



**COASTAL RESILIENCE PARTNERSHIP**  
SOUTHEAST PALM BEACH COUNTY

# Climate Change Vulnerability Assessment

Palm Beach County Water Resources Task Force  
September 30, 2021





# COASTAL RESILIENCE PARTNERSHIP

SOUTHEAST PALM BEACH COUNTY

## Seven municipalities + unincorporated County areas with

- Shared waterways and infrastructure
- Similar physical, geographic, and social characteristics
- Similar climate change impacts and threats
- Shared vulnerability
- Shared need for a comprehensive climate change vulnerability assessment

Visit [CoastalResiliencePartnership.org](https://CoastalResiliencePartnership.org) for more information

Unincorporated Palm Beach County

Lake Worth Beach

Lantana

Ocean Ridge

Boynton Beach

Delray Beach

Highland Beach

Boca Raton



# What is a Climate Change Vulnerability Assessment (CCVA)?

**A CCVA provides a foundational understanding of the risks a certain community, place, or asset faces as it relates to climate threats.**

## CCVA Process

Explore Climate Threats

Assemble Data on Community Assets

Assess Vulnerabilities and Risks

Investigate Potential Adaptation Strategies

Prepare Final Report

*Adapted from:*



U.S. Climate  
Resilience Toolkit  
[toolkit.climate.gov](https://toolkit.climate.gov)



# Public Engagement and Outreach

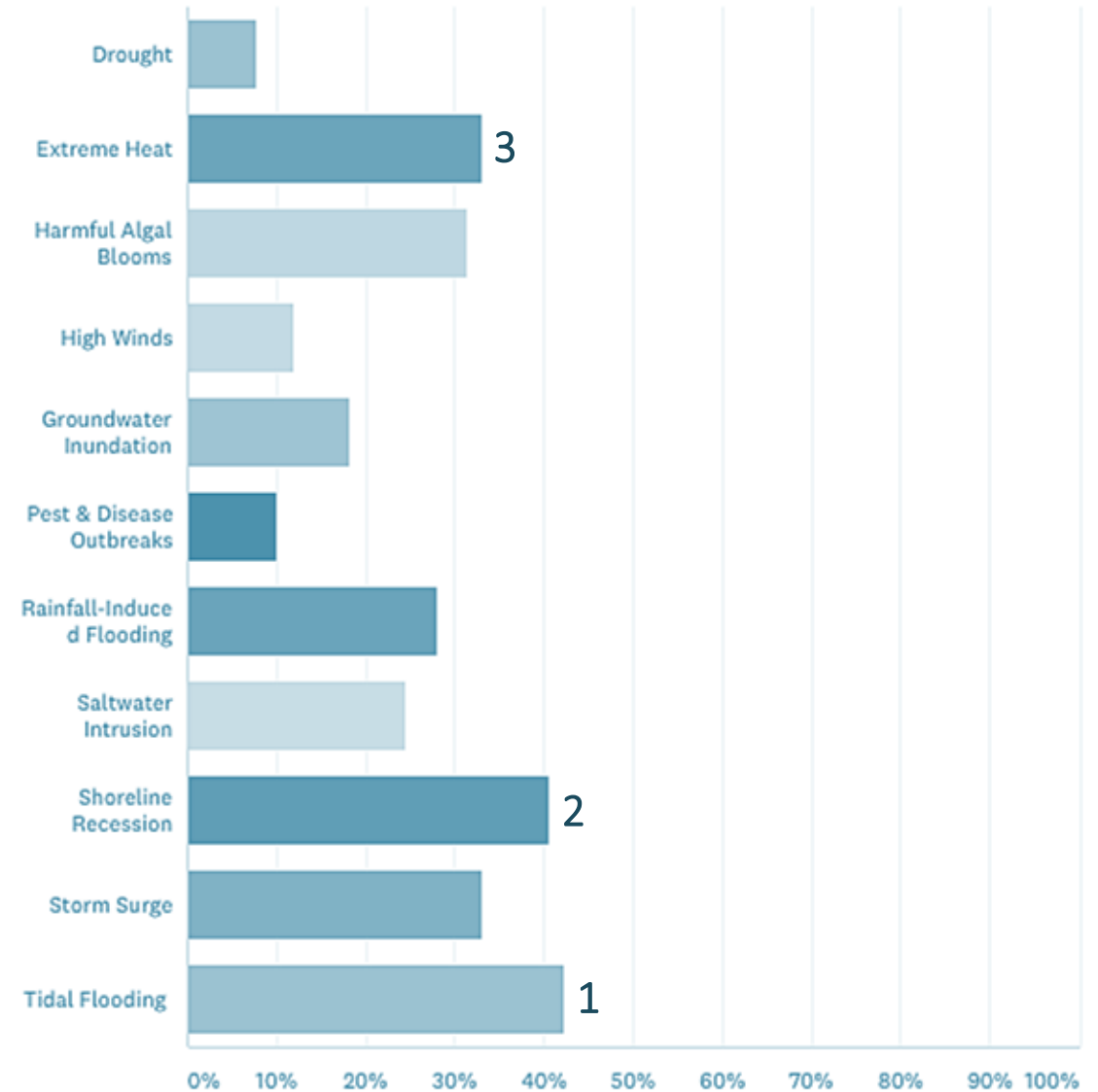
Public engagement was an important part of this project and is essential to the success of the CRP.

