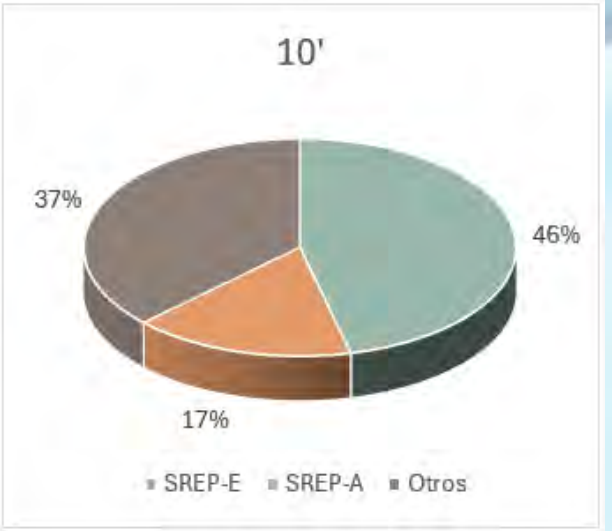
7'		
SREP-E	224	54%
SREP-A	60	14%
Otros	132	32%
Total	416	km2

10'		
SREP-E	244	46%
SREP-A	88	17%
Otros	196	37%
Total	528	km2



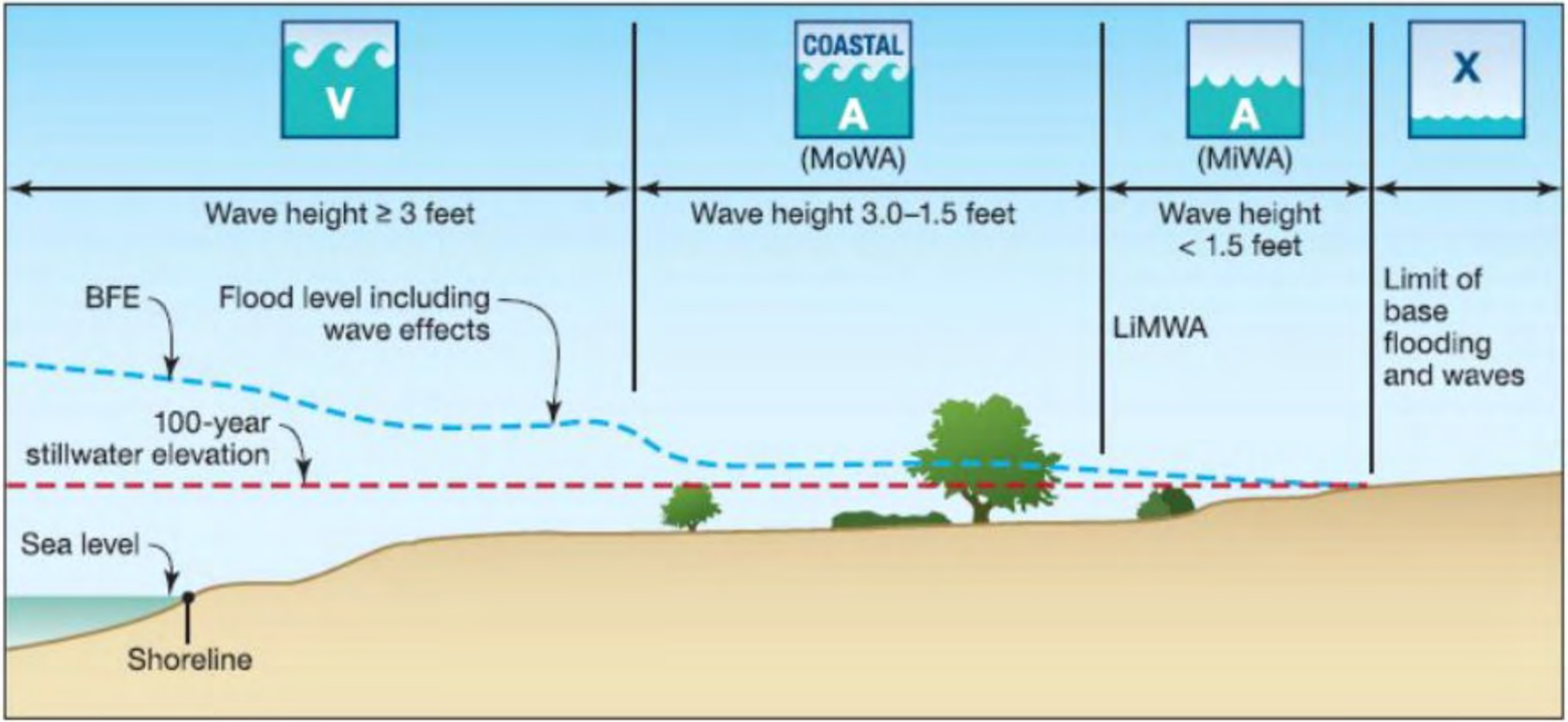




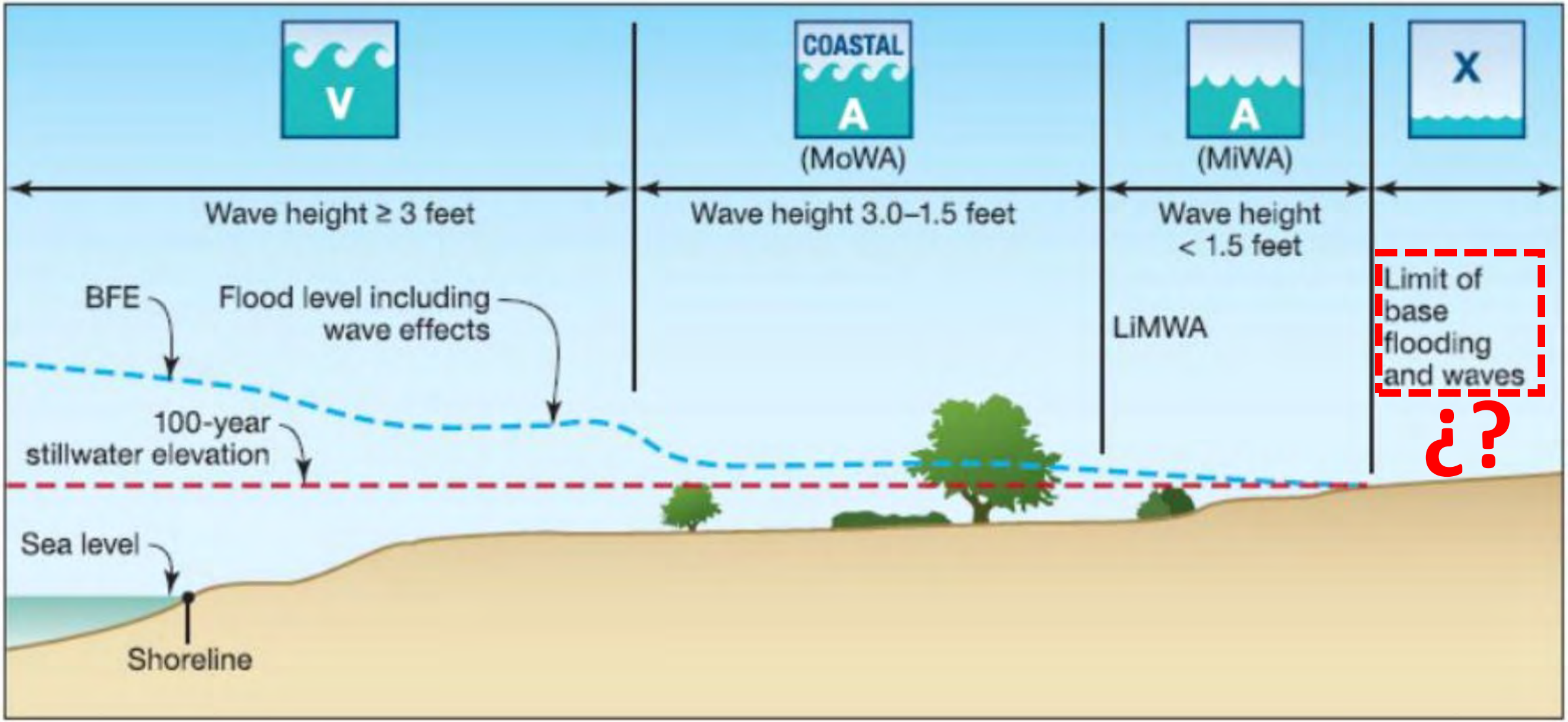


Centro Caribeño de Aumento del Nivel del Mar

Fuentes: El Nuevo Día, FEMA


V
COASTAL
A
(MoWA)
A
(MiWA)
X
Wave height ≥ 3 feet
Wave height 3.0–1.5 feet
Wave height
< 1.5 feet
LiMWA
Limit of
base
flooding
and waves
BFE
Flood level including
wave effects
100-year
stillwater elevation
Sea level
Shoreline

Fuente: FEMA


V
COASTAL
A
(MoWA)
A
(MiWA)
X
Wave height ≥ 3 feet
Wave height 3.0–1.5 feet
Wave height
< 1.5 feet
LiMWA
Limit of
base
flooding
and waves
¿?
BFE
Flood level including
wave effects
100-year
stillwater elevation
Sea level
Shoreline


