

A satellite-style map of Florida and the surrounding Gulf of Mexico. The land is shown in shades of green and brown, while the water is a deep blue. The title text is overlaid on the map.

Addressing Coastal Vulnerabilities and Mitigating Losses

July 19, 2016



Metropolitan
Center

Webinar Outline

- Introduction to Research
- Mabel A. Rodriguez
 - State and Local Resiliency Efforts
 - Public Officials Survey Results
- Matt Walker
 - Public Sector Response Typology
 - Innovation Competitions
- Dr. Maria Ilcheva
 - Residential Survey Results

Research Focus



Source: Geology.com

Top Florida Zip Codes At Risk From SLR, < 3 ft.

Variable	State Total Below 3 ft	Top Five Zip Codes Affected	% of Total < 3ft	Top Zip Codes (Most to Least Affected)
Land (acres)	1,357,195	280,737	21%	34141 (Ochopee), 33034 (Homestead), 32465 (Wewahitchka), 34114 (South Naples), 32328 (Eastpoint)
Population	489,925	75,383	15%	33139 (Miami Beach), 33141 (Ochopee), 33040 (Key West), 33027 (Pembroke Pines), 33160 (North Miami Beach)
Property Value (\$ Billions)	145	20.8	14%	33139 (Miami Beach), 33480 (Palm Beach), 33040 (Key West), 33140 (Miami Beach), 33050 (Marathon)
Housing