Over the past year, the CRP has held:

- Two public workshops\*
- Six staff workshops
- One micro-regional survey



## Community Survey Results – Perceived Threats



# Threats Assessed



**High Winds**



**Rainfall-Induced Flooding**



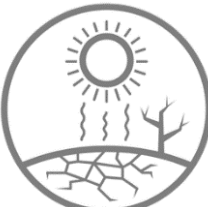
**Harmful Algal Blooms**



**Pest & Disease Outbreaks**



**Extreme Heat**



**Drought**



**Wildfire**



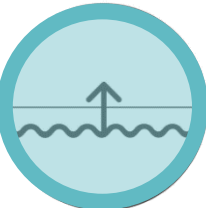
**Shoreline Recession**



**Tidal Flooding**



**Storm Surge**



**Groundwater Inundation**



**Saltwater Intrusion**



# Asset Categories Assessed



Critical Facilities



Water Infrastructure



Transportation & Mobility



Natural Resources



Economic Factors



People and Socioeconomics



Property



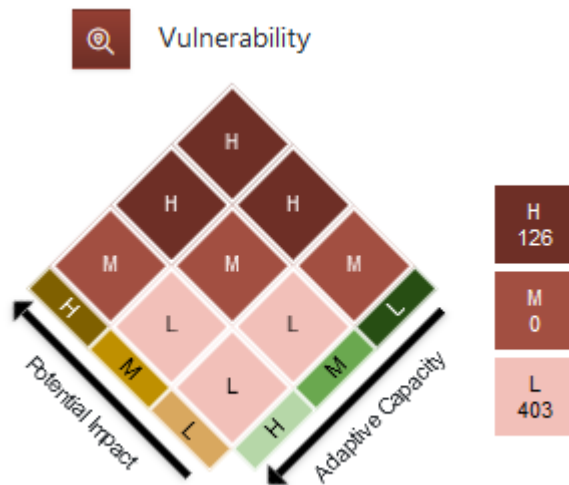
# Vulnerability

Understanding the susceptibility of societal assets due to physical and social factors.

**Exposure:** presence of assets in harm's way

**Sensitivity:** the degree to which assets are affected by a threat

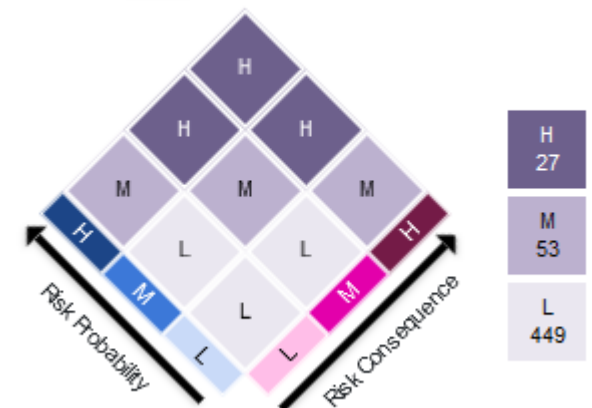
**Adaptive Capacity:** the ability to cope



Combined Vulnerability and Risk



Risk\*



# Risk

Understanding the probability and negative outcome of threats.

