

Comments on Coastal Resiliency

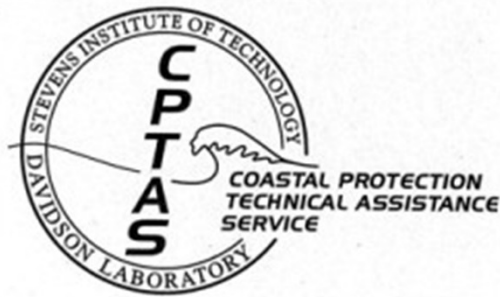
Jon K. Miller, Ph.D.

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Research Assistant Professor of Coastal Engineering*



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Marine Board Spring Meeting, Washington D.C. – April 8, 2014

Other hats...



- Assistant Director New Jersey Coastal Protection Technical Assistance Service

- New Jersey Sea Grant Coastal Processes Specialist



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What are the risks?

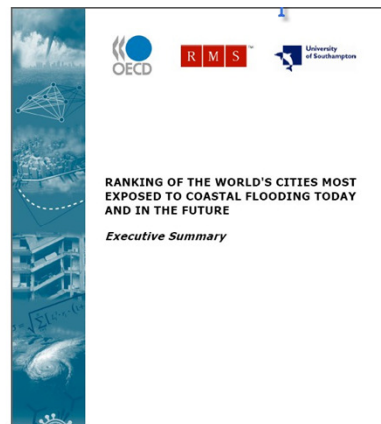
- Storms



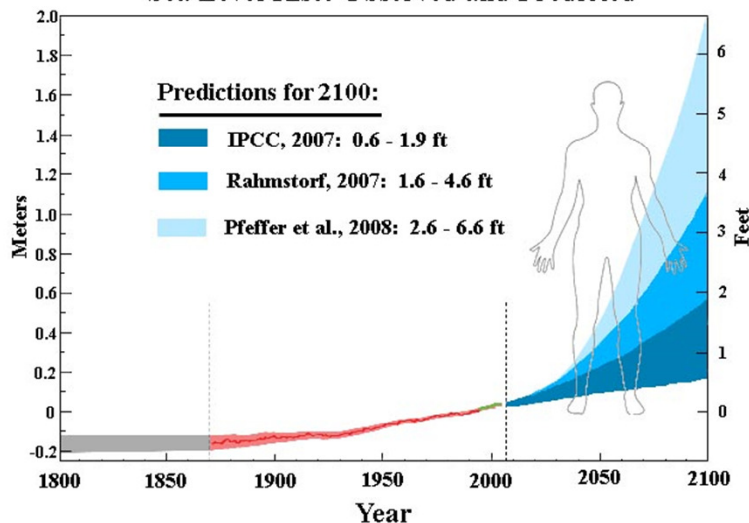
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What are the risks?

- Sea Level Rise



Sea Level Rise: Observed and Predicted



Rank	Country	Urban Agglomeration	Exposed Population Current	Exposed Population Future
1	INDIA	Kolkata (Calcutta)	1,929,000	14,014,000
2	INDIA	Mumbai (Bombay)	2,787,000	11,418,000
3	BANGLADESH	Dhaka	844,000	11,135,000
4	CHINA	Guangzhou	2,718,000	10,333,000
5	VIETNAM	Ho Chi Minh City	1,931,000	9,216,000
6	CHINA	Shanghai	2,353,000	5,451,000
7			907,000	5,138,000
8			510,000	4,965,000
9			2,003,000	4,795,000
10			794,000	4,711,000
11			1,330,000	4,375,000
12			956,000	3,790,000
13			441,000	3,641,000
14			299,000	3,305,000
15	NIGERIA	Lagos	357,000	3,229,000
16	CÔTE D'IVOIRE	Abidjan	519,000	3,110,000
17	USA	New York-Newark	1,540,000	2,931,000
18	BANGLADESH	Chittagong	255,000	2,866,000
19	JAPAN	Tokyo	1,110,000	2,521,000
20	INDONESIA	Jakarta	513,000	2,248,000

Table 1: Top 20 cities ranked in terms of population exposed to coastal flooding in the 2070s (including both climate change and socioeconomic change) and showing present-day exposure (Source: Nicholls et al (2007), OECD, Paris)