Centro Caribeño de Aumento
del Nivel del Mar

Inundaciones Costeras

1. Tormentas
2. Lluvia
3. Escorrentías
4. Marejadas

Causadas por condiciones del tiempo

5. Mareas Extremas

6. Aumento del Nivel del Mar

Eventos Temporeros

Sources: Microjuris, NOAA, Shutterstock, Fernando Pabón, Eloy Pérez

Inundación Temporera del Huracán Fiona

Fuente: Alejandro Granadillo/AP

Combinación

Fuente: Shutterstock photograph from Hurricane María aftermath in Mayagüez

Centro Caribeño de Aumento del Nivel del Mar

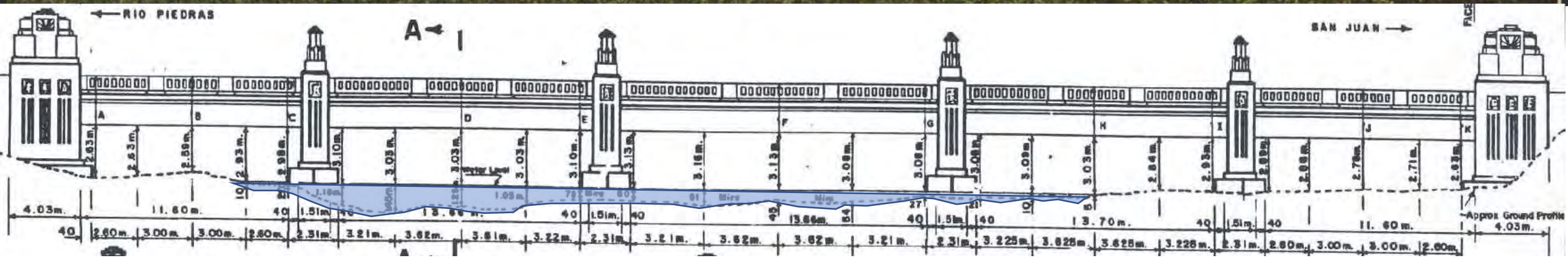
¿A quiénes impacta?

Fuentes: Inundaciones y Derrumbes en Puerto Rico Guía de Mitigación de Daños, CIAPR, AEME, FEMA, Fernando Pabón

Centro Caribeño de Aumento del Nivel del Mar

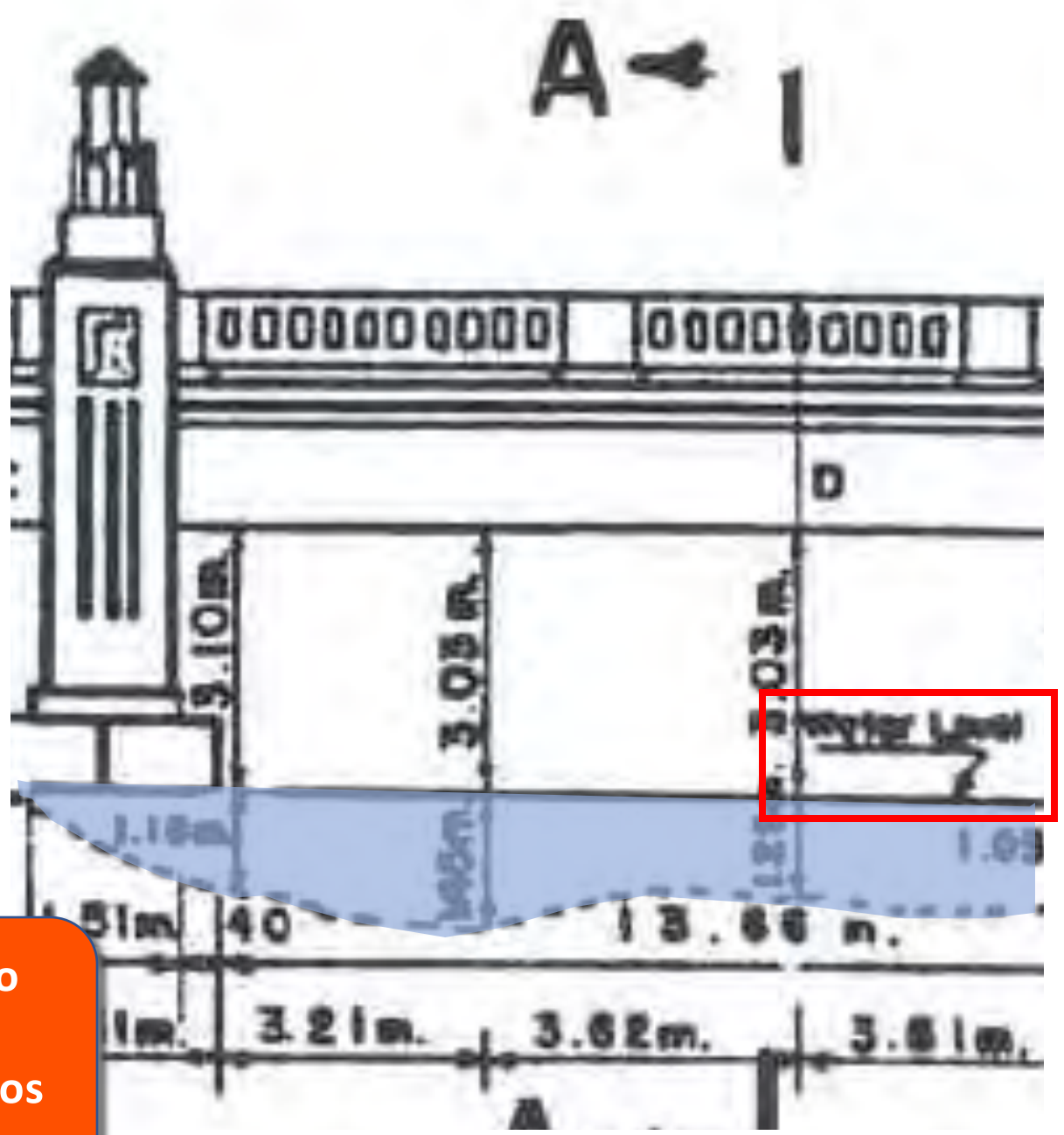
La Infraestructura Debe Durar

Fuente: Colección Puertorriqueña del Sistema de Bibliotecas de la Universidad de Puerto Rico



Fuente: Registro Nacional de Lugares Históricos

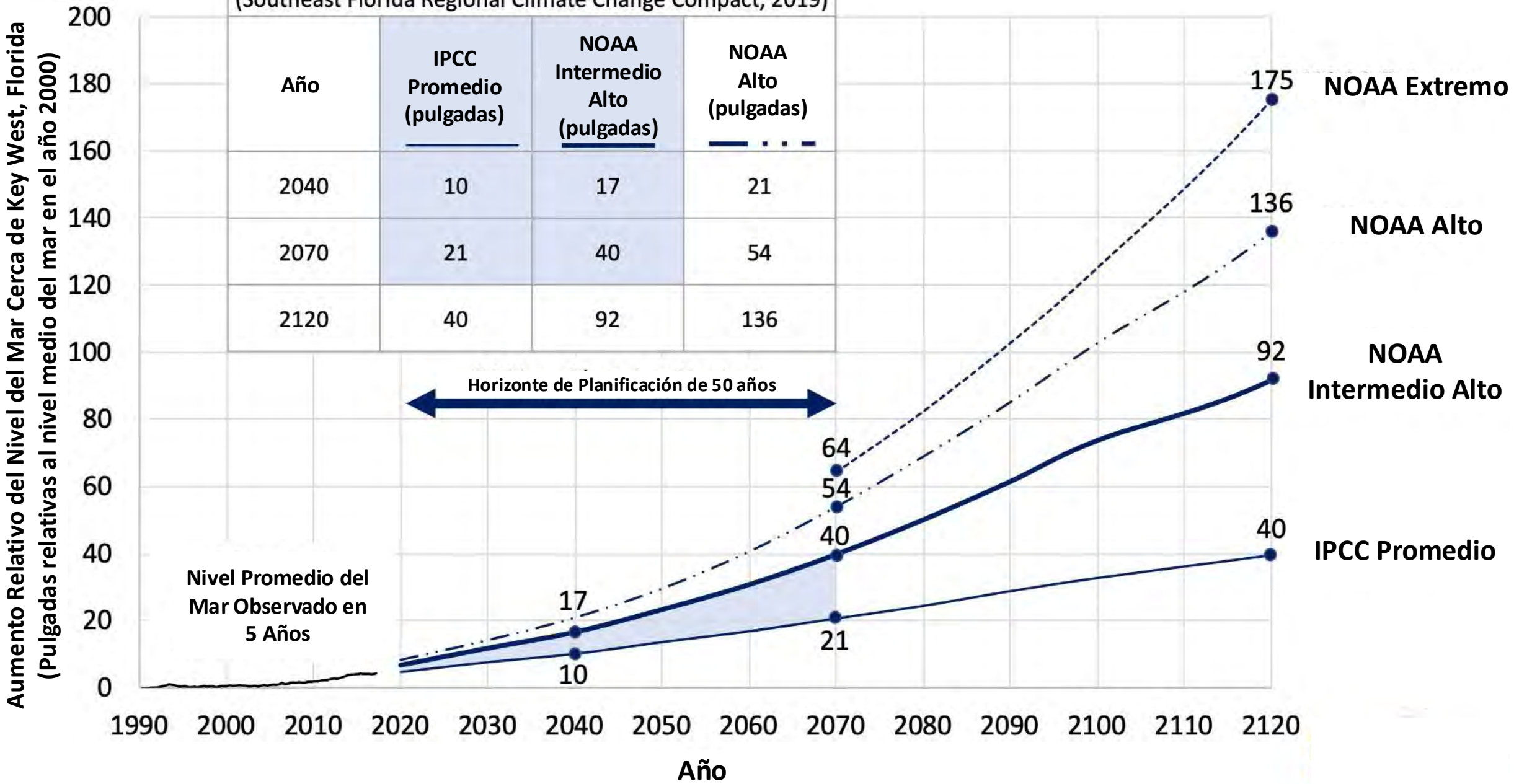
¿Estamos diseñando todavía para las realidades de 85 años atrás?



