

The Nature  
Conservancy



# Climate Change Adaptation

**Alison Branco, Ph.D., Director of Coastal Programs**

**The Nature Conservancy in New York**

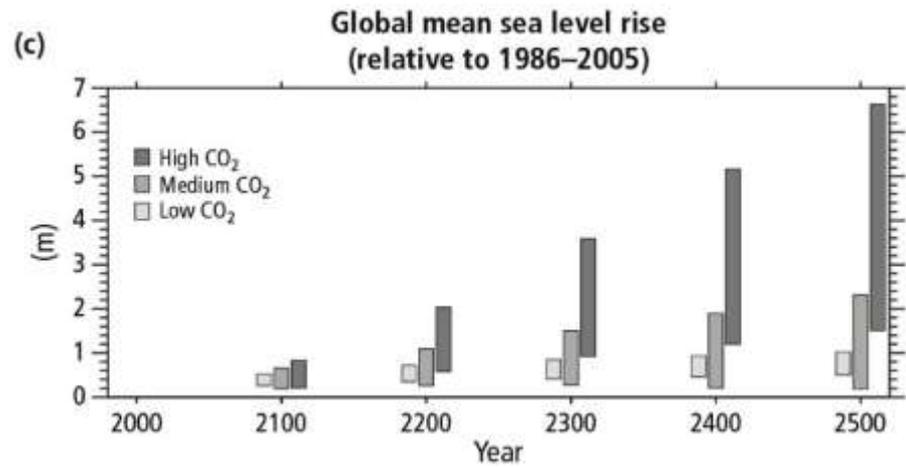
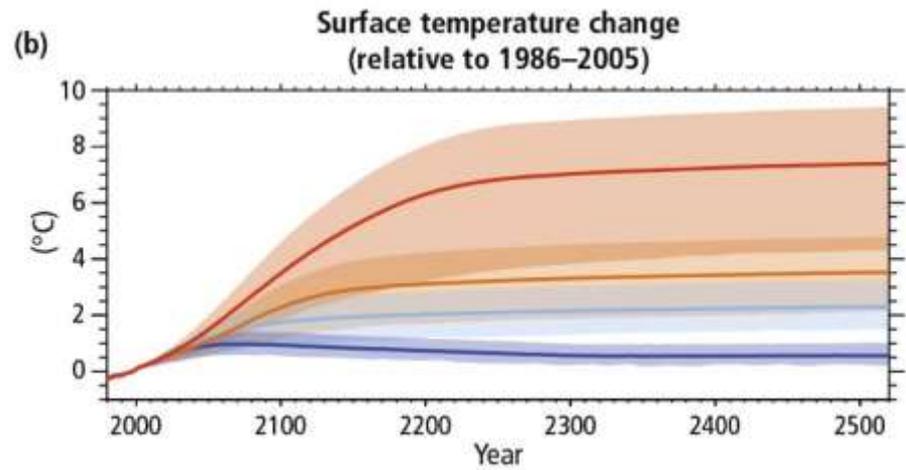
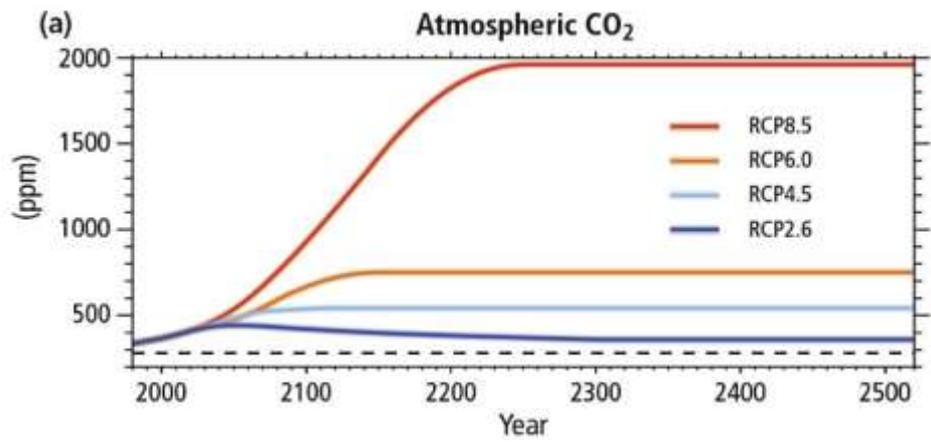