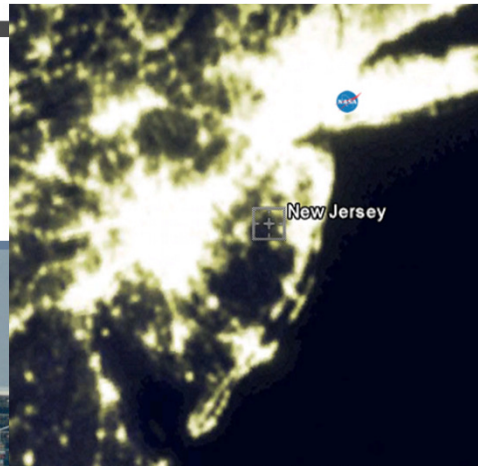
Rank	Country	Urban Agglomeration	Exposed Assets Current (\$Billion)	Exposed Assets Future (\$Billion)
1	USA	Miami	416.29	3,513.04
2	CHINA	Guangzhou	84.17	3,357.72
3	USA	New York-Newark	320.20	2,147.35
4	INDIA	Kolkata (Calcutta)	31.99	1,961.44
5	CHINA	Shanghai	72.86	1,771.17
6	INDIA	Mumbai	46.20	1,598.05
7			29.62	1,231.48
8			174.29	1,207.07
9			35.94	1,163.89
10			38.72	1,117.54
11			9.26	1,073.93
12			233.69	1,013.45
13			215.62	968.96
14			128.33	843.70
15	NETHERLANDS	Rotterdam	114.89	825.68
16	VIETNAM	Ho Chi Minh City	26.86	652.82
17	JAPAN	Nagoya	109.22	623.42
18	CHINA	Qingdao	2.72	601.59
19	USA	Virginia Beach	84.64	581.69
20	EGYPT	Alexandria	28.46	563.28

Table 2: Top 20 cities ranked in terms of assets exposed to coastal flooding in the 2070s (including both climate change and socioeconomic change) and showing present-day exposure (Source: Nicholls et al (2007), OECD, Paris)

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What are the risks?

- Us?



Population Trends Along the
Coastal United States: 1980-2008

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

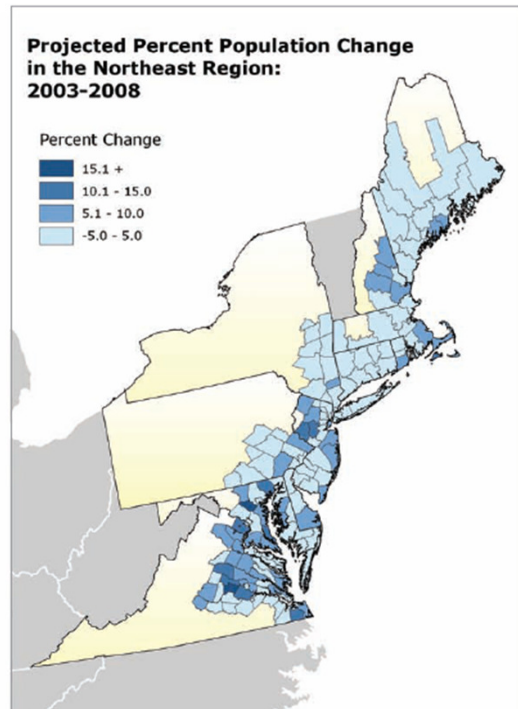


FIGURE 11. Projected percent population change in the Northeast Region: 2003-2008

Source: U.S. Census Bureau and W&PE, Inc.