**Probability:** the likelihood of a threat or hazard event occurring

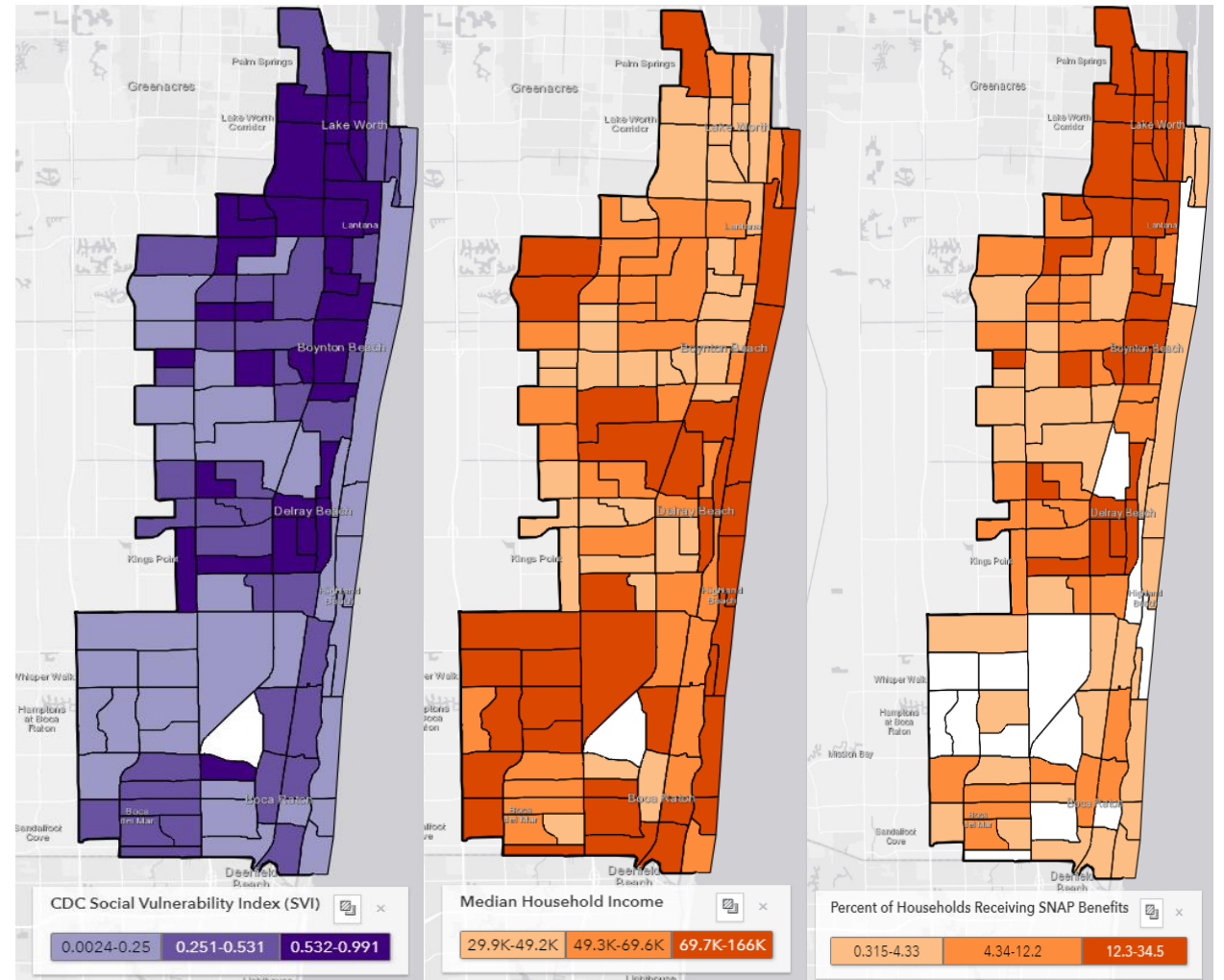
**Magnitude of Consequence:** the negative outcome of a threat or hazard event

# Social Vulnerability

Characteristics of a community that affect their capacity to anticipate, confront, repair, and recover from the effects of a disaster.

- Data and metrics include
  - Socioeconomic Metrics (ACS)
  - CDC Social Vulnerability Index
  - Critical Community Assets specific to CRP CCVA project
    - Assisted housing
    - Medical congregate facilities
    - Residential cooling
    - SNAP retailers, etc.