**MITIGATION:** Actions that address the root causes of climate change such as reducing greenhouse gas emissions

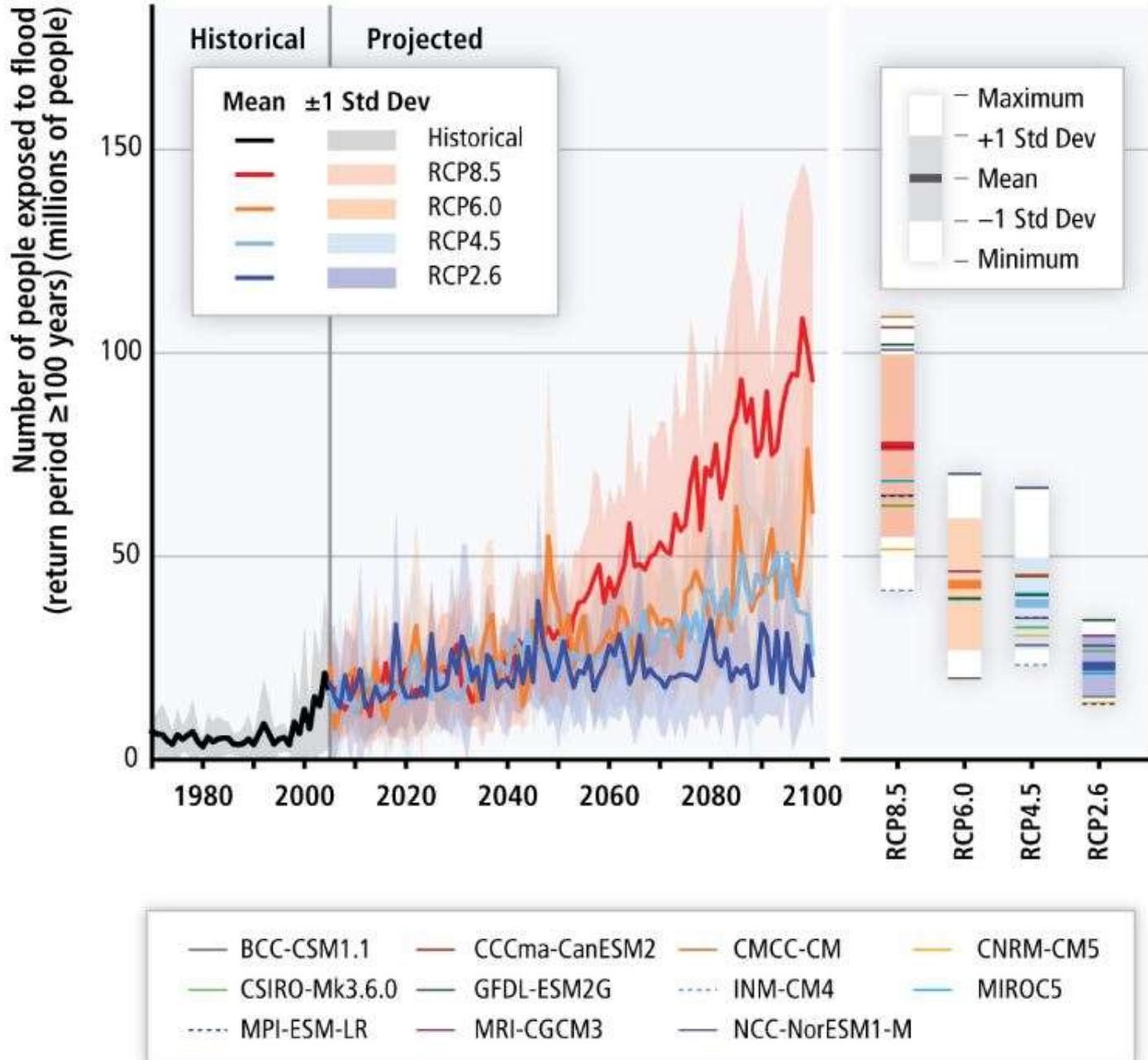
Ex. renewable energy

**ADAPTATION:** Actions that seek to lower the risks posed by the consequences of climatic changes.

Ex. elevate buildings



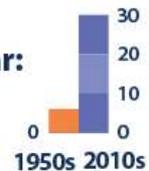
Source: IPCC 2014



## Frequency of Flooding Along U.S. Coasts, 2010–2015 Versus 1950–1959



**Average number of flood days per year:**



Data source: NOAA (National Oceanic and Atmospheric Administration). 2016 update to data originally published in: NOAA. 2014. Sea level rise and nuisance flood frequency changes around the United States. NOAA Technical Report NOS CO-OPS 073. [https://tidesandcurrents.noaa.gov/publications/NOAA\\_Technical\\_Report\\_NOS\\_COOPS\\_073.pdf](https://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_073.pdf).

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

Source: EPA

## NEW YORK CLIMATE RISK REALITY

**THREE TRILLION  
DOLLARS**

of NY Coastal Property at Risk

**Every Single New  
York Citizen**

Lives in a county affected by at  
least one weather disaster  
since 2010



**(b) New York City/Lower Hudson Region**

<b>Time Interval</b>	<b>Low Projection</b>	<b>Low-Medium Projection</b>	<b>Medium Projection</b>	<b>High-Medium Projection</b>	<b>High Projection</b>
2020s	2 inches	4 inches	6 inches	8 inches	10 inches
2050s	8 inches	11 inches	16 inches	21 inches	30 inches
2080s	13 inches	18 inches	29 inches	39 inches	58 inches
2100	15 inches	22 inches	36 inches	50 inches	75 inches