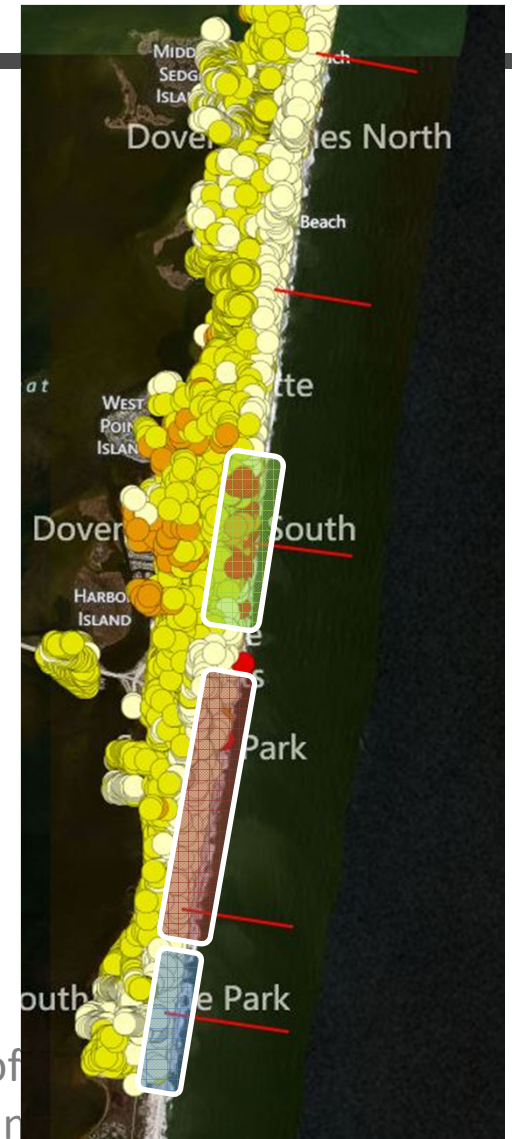
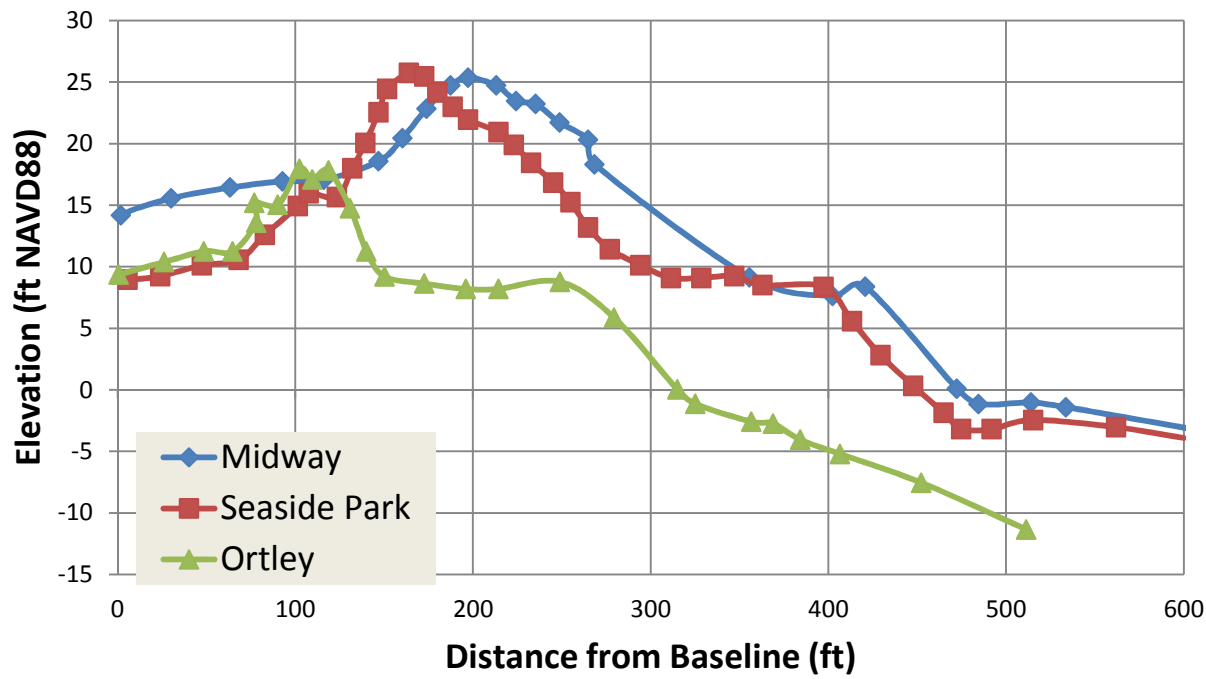
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Risk Reduction Strategies

- Stop the water...