**\*Included as a co-occurrence in every threat assessment**

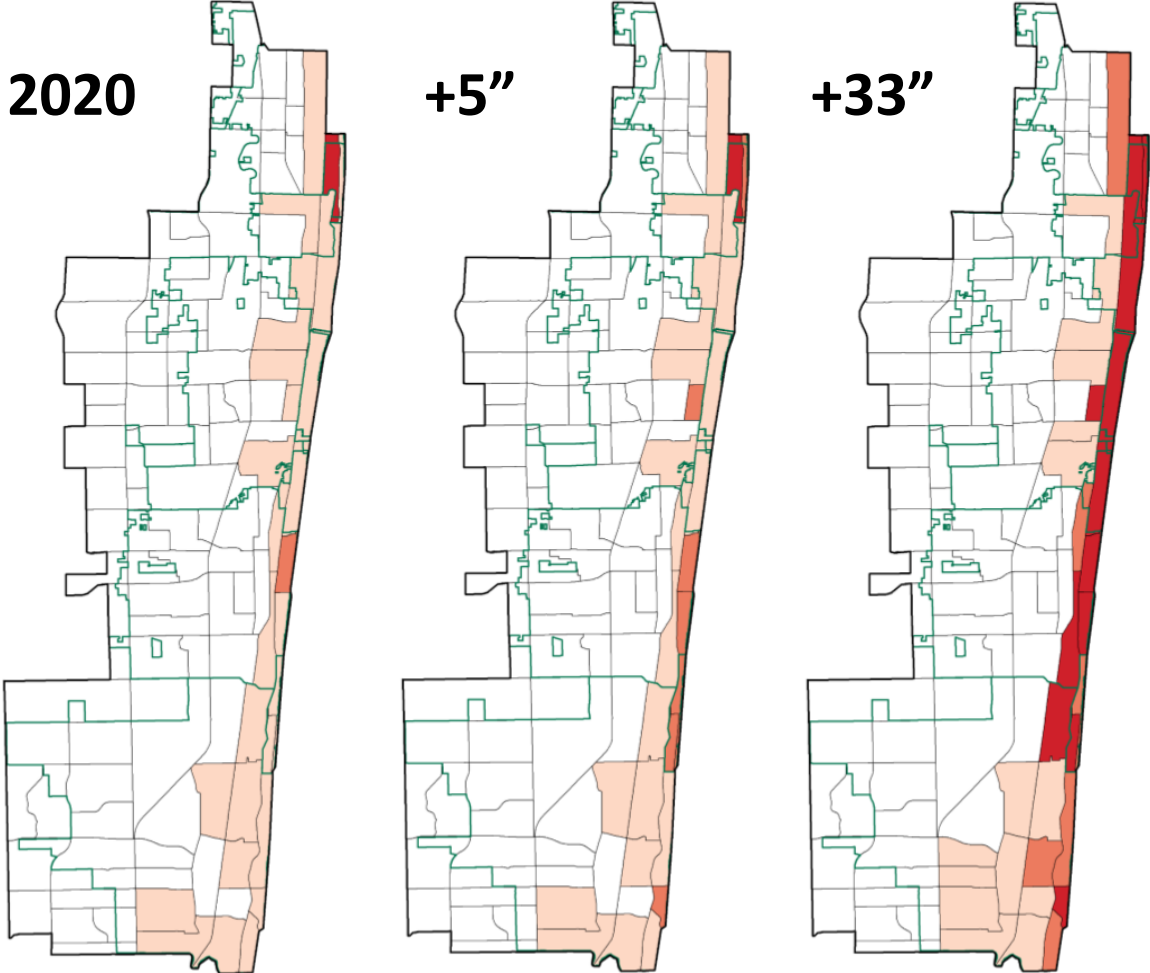






# Tidal Flooding Assessment

Exceptionally high tidal events that result in the temporary inundation of low-lying areas



Percent of parcels with medium-high vulnerability and risk per census tract

- 25.1-50
- 10.1-25
- 0.01-10
- Assessment Extent
- Census Tract
- CRP Jurisdiction

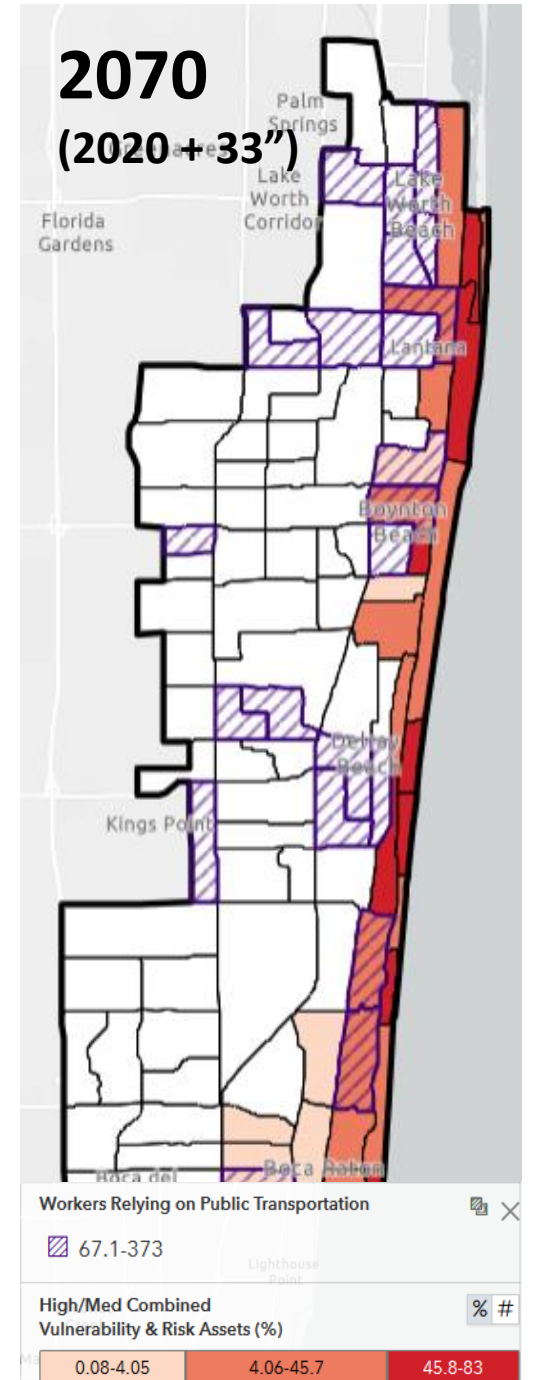




# Tidal Flooding Assessment

## Regional Summary (CCVA Study Area)

| Asset                                     | 2020           | 2020 + 5"      | 2020 + 33"    |
|---|----------------|----------------|---------------|
| Residential                               | 342<br>(<1%)   | 502<br>(<1%)   | 3,825<br>(3%) |
| Assessed Improvement Value (all property) | \$2.2B<br>(5%) | \$2.9B<br>(6%) | \$10B (21%)   |