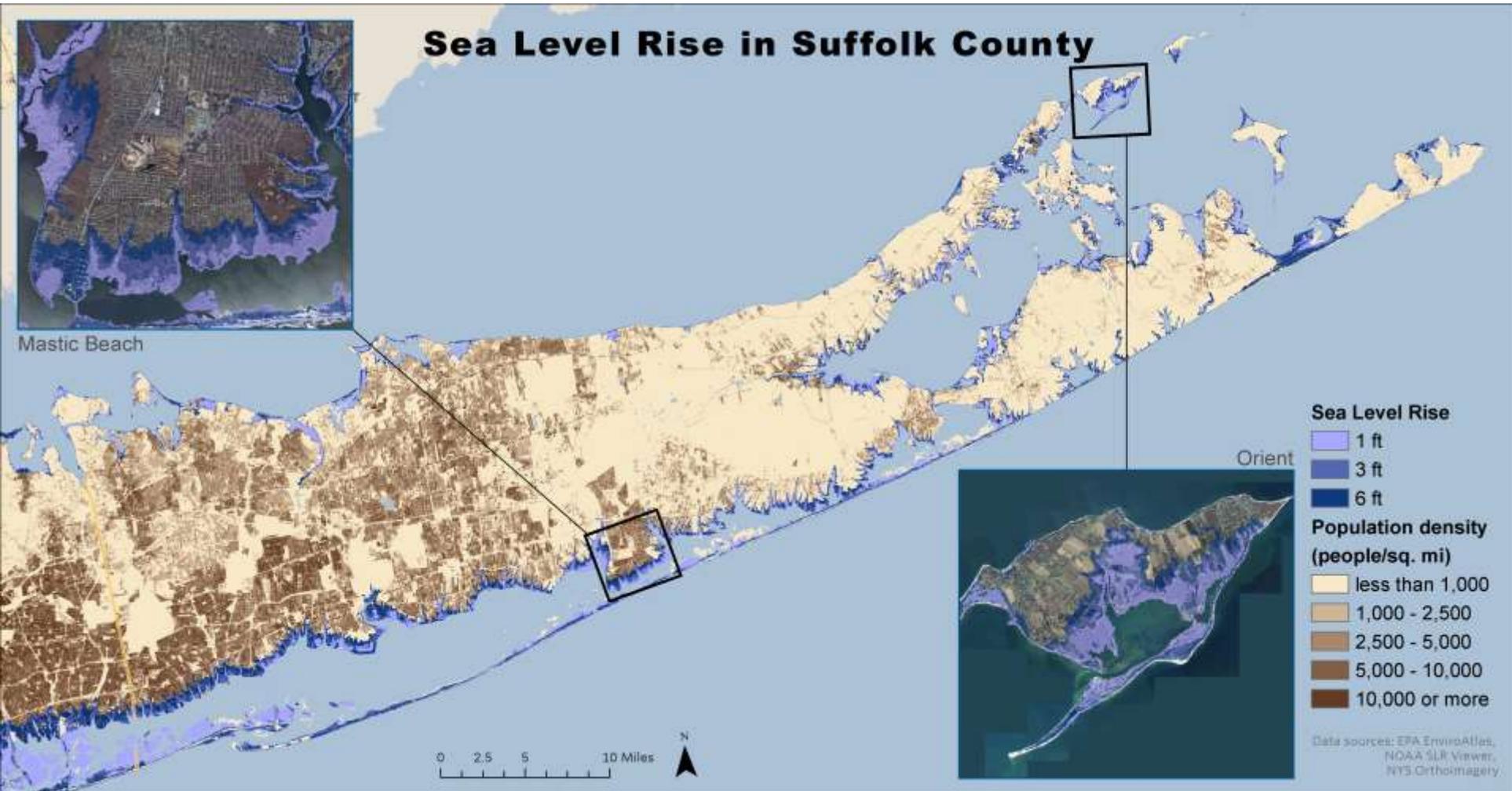
**(c) Long Island Region**

<b>Time Interval</b>	<b>Low Projection</b>	<b>Low-Medium Projection</b>	<b>Medium Projection</b>	<b>High-Medium Projection</b>	<b>High Projection</b>
2020s	2 inches	4 inches	6 inches	8 inches	10 inches
2050s	8 inches	11 inches	16 inches	21 inches	30 inches
2080s	13 inches	18 inches	29 inches	39 inches	58 inches
2100	15 inches	21 inches	34 inches	47 inches	72 inches

**6 NYCRR Part 490, Projected Sea-level Rise**

Inches of rise relative to 2000-2004 baseline

# coastalresilience.org



# Union of Concerned Scientists

## Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate (2018)

US Coastal Property at Risk from Rising Seas

By the Union of Concerned Scientists

Introduction | By State | By Community | By ZIP Code | Homes in the Balance | Challenges and Choices | About this Analysis

### Town by town

**In 2045**  
Homes | Value | Population | Tax Base

**In 2100**  
Homes | Value | Population | Tax Base

This scenario assumes a high rate of sea level rise caused by a continued rise in global carbon emissions and an increasing loss of land ice. In this scenario, global average sea level is projected to rise about 2 feet by 2045 and about 6.5 feet by 2100.