Comparison of Pre-Sandy Beach Profiles
(Data from Stockton CRC)

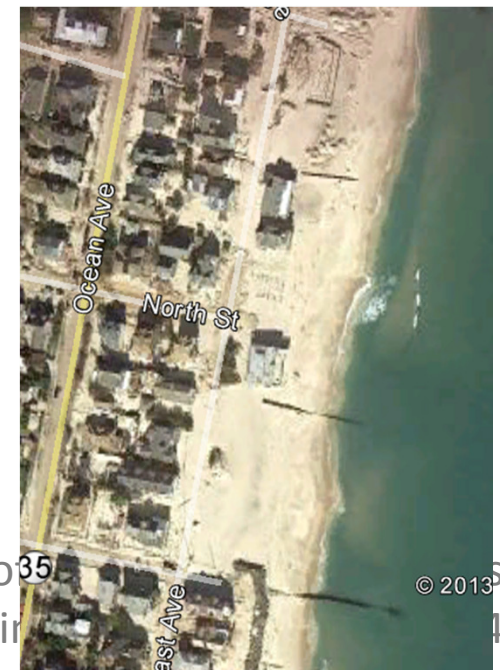


Risk Reduction Strategies

- Stop the water...



Deployed RSA Flood Wall System – protecting Hoboken from Hurricane surge flooding



Risk Reduction Strategies

- Stop the water



Graphic courtesy Burke Environmental Associates

**Riparian
Vegetation
Management
Bank Grading
Fiber Logs**

**Tidal Marsh
Enhancement
Tidal Marsh Creation
Beach Nourishment &
Dune Restoration
Marsh Toe Revetment
Marsh Sill
Marsh with Groins**

**Living Breakwater
Offshore Breakwater System
Oyster Reefs**

Risk Reduction Strategies

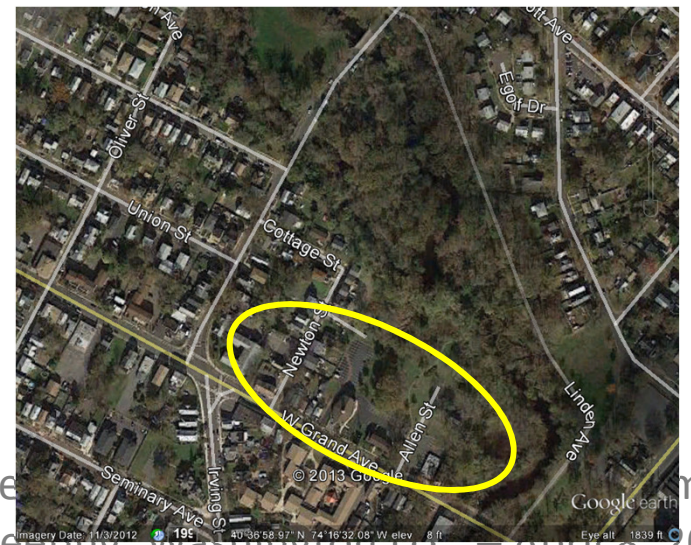
- Deal with the water...



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Risk Reduction Strategies

- Move...



Challenges

- Money
 - Funding mechanisms
- Cross-agency politics
 - FEMA/Corps
- Interagency politics
 - Fill
- Home rule
- Urban coasts (non-traditional structures)



Decision Support Tools

Sea Level Rise and Coastal Flooding Impacts Viewer

Contributing Partners: [NOAA Coastal Services Center](#)

Overview

In Action

Support

Get It Now

Being able to visualize potential impacts from sea level rise is a powerful teaching and planning tool, and the Sea Level Rise Viewer brings this capability to coastal communities. A slider bar is used to show how various levels of sea level rise will impact coastal communities. Additional coastal counties will be added in the near future. Maps are not available for Alaska due to elevation data accuracy and vertical datum transformation gaps.