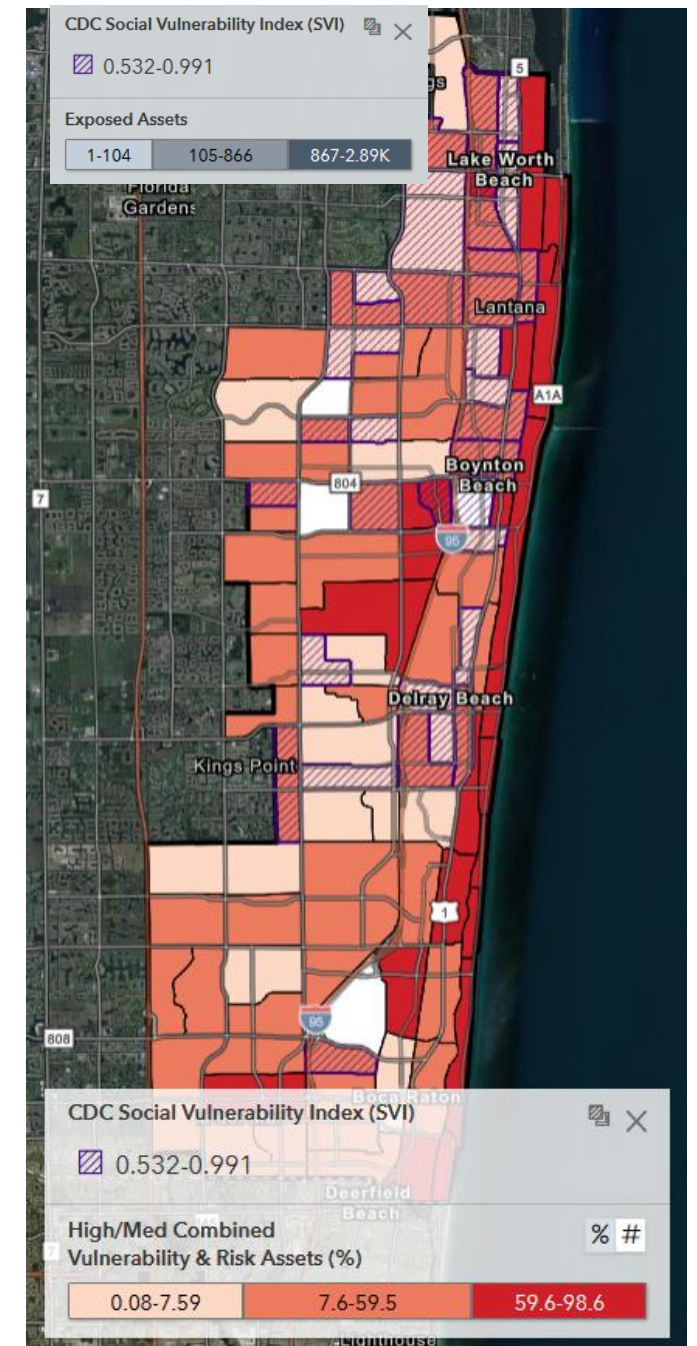




# Rainfall Induced Flooding

Flooding on normally dry land caused by changes in rainfall patterns

- Presents the greatest exposure and highest levels of vulnerability and risk of all flooding threats assessed in this regional study.
- NW areas show a co-occurrence of rainfall-induced flooding and high social vulnerability
- Most W and SW properties are within the 25 to 100-yr inundation extents, many are pre-FIRM or outside regulatory extent
- Along the coast, rainfall induced flooding is compounded by tidal flooding and storm surge
- Roadways and sidewalks are especially vulnerable in the west and southwest areas