Note that these projections do not include future development or new homes; they capture only today's homes and current property values.

### With a moderate rate of sea level rise

With a more moderate rate of sea level rise, nearly 140,000 homes are still at risk of chronic inundation by 2035 and more than 1.2 million by 2100.

**In 2035**  
Homes | Value | Population | Tax Base

#### Homes at risk in Brookhaven, NY

By 2100, **6,657** of today's homes are at risk of becoming chronically inundated in Brookhaven. This represents **5%** of the community's homes.

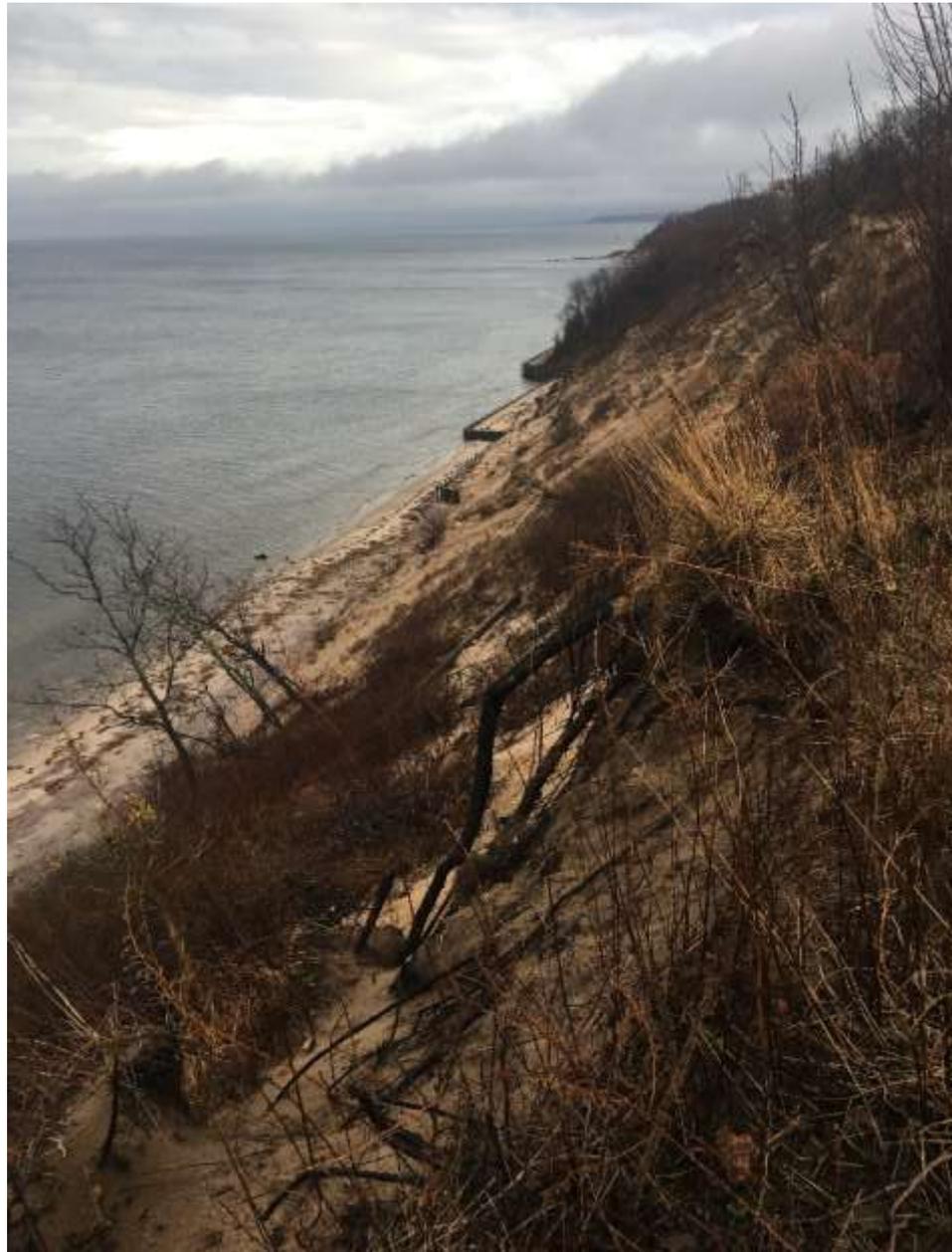
Today those homes are worth a collective **\$1,895,083,533**, house an estimated **17,907 people**, and contribute **\$36,763,459** to the local property tax base.