Centro Caribeño de Aumento del Nivel del Mar

Proyección Unificada del Aumento del Nivel del Mar
(Southeast Florida Regional Climate Change Compact, 2019)

Año	IPCC Promedio (pulgadas)	NOAA Intermedio Alto (pulgadas)	NOAA Alto (pulgadas)
2040	10	17	21
2070	21	40	54
2120	40	92	136

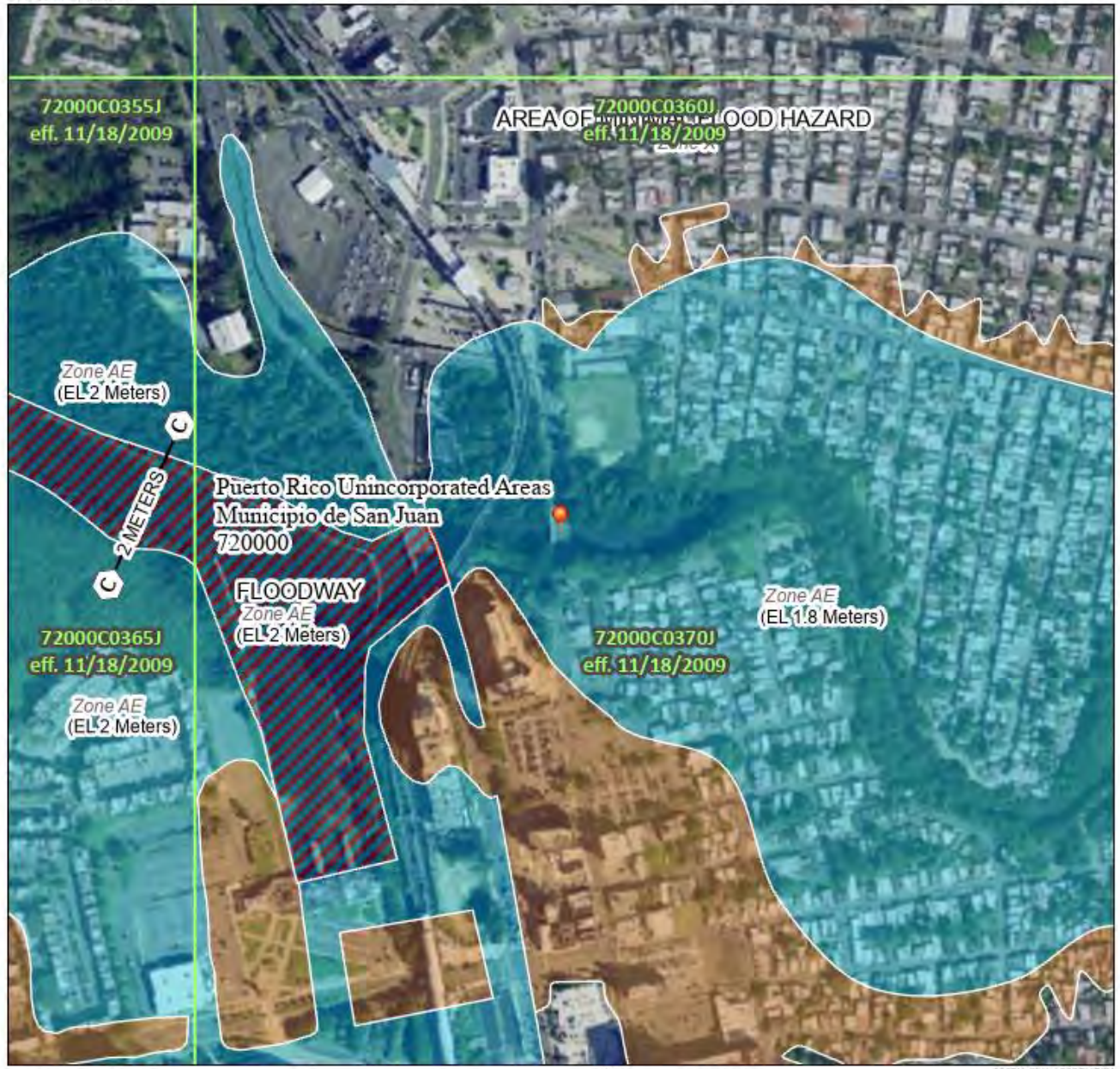


Fuente: *Southeast Florida Climate Change Regional Compact*

National Flood Hazard Layer FIRMette

FEMA

66°3'51"W 18°26'17"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

66°3'14"W 18°25'43"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

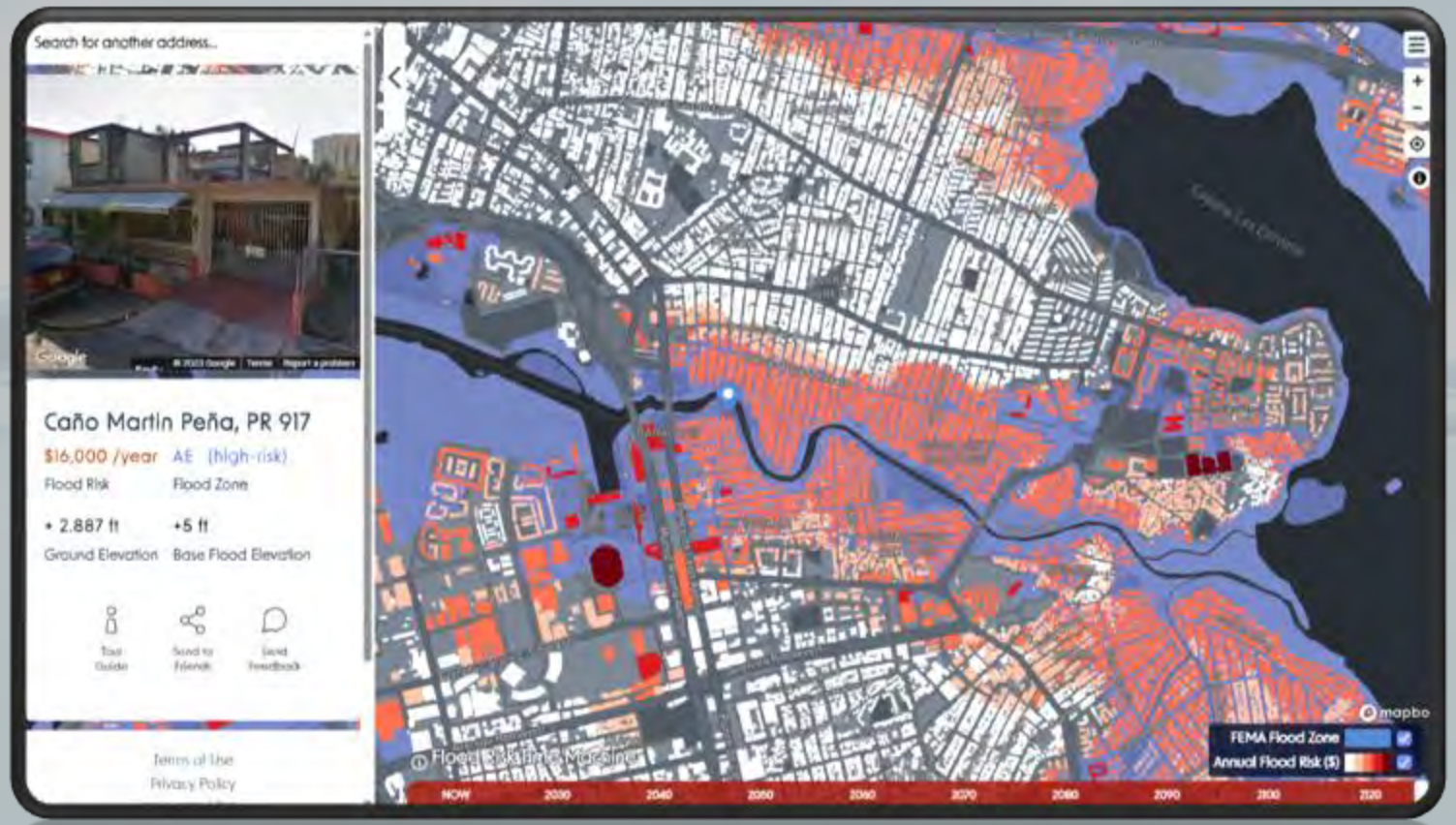
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/4/2025 at 8:04 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