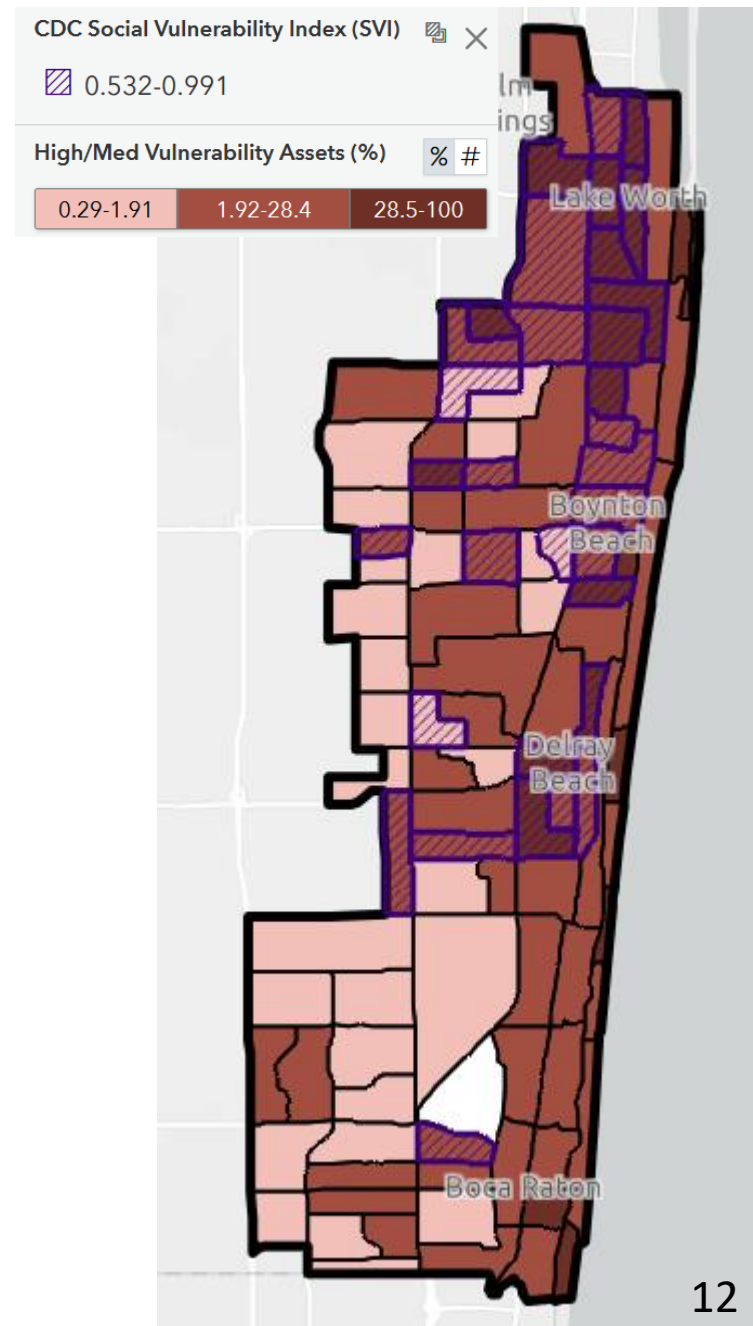




## High Winds

Sustained high winds are typically associated with tropical storms and can destroy infrastructure and assets

- Property-level assessment based on use type and wind-related building design regulations
- Health/Medical & Energy/Communications assets show highest percentages of vulnerability
- Unincorporated County areas have relatively low residential vulnerability compared to other jurisdictions in the region
- Several areas with high residential building vulnerability co-occur with areas of high social vulnerability (e.g., NW)
- 18 of the 22 most vulnerable residential areas are also among the most socially vulnerable





## Extreme Heat

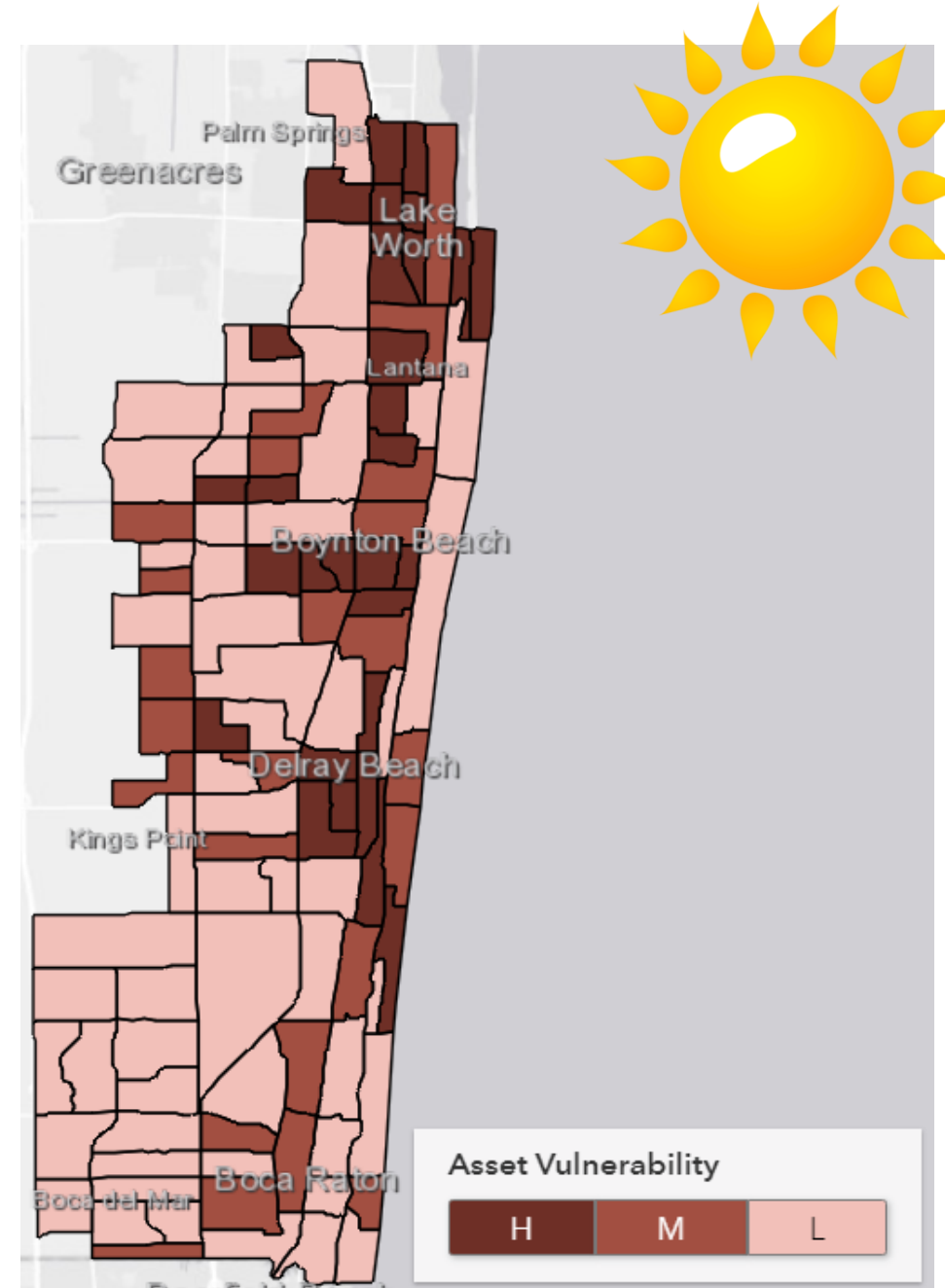
Extreme heat events are periods of excessively hot and/or humid weather that can last multiple days.