LEGEND

Current population living in homes at risk in 2100 (high sea level rise scenario)

- 50,001 to 335,000
- 25,001 to 50,000
- 10,001 to 25,000
- 1,001 to 10,000
- 1 to 1,000

Esri, HERE, Garmin, NGA, USGS, NPS



Eastern Site  
*Stabilizing began in 2016*

10/07/2017



03/04/2018

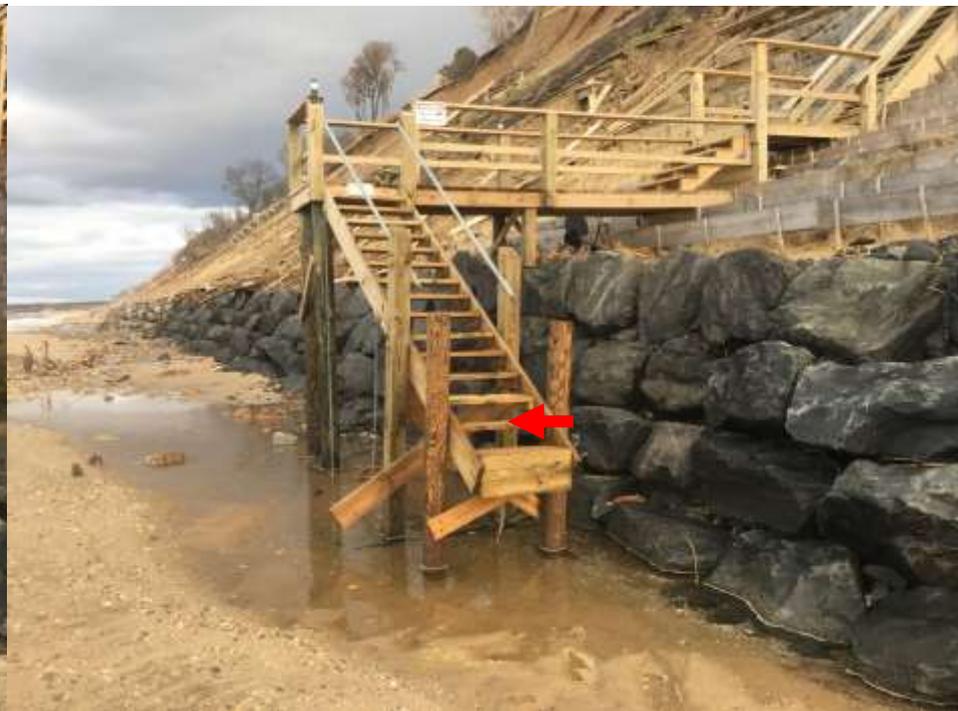




Photo: Matthew Grasso, TNC



**ALL OVER THE WORLD  
NATURAL INFRASTRUCTURE PROTECTS  
PEOPLE, COMMUNITIES AND  
ECONOMIES**

**FROM STORMS AND FLOODS**



Image: Delaware Center for the Inland Bays

## Marsh Migration Info

Mastic Peninsula example:

Current tidal marsh & marsh migration potential

- Village of Mastic Beach
- Current Tidal Marsh Extent (2012)
- Future SLAMM projection (RIM MIN - 2085)**
- Flooded Developed Dry Land
- Tidal Marsh

Long Island Wide:	Suffolk	Nassau	Long Island	
2005/2008 Marsh Extent (Vegetated)	12,896	7,336	20,232	acres
Marsh Gain Potential (2085)	4,379	1,316	5,695	
Marsh Loss Potential (2085)	2,795	659	3,454	



A coastal landscape featuring a sandy beach in the foreground, a body of water in the middle ground, and a line of reeds or marsh grasses. The sky is overcast with grey clouds. The text 'Nature & Nature-Based Solutions' is overlaid in large white font on the left side of the image.

# **Nature & Nature-Based Solutions**

## WHY NATURE-BASED SOLUTIONS?

Smart nature-based solutions give communities high returns on their investments in flood risk reduction strategies. They provide:



Healthier  
Environments



Improved  
Social Ties

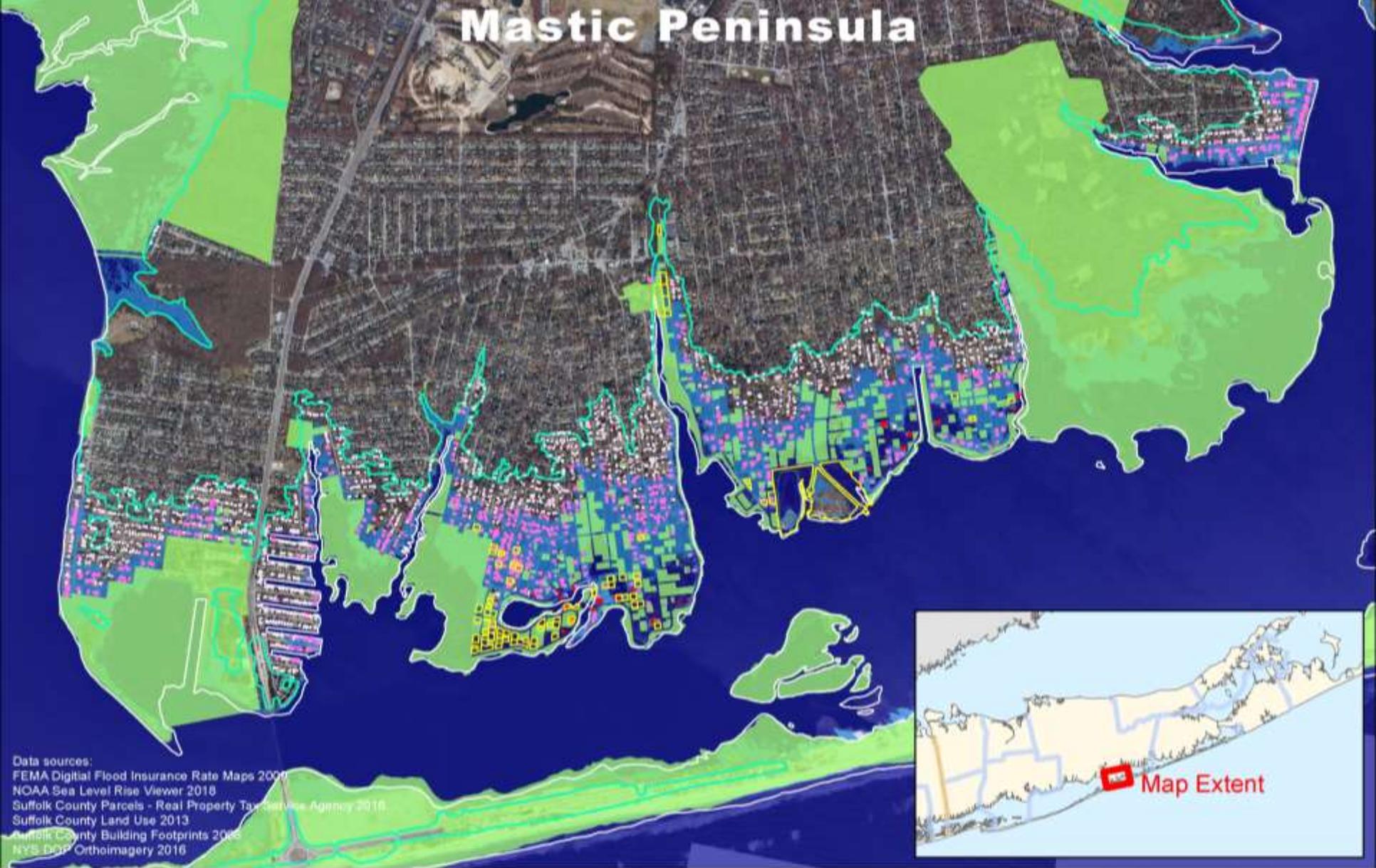


Healthier  
Communities



Stronger  
Economies

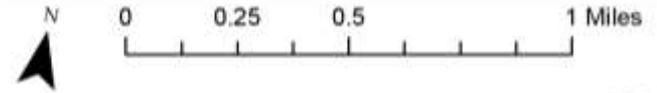
# Mastic Peninsula



Data sources:  
FEMA Digital Flood Insurance Rate Maps 2009  
NOAA Sea Level Rise Viewer 2018  
Suffolk County Parcels - Real Property Tax Service Agency 2016  
Suffolk County Land Use 2013  
Suffolk County Building Footprints 2009  
NYS DDP Orthoimagery 2016

- 100 yr floodplain extent
- Sea Level Rise**
- 1 ft
- 3 ft
- Protected open space/vacant lands in 100 yr floodplain

- Buy out parcels (NRCS, NY Rising)
- Buildings in flood prone areas**
- Within 1 foot sea level rise
- Within 3 foot sea level rise
- Within 100 yr floodplain





[www.coastalresilience.org](http://www.coastalresilience.org)

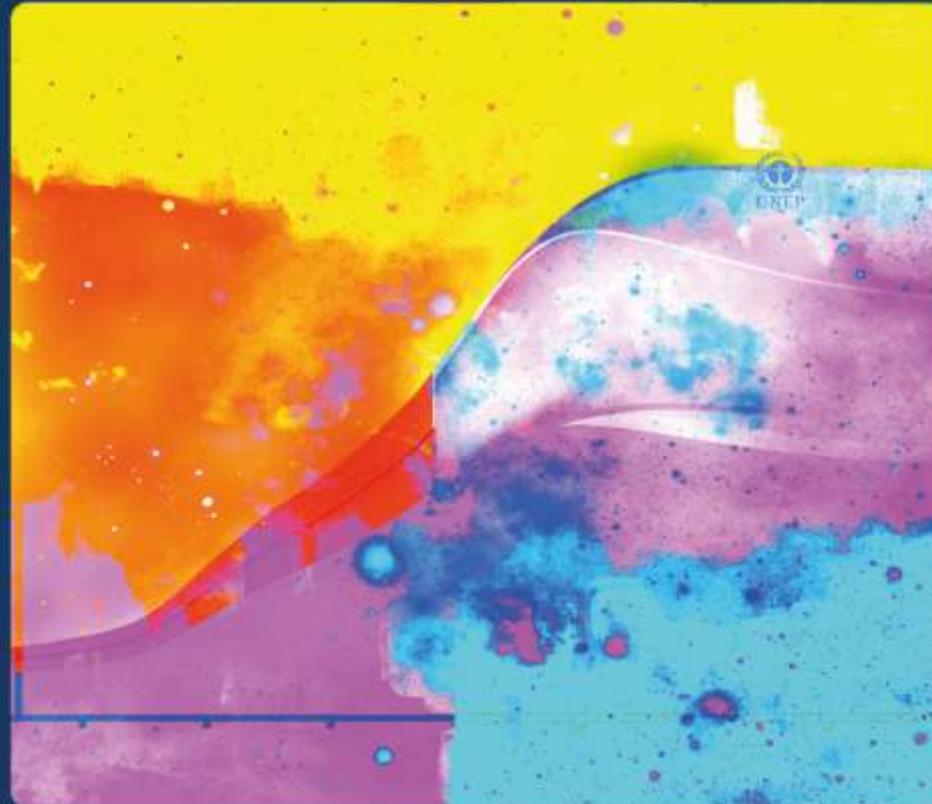
Or contact:

**Alison Branco, Director of Coastal Programs**

[alison.branco@tnc.org](mailto:alison.branco@tnc.org)

# Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.



A New Climate Tipping Point - 1 x +

https://www.nytimes.com/2018/10/19/podcasts/the-daily/climate-change-un-report-carbon-tax.html

Apps Bookmarks Zoom for TNC CONNECT Detek PeopleSoft Workspace Box Conour Nature Conservancy Coastal Resilience Naturally Resilient C Other bookmarks

THE DAILY

The New York Times

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Oct. 19, 2018

# A New Climate Tipping Point

A landmark United Nations report says that we're likely to witness some of the most devastating effects of global warming within our lifetimes. We talk to one man with a solution.

Hosted by Michael Barbaro, produced by Alexandra Leigh Young, Michael Simon Johnson and Clare Fowlkesarter, and edited by Lisa Tobin

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The Migrant Caravan and the Midterms
- October 23, 2018 - 27:23  
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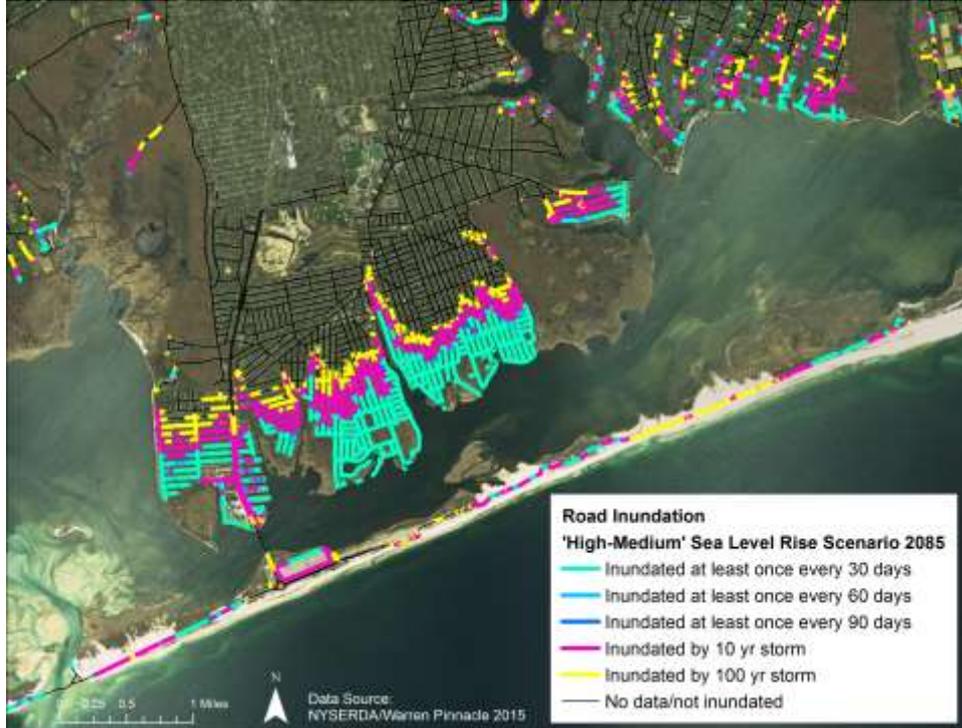
SET MY OPTIONS >

<https://www.nytimes.com/2018/10/19/podcasts/the-daily/climate-change-un-report-carbon-tax.html>

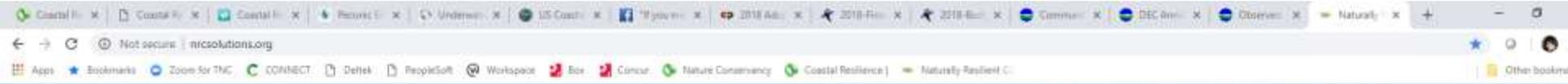
# Vulnerability of Roadways

Mastic Peninsula

Orient Point



# NRCsolutions.org



## USING NATURE TO ADDRESS FLOODING

We've created this guide of nature-based solutions and included case studies of successful projects from across the country to help communities learn more and identify which nature-based solutions might work for them.