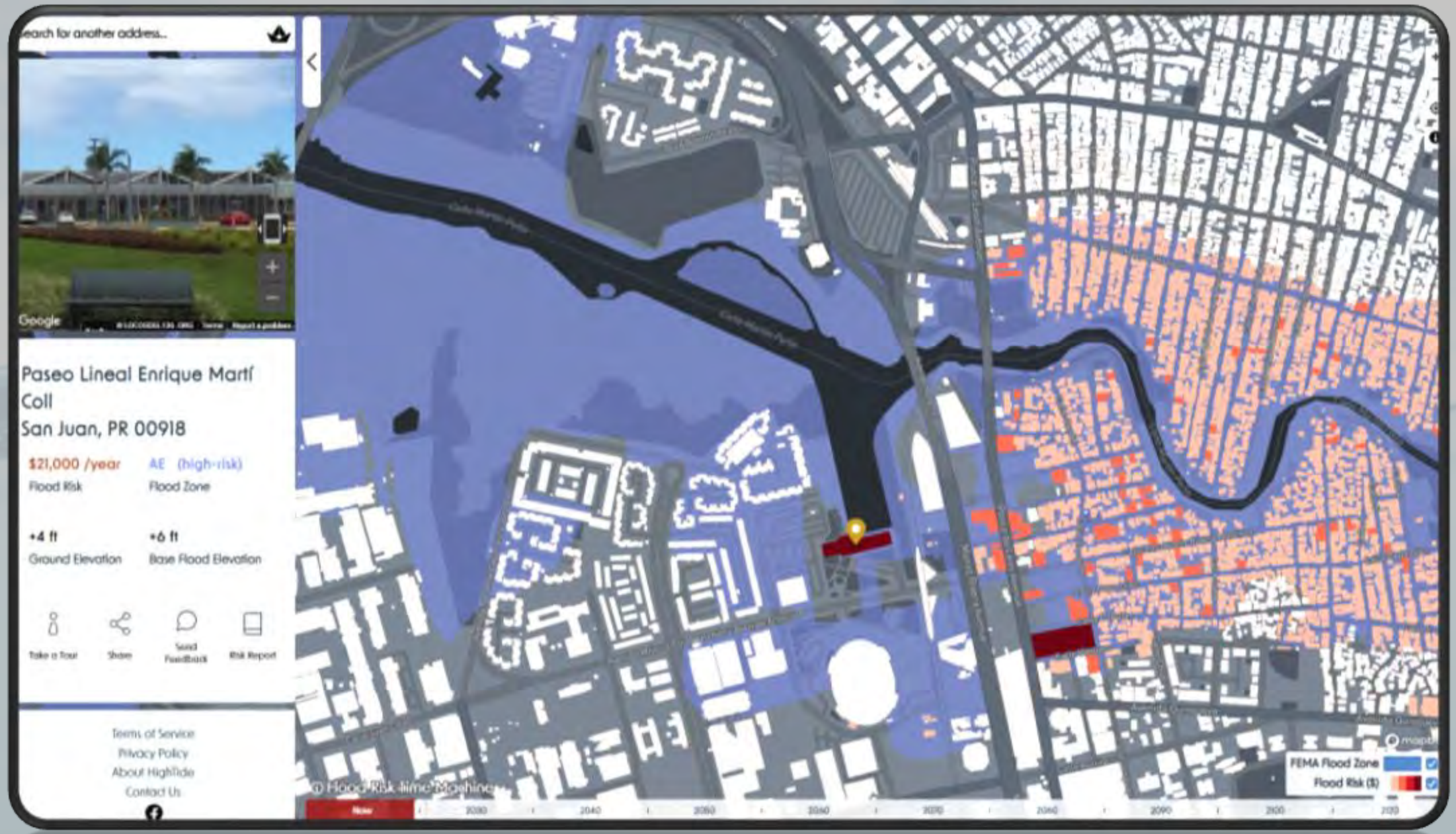
Entender Riesgos Para Planificar a Largo Plazo



Arkly

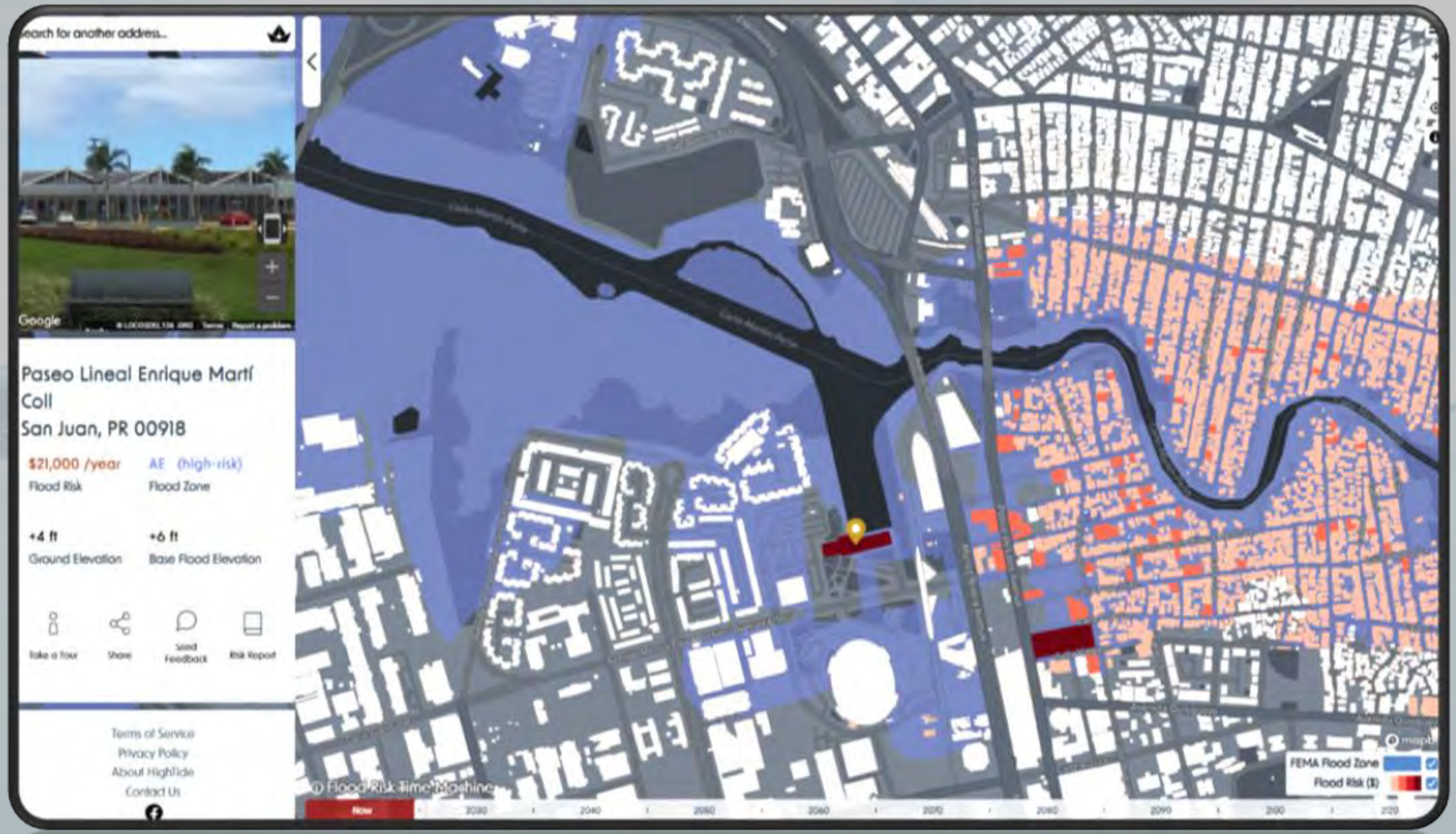
https://www.arkly.com/pr/

Fuentes: FEMA, Astra Intelligence, Inc.

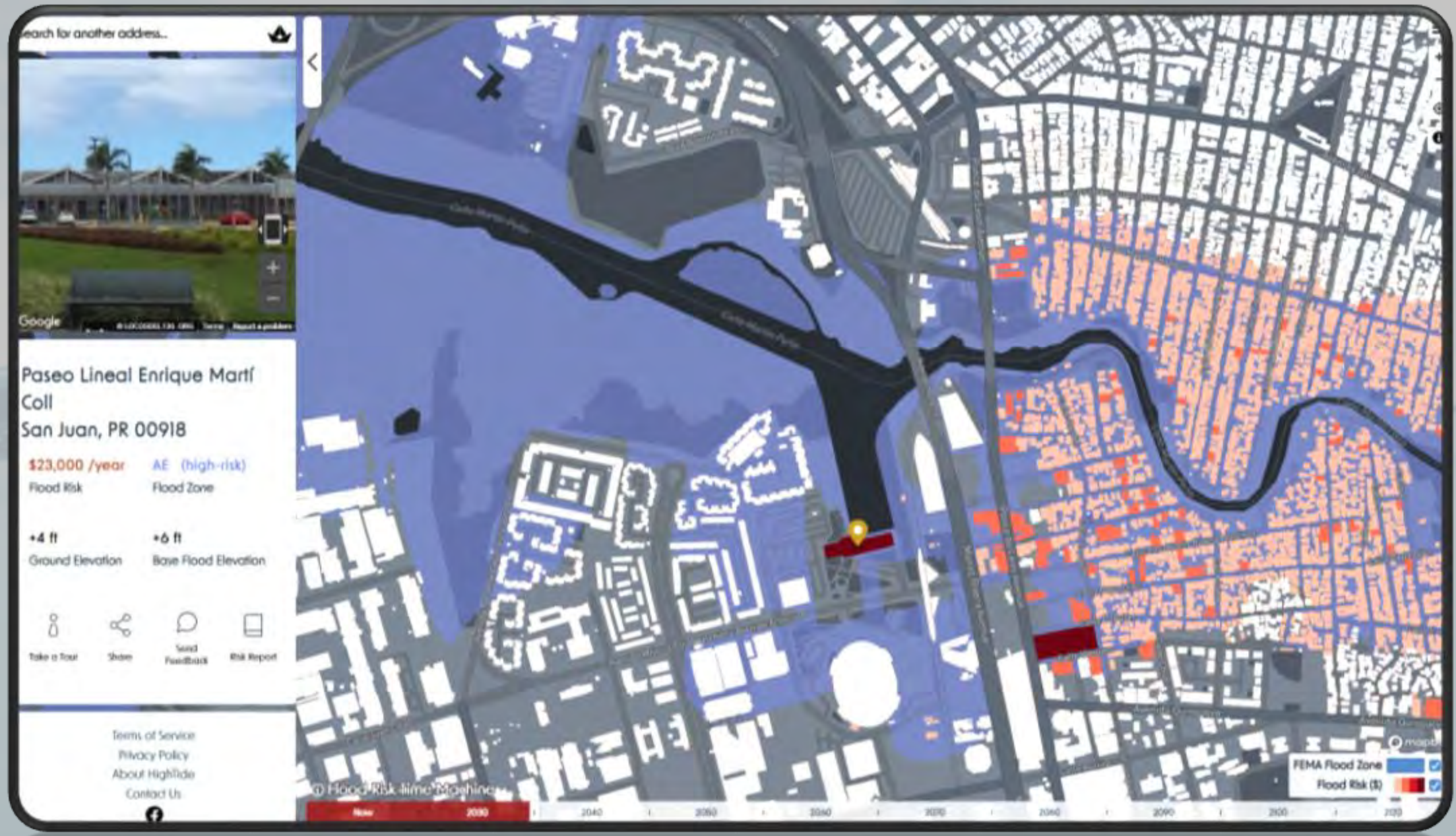


Fuentes: FEMA, Astra Intelligence, Inc.