### Areas most vulnerable to extreme heat have:

- More than 85% developed land cover
- Less than 6% tree canopy coverage
- High socioeconomic stress
- Sensitive populations

### The most vulnerable areas include:

- 33,900 households with members 65 +
- 18,400 households with members < 18



# Individual Household Options



## ❖ Dry Flood Proofing

Using a permanent structure that can only be applied to the bottom three feet of residential buildings.

## ❖ Wind Proofing

Using resilient construction materials, implementing impact-resistant windows, doors, and roofs, and installing hurricane shutters.

## ❖ Elevating Structure

Raising the entire structure or simply elevating the first floor above flood levels.

## ❖ Green Infrastructure

Using nature-based solutions such as bioswales, rain gardens, native wildlife, or integrating permeable pavement.

## ❖ Seawalls

Building a permanent structure to protect a home from storm surge and prevent erosion.



# Community-Wide Options

Regional Flood Control System

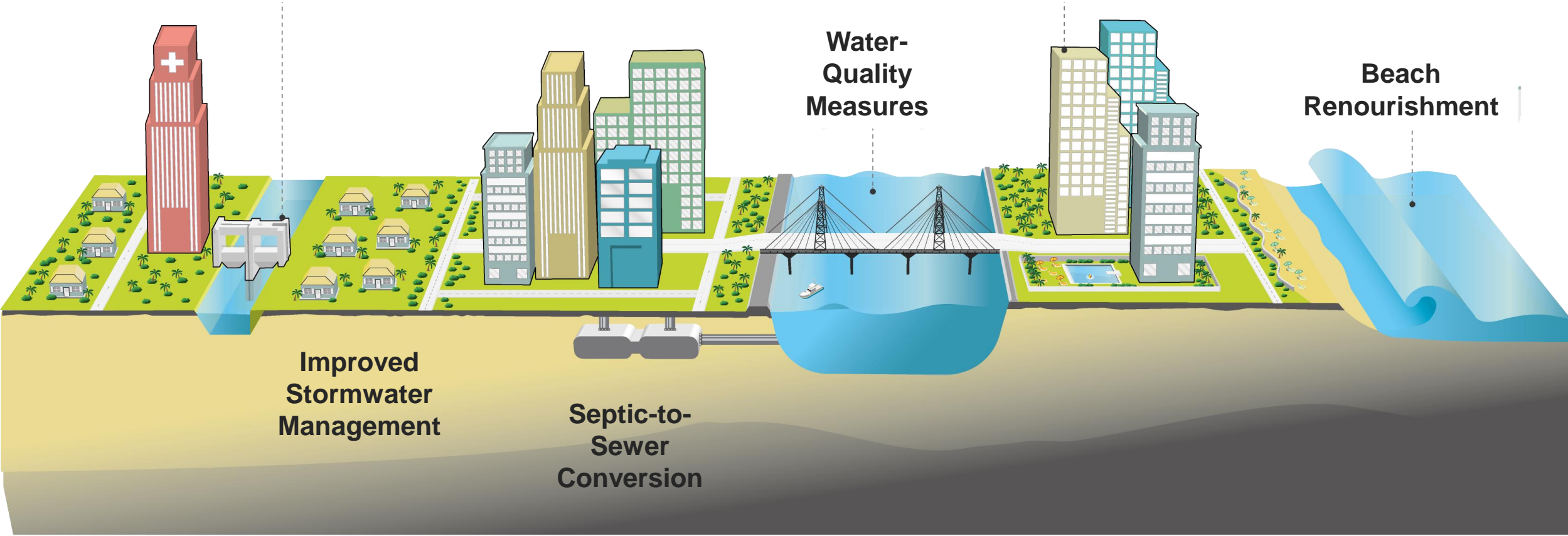
Development Standards

Water-Quality Measures

Beach Renourishment

Improved Stormwater Management

Septic-to-Sewer Conversion



# Adaptation Strategies



Infrastructure



Land Use, Building Codes and Standards



Public Outreach



Planning, Policy and Management



Capacity Building



Funding and Financing





## Highlighted Regional Strategies

1. Collaborate on grant opportunities to fund adaptation.
2. Collaborate on neighborhood resilience hubs to provide support before, during, and after climate disruptions.
3. Pursue watershed, floodplain, and groundwater models that plan for future construction and hydrologic changes.