Features

- Displays potential future sea levels
- Provides simulations of sea level rise at local landmarks
- Communicates the spatial uncertainty of mapped sea levels
- Models potential marsh migration due to sea level rise
- Overlays social and economic data onto potential sea level rise
- Examines how tidal flooding will become more frequent with sea level rise



Acknowledgements

The NOAA Coastal Services Center would like to acknowledge those organizations that provided direct content used in this tool or feedback, ideas, and reviews over the course of the tool's development. Specifically the Center would like to acknowledge the [following groups](#)

Displaying 53 Results

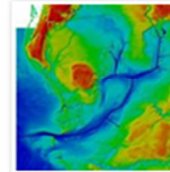


United States Interagency Elevation Inventory



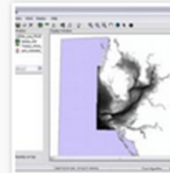
[NOAA Coastal Services Center, U.S. Geological Survey](#)
Enables users to locate and learn about the best available elevation data sets for their area

VDatum



[NOAA Center for Operational Oceanographic Products and Services, NOAA Office of Coast Survey](#)
Converts datums associated with elevation data to a common system reference

Wave Exposure Model



[NOAA Center for Coastal Fisheries and Habitat Research](#)
Estimates wave energy and its effects on ecosystem function (extension to ArcGIS)

Weather and Hazards Data Viewer



[NOAA National Weather Service](#)
Provides access to weather forecasts and hazards planning data in an Internet mapping tool for monitoring storms and fire weather

Displaying 53 Results

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What can NOAA do better to support local/regional resilience

- Training
 - Local/regional capacity building
 - Sea Grant

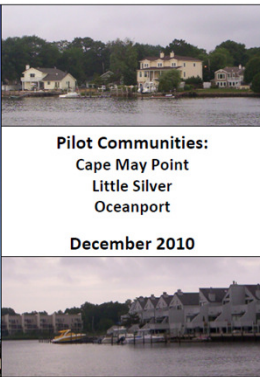


New Jersey Coastal Community Resilience Demonstration Project



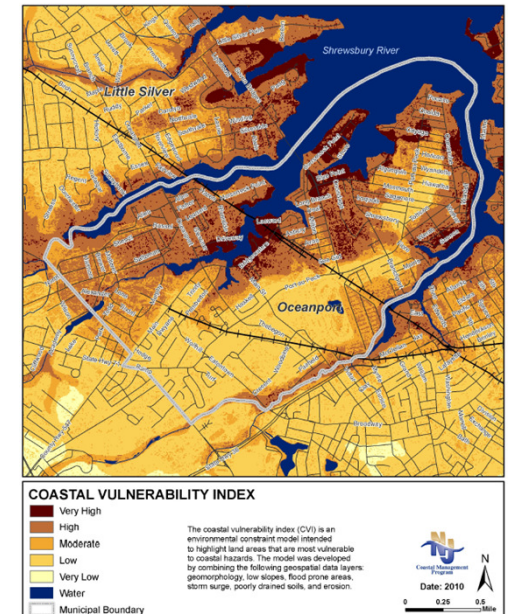
Pilot Communities:
Cape May Point
Little Silver
Oceanport

December 2010



RISK AND VULNERABILITY ASSESSMENTS		Yes	No	Other	N/A
1.1	Are previous coastal hazards and disasters identified and mapped through historical information, existing plans and reports, scientific knowledge, and local knowledge?				
1.2	Are hazard probability, frequency, magnitude, and duration defined?				
1.3	Is coastal erosion and/or shoreline change identified as a hazard?				
1.4	Is sea level rise identified as a hazard?				
1.5	Are historic rates of sea level defined?				
1.6	Are conditions identified that could amplify the impact of a hazard, like storm surge inundation at a high tide or erosion rates on stabilized shorelines?				
1.7	Are maps used to define the spatial extent of coastal hazards?				
	Flooding, e.g. Flood Insurance Rate Maps				
	Storm Surge: Sea, Lake and Overland Surges from Hurricanes (SLOSH)				
	Erosion, e.g. Shoreline Change Analysis				
	Cumulative Risk Assessments, e.g. Risk and Vulnerability Assessment				
	Sea Level Rise Inundation Maps				
	Other:				

Map 21: Coastal Vulnerability Index, Oceanport



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Communicating with planners/decision makers

- Talk with them, not at them
- Walk a yard in their shoes
- Don't be afraid of them, they won't bite

10' NAVD 88 → 8.8' MSL →



Board of the
Washington

Building a Better Future

- Consistency
- Adaptability
- Redundancy
- Working with nature
- Prioritization



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