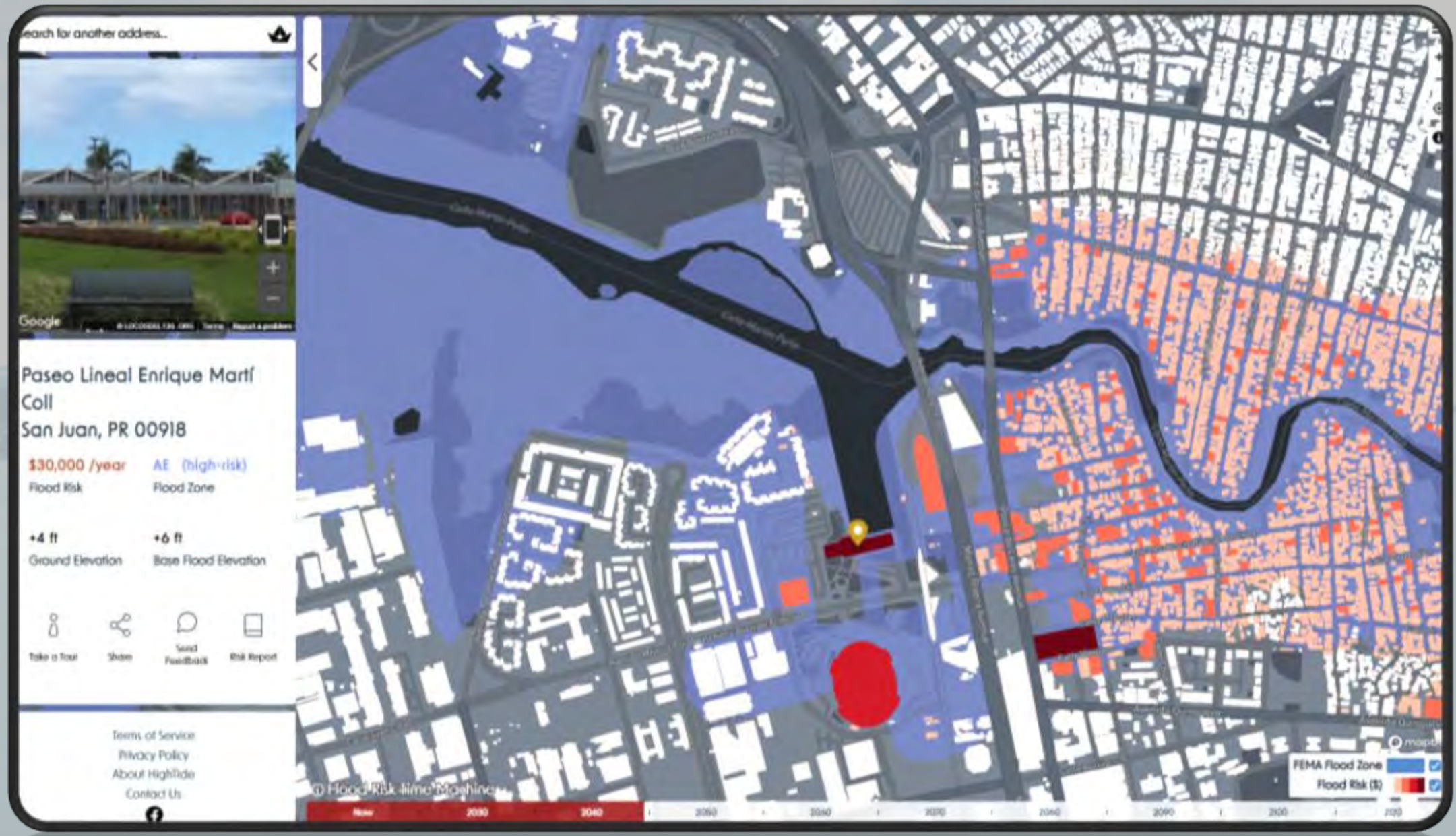
Fuente: http://130706.cloudaccess.net/images/christiansen/005.jpg?1497225600079



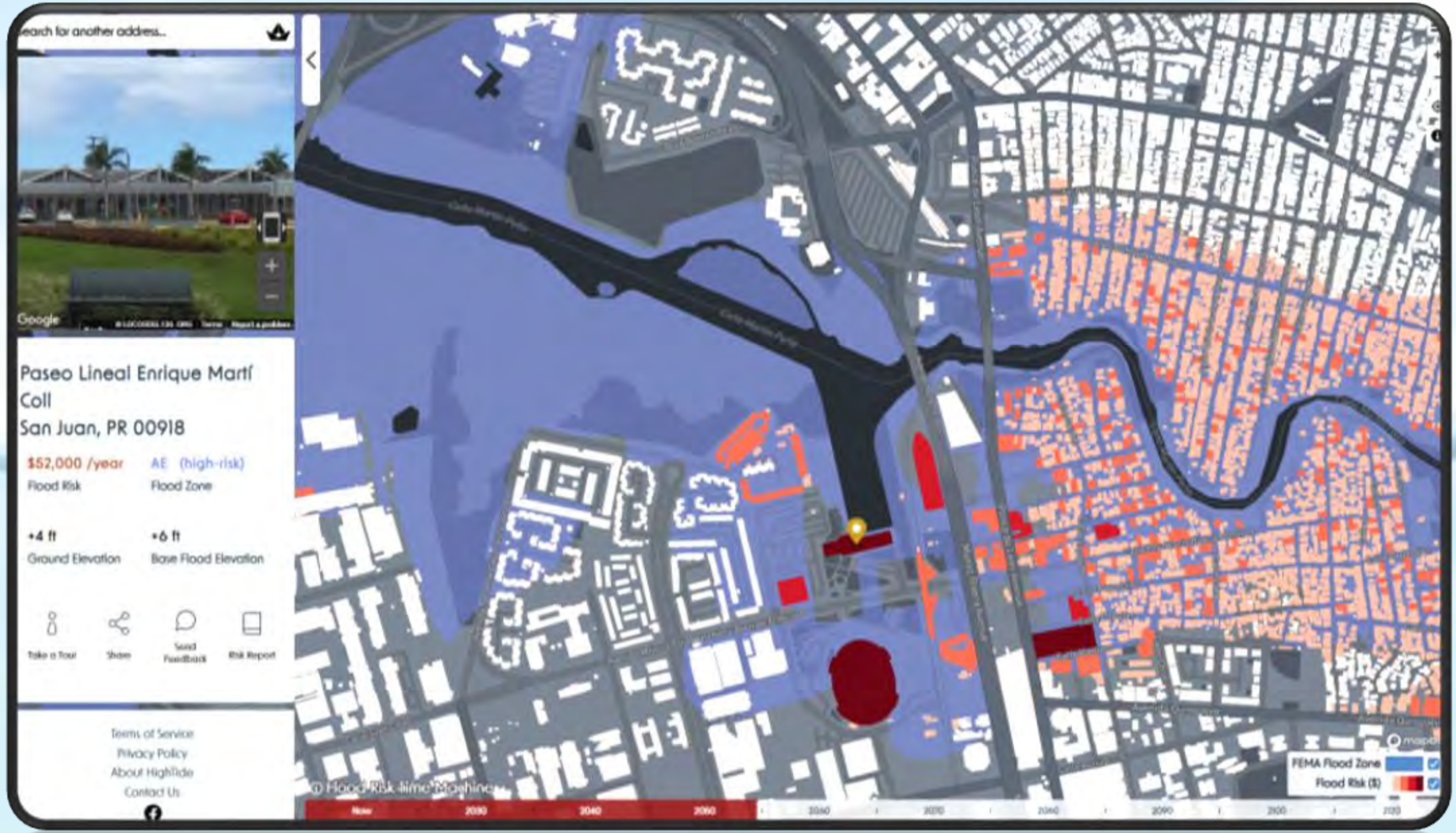
Fuentes: FEMA, Astra Intelligence, Inc.



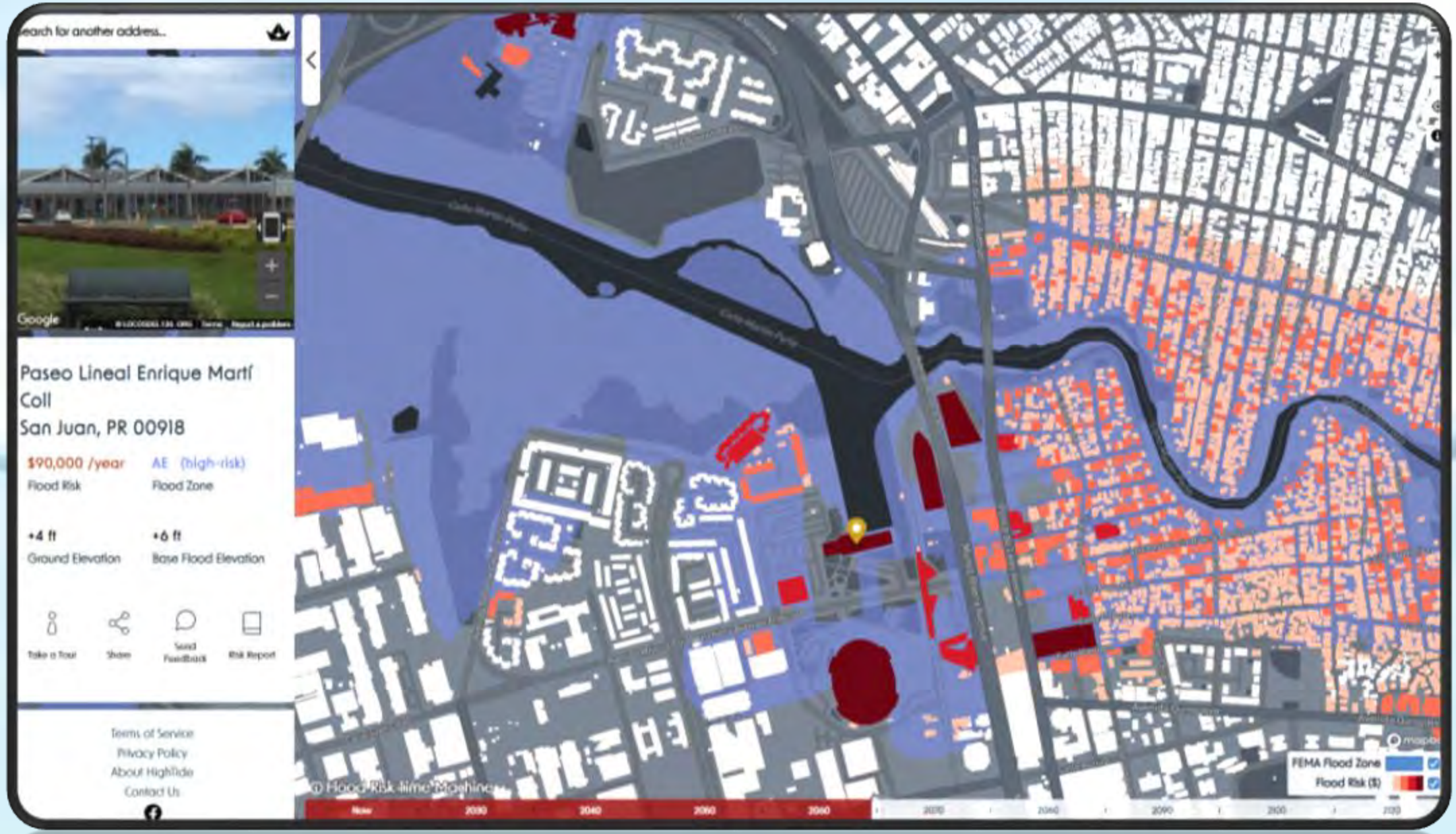
Fuentes: FEMA, Astra Intelligence, Inc.



Fuentes: FEMA, Astra Intelligence, Inc.

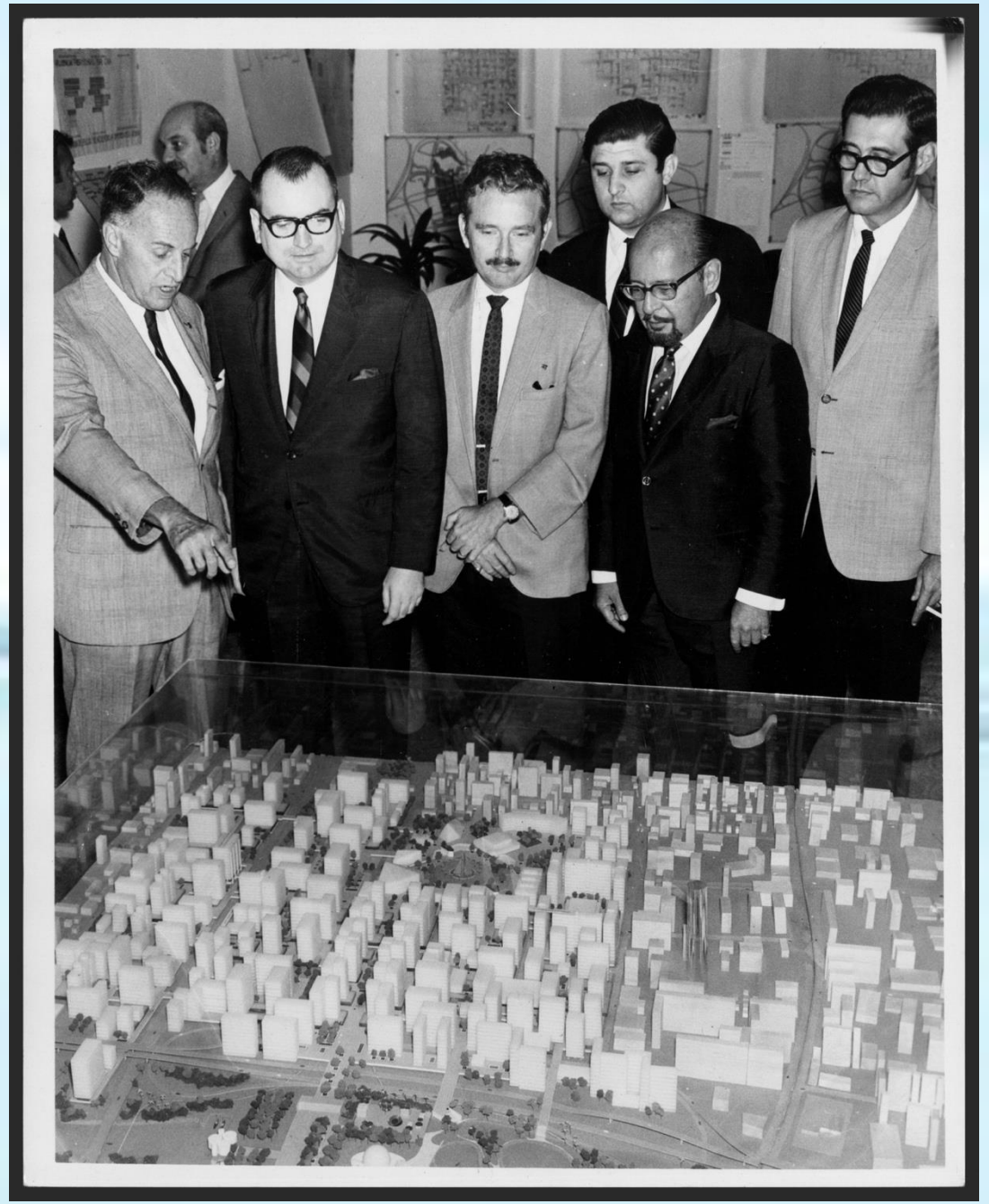


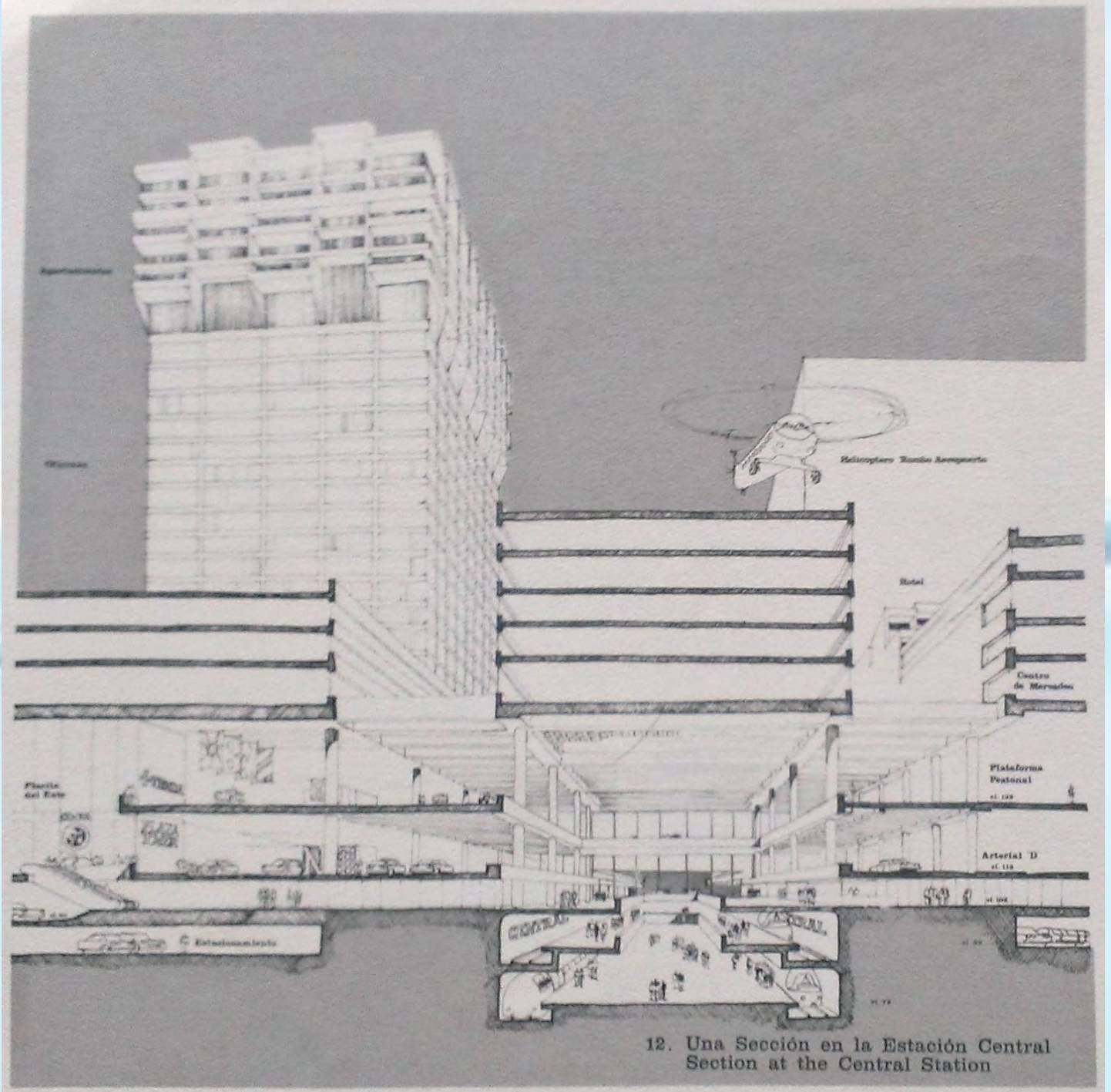
Fuentes: FEMA, Astra Intelligence, Inc.



Fuentes: FEMA, Astra Intelligence, Inc.

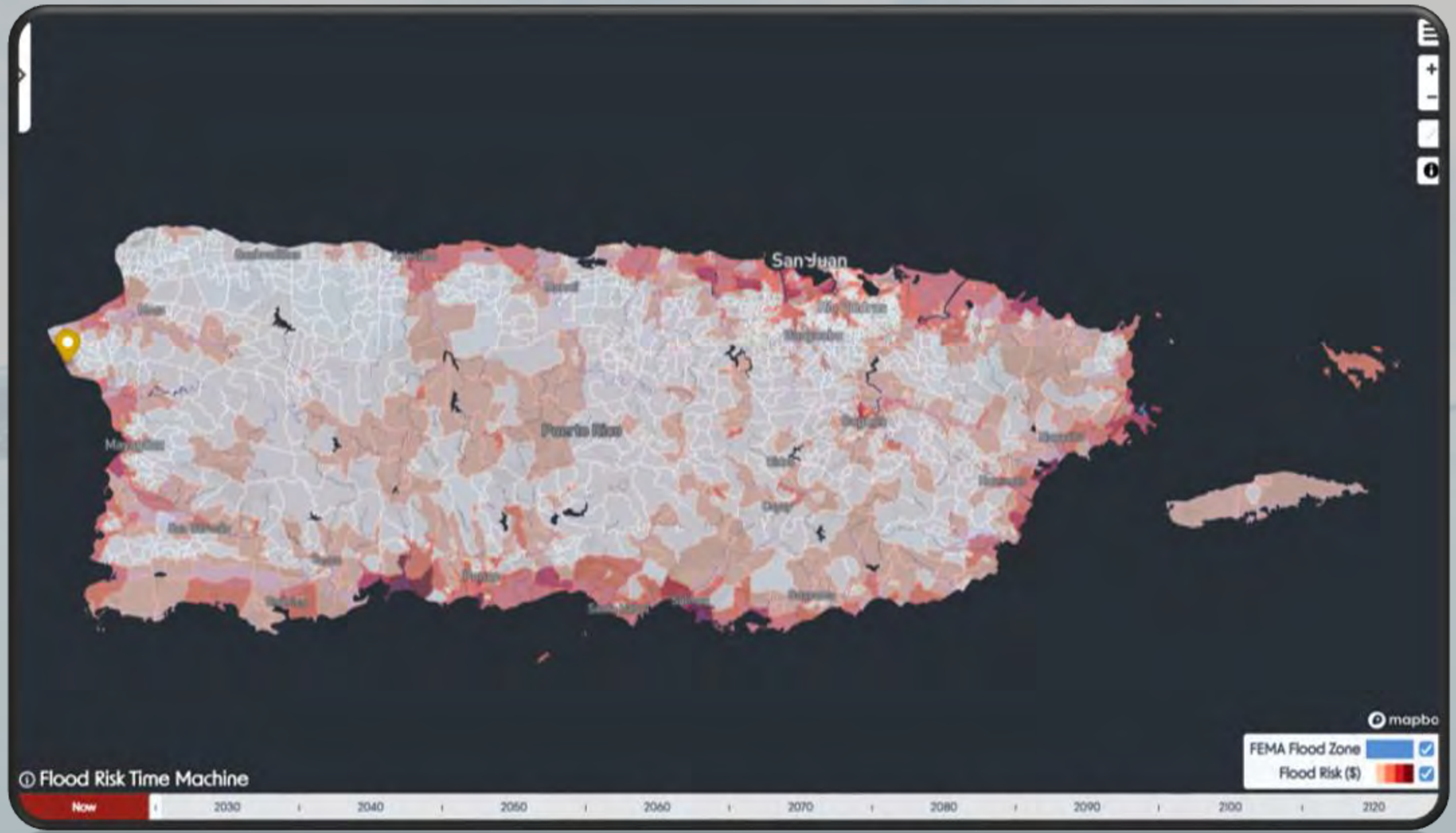
Fuentes: FEMA, Astra Intelligence, Inc.





12. Una Sección en la Estación Central
Section at the Central Station

Fuentes: Proyecto Nuevo Centro de San Juan, 1970. El Mundo.



Fuentes: FEMA, Astra Intelligence, Inc.

94% de Puerto Rico está a 10’ + del nivel del mar

Centro Caribeño de Aumento del Nivel del Mar

ETAPAS DE AUMENTO DEL NIVEL DEL MAR

Fuentes: *ESRI, CGIAR, USGS, HERE, Garmin, SafeGraph, METI/NASA, NPS NOAA Cesar Piovanetti, Fernando Pabón*

Centro Caribeño de Aumento del Nivel del Mar

Investigar para Innovar

Centro Caribeño de Aumento del Nivel del Mar

Afiliado de RISING SEAS INSTITUTE

Un programa de Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

Planificar próximos pasos y establecer prioridades significa:

Una forma de gradualmente impulsar un cambio, manejar la incertidumbre y evitar o acostumbrarse a condiciones desventajosas.

Reconocer la creciente obsolescencia de las herramientas disponibles.

- Reunir, actualizar, analizar y representar datos clave.
- Desarrollar nuevas herramientas para apoyar la toma de decisiones con una perspectiva a largo plazo.

Aumentar la Redundancia y así la Resiliencia

- Cotejar e incrementar los márgenes de seguridad.
- Actualizar los Códigos de Construcción, Mapas de Inundación, Reglamentos de Zonificación y otros Instrumentos de Planificación.
- Elevar estructuras o viabilizar su resiliencia y adaptación.

Materializar un nuevo marco holístico de referencia

- Anclar en conocimiento producido por la investigación.
- Adoptar un duo de paradigmas: Retirarse Tierra Adentro, Tierra Arriba.

Centro Caribeño de Aumento del Nivel del Mar

Investigación sobre herramientas

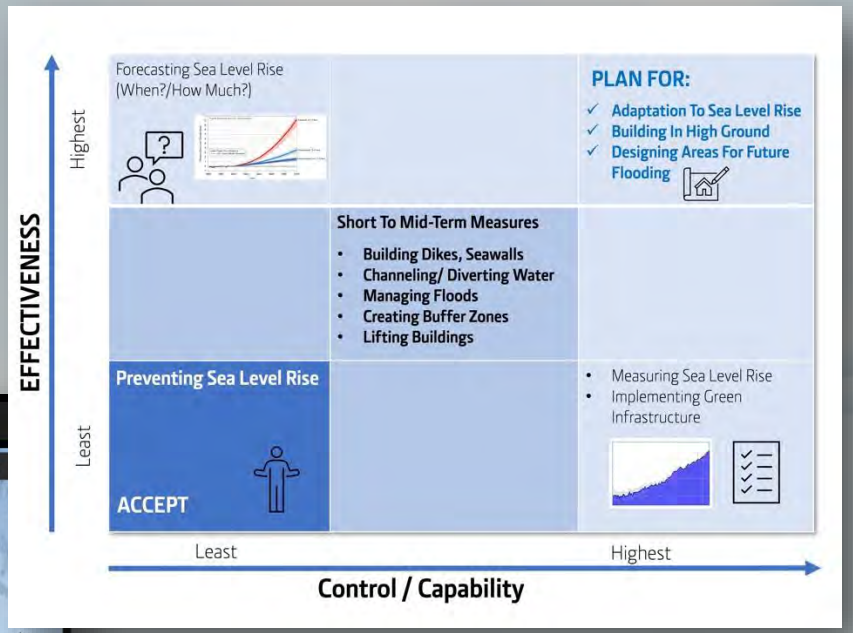
Benchmarks

Guide to Planning Height with Safety Margin per life expectancy of buildings and infrastructures

Risk Sensitivity	30 Years	50 Years	100 Years
LOW	1’		
MEDIUM	2’		
HIGH	3’		

Reference year for this projection is 2020. The first column is ap

Source: John Englander



Centro Caribeño de Aumento del Nivel del Mar

EFECTIVIDAD

Mayor

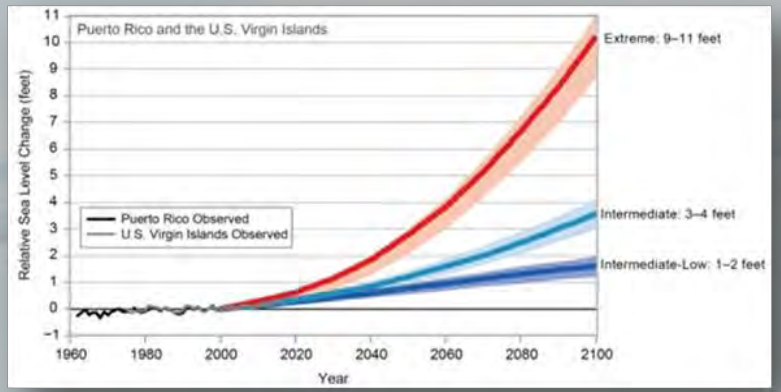
Menor

Pronosticar el aumento del nivel del mar (¿Cuándo?/¿Cuánto?)		**PLANIFICAR:** • Adaptarnos al aumento del nivel del mar • Construir en terrenos elevados • Diseñar inundaciones futuras
	• Construcción de diques, malecones / tablaestacados • Canalizar y desviar agua • Manejo de inundaciones • Crear zonas de amortiguamiento • Elevar los edificios	
Prevenir el aumento del nivel del mar **ACEPTAR**		• Medir el aumento del nivel del mar • Implementar infraestructura verde

Menor — Mayor

Control/ Capacidad / Confianza

Las herramientas que tenemos a nuestra disposición son estupendas para medir pero...

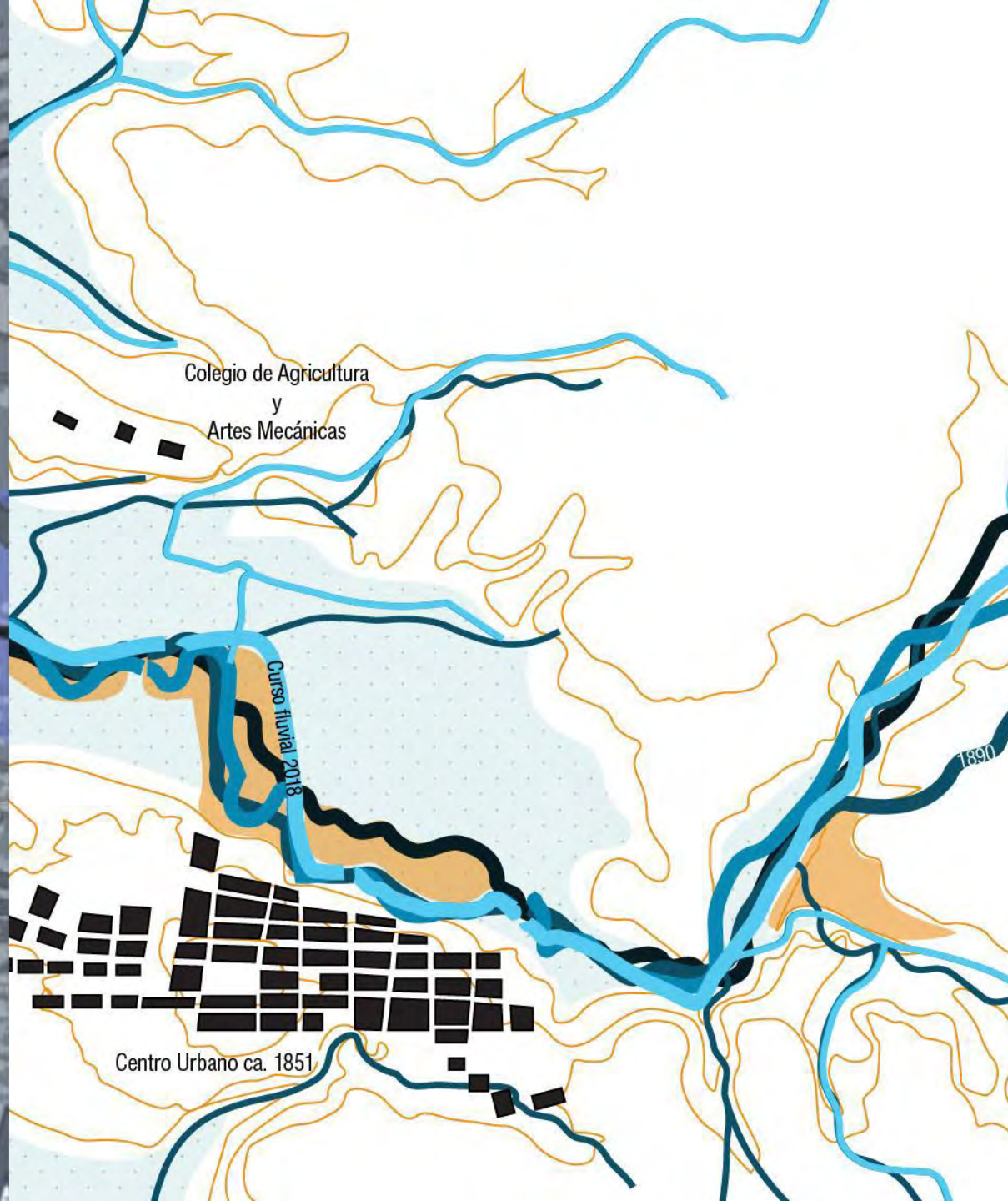


Centro Caribeño de Aumento del Nivel del Mar

Buena Planificación

Centro Caribeño de Aumento del Nivel del Mar


EL SECO
TRASTALLERES
DULCES
LABIOS
Calle José de
Calle Cristy


Colegio de Agricultura
y
Artes Mecánicas
Curso fluvial 2018
1890
Centro Urbano ca. 1851

Contradicciones

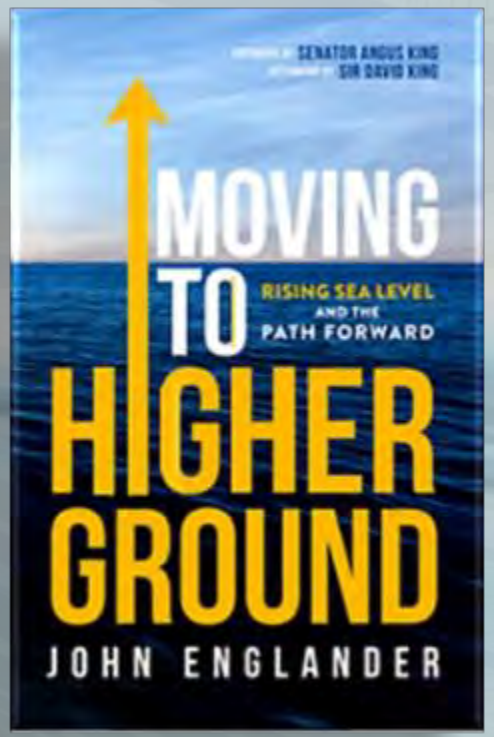
Centro Caribeño de Aumento del Nivel del Mar

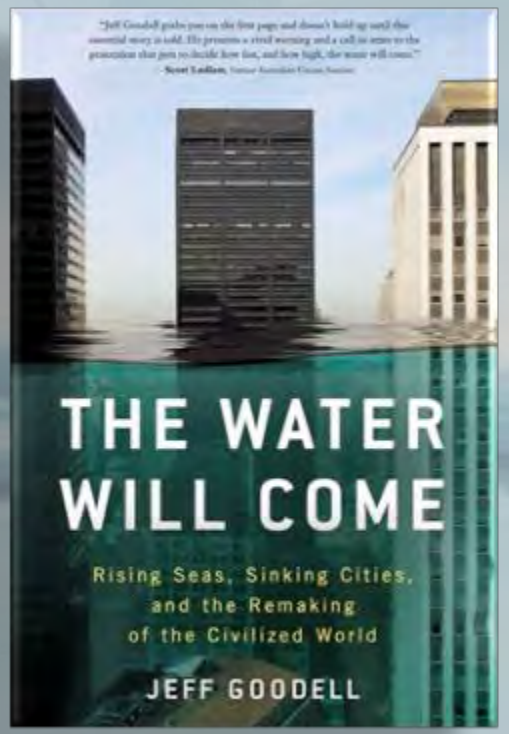
Fuente: Yiyo Tirado Rivera, La Concha, 2022. Serie Castillos de arena, 2020- Expuesto en el Whitney Museum of American Art

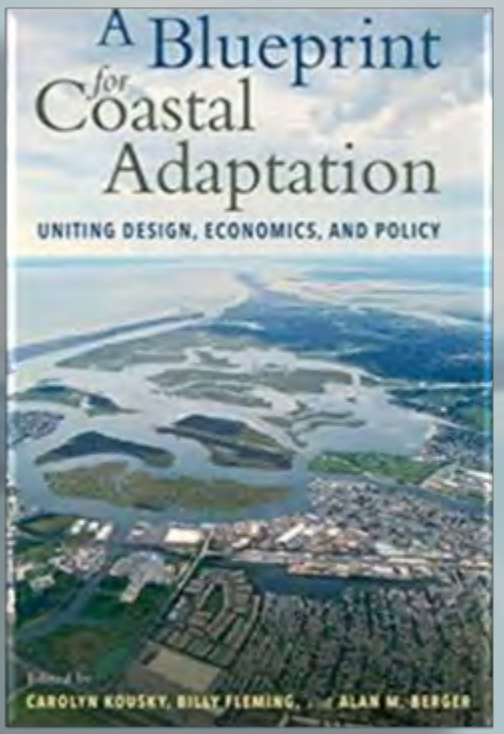

Cuando el
Mar
nos ALCANCE
Centro Caribeño de Aumento del Nivel del Mar
Afiliado al
RISING SEAS INSTITUTE
Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico


Cuando el
Mar
nos ALCANCE

Leer, Educarnos y Enseñar







Centro Caribeño de Aumento del Nivel del Mar

Afiliado al RISING SEAS INSTITUTE

Un programa del Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

EN RESUMEN

- El aumento en el nivel del mar no puede detenerse y está acelerando.
- Debemos prepararnos para aproximadamente 10 pies o más de aumento.
- Movernos tierra adentro, tierra arriba… es la mejor alternativa de adaptación.
- Urge comenzar la adaptación ahora pues tomará generaciones implementarla.
- Distinto a otros países, Puerto Rico puede adaptarse.

Fuente: https://coast.noaa.gov/slr/#

Centro Caribeño de Aumento del Nivel del Mar

El planeta rebasó el punto de inflexíon…
tenemos que adaptarnos a la marea.

Centro Caribeño de Aumento del Nivel del Mar

¡Gracias!

Centro Caribeño de Aumento del Nivel del Mar

Afiliado al: RISING SEAS INSTITUTE

Un programa del: Fideicomiso para Ciencia, Tecnología e Investigación de Puerto Rico

caribbeancenterrisingseas.org