4. Create green infrastructure / low impact development manual for municipal staff, engineers, and architects.



## Highlighted PBC Strategies

1. Continue to incorporate future conditions into engineering standards as well as in the design and prioritization of County infrastructure.
2. Continue to map watersheds and floodplains, and document the County's water resources and stormwater systems via an engaged and regional modeling effort.
3. Continue to ensure alternate transportation facilities are in place (i.e. trails, separated bike paths) to allow impacted populations a safe path to public service/health facilities.
4. Continue to incorporate green infrastructure in capital improvements through revisions to the land development regulations.
5. Continue to offer climate and resilience information in multiple languages at outreach events to ensure all communities are engaged in an approachable way.

## Next Steps

- PBC will continue to collaborate with the CRP of SE PBC on adaptation strategies, funding solutions, and other opportunities.
- PBC staff will pursue similar CCVA for unincorporated PBC via DEO grant awarded.
- PBC staff will share and promote the CRP model with other local partners and explore similar partnerships.



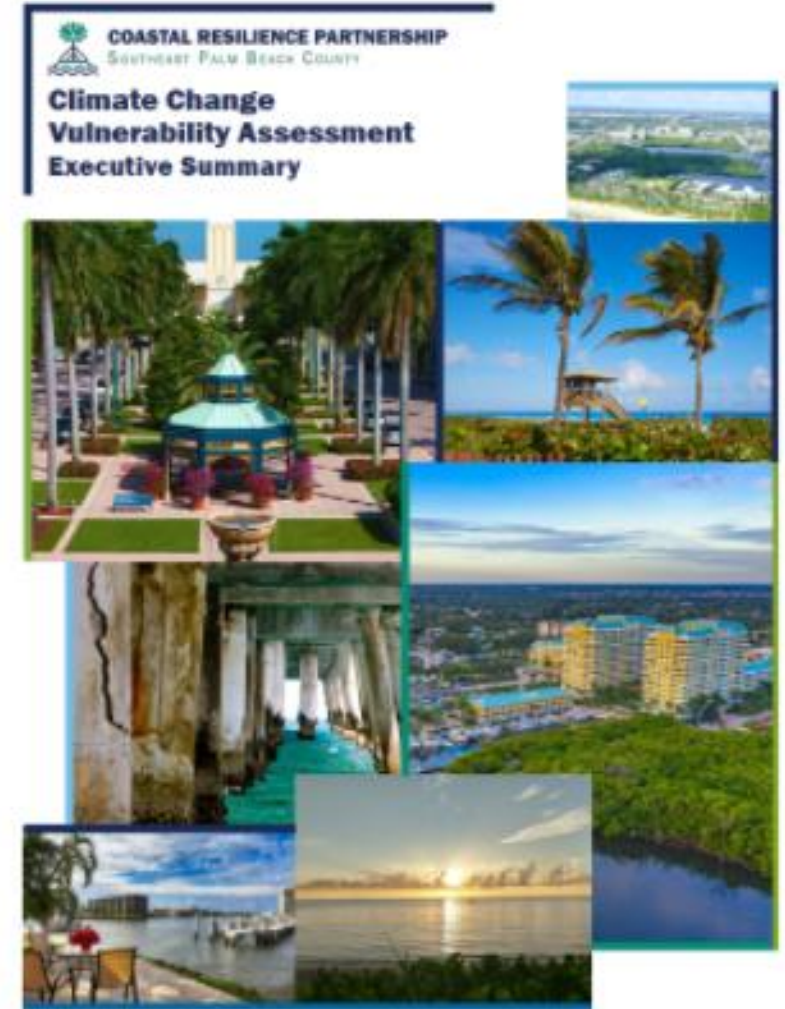
# Office of Resilience

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## Coastal Resilience Partnership



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# **COASTAL RESILIENCE PARTNERSHIP**

## SOUTHEAST PALM BEACH COUNTY

**Thank You**

Megan S. Houston

[mshouston@pbcgov.org](mailto:mshouston@pbcgov.org)

(561) 681-3812