## WHAT ARE NATURE-BASED SOLUTIONS?

Nature offers a powerful set of tools for addressing hazards like flooding and erosion. Nature-based solutions use natural systems, mimic natural processes, or work in tandem with traditional approaches to address these specific hazards. Communities across the country—along rivers or coasts, large or small, rural or urban— can incorporate



**HELP ME CHOOSE**

**Hazard Types**

- Coastal Erosion
- Tidal Flooding
- Coastal Flooding
- Riverine Erosion
- Riverine Flooding
- Stormwater Flooding

**Region**

- Coastal West
- Great Lakes
- Gulf of Mexico
- Mid-Atlantic
- Midwest
- Northeast
- Pacific Northwest
- Rocky Mountain West
- Southeast
- Southwest

**Community Type**

- Rural
- Suburban
- Urban

**Scale**

- Community
- Metropolitan

**SOLUTIONS**  
9 Results

**CASE STUDIES**  
0 Results



**Coastal Marshes**

Coastal wetlands occur along marine, estuarine, and freshwater coastlines and may be...



**Beaches and Dunes**

Beaches and dunes occur in a variety of shapes, sizes, compositions, and...



**Restoring Offshore Features**

Restoration is the process of establishing or reestablishing a habitat that closely...



**Restoring Coastal Features**

Natural coastlines have evolved to absorb wave energy and provide a buffer...



**Regulatory and Policy Approaches to Address Hazards**

Flooding is a natural process that, in the absence of human settlements...



**Planning Approaches to Reduce Natural Hazards**

Flooding is a natural process that, in the absence of human settlements...

NatureWORK: x Tools & Assets: x Kleinschmidt: x Open Space P: x

Home Funding Resources **Explore Solutions & Case Studies**



# Open Space Preservation through Land Acquisition

Land acquisition of undeveloped land to lessen or prevent the impacts of flooding on a community strategy requires the following steps: (1) identification or mapping of available open space and (2) acquisition of property.

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RELATED CASE STUDIES

File Name of this Book: x FRC\_Solutions\_Land\_Ac...  
October\_2016\_Land\_Acquisition.pdf

Naturally **RESILIENT** Communities

**Solution:**  
**OPEN SPACE PRESERVATION THROUGH LAND ACQUISITION**

**Description of Solution**  
This strategy focuses on the public acquisition of undeveloped land to lessen or prevent the impacts of flooding on a community's assets. In general, the strategy requires the following steps: (1) identification or mapping of available open space, (2) prioritization of parcels, and (3) acquisition of property.

Acquisition of land can take a number of forms. Municipalities may purchase land from willing sellers outright, and there are many communities that have dedicated funds to land preservation. Donation of private land to a land trust, which is then transferred to public ownership, is another common method of land acquisition for municipalities. However, it may occur, land acquisition strategies can be challenging in areas experiencing high development pressure. For municipalities experiencing growth, the cost of the outright purchase of land may be out of reach, especially along the coast.

Land acquisition as a flood management strategy is most effective on a large scale, though targeted acquisition of flood-prone parcels or areas that are likely to flood in the near future can effectively mitigate some flood impacts. This strategy tends to be most suitable for ex-urban, suburban, or rural locations vulnerable to flooding with large amounts of open space. The practice may be more difficult for urban areas with developed waterfronts that may have less habitat and natural coastal features. However, some large cities have had success reclaiming and rewilding former landfills and wetlands.

Acquisition of open space serves the dual role of explicitly protecting valuable habitat and coastal features, and implicitly removing vulnerable land from the development market. Coastal floodplains tend to be places of extraordinarily rich ecological diversity. Where flooding is an integral part of existing natural systems, and where coastal features offer natural protection against flooding, the value of an undeveloped floodplain is clear.

**Siting Considerations**  
Protecting a community from flooding through open space preservation is often a large-scale proposition. At smaller scales, the benefits afforded by preserved or restored coastal features, wetlands, and other natural floodplain functions are far more limited. Additionally, any habitat preserved as part of this strategy is likely to require a sustainable functioning ecosystem that may be difficult or impossible to replicate.



**Hazards Addressed**  
Riverine Flooding  
Coastal Flooding  
Tidal Flooding

**Regional Considerations**  
Northwest  
Mid-Atlantic  
Southeast  
Gulf of Mexico  
Midwest  
Great Lakes  
Southwest  
Rocky Mountain West  
Central West  
Pacific Northwest

**Cost**  
\$-\$

**Community Types**  
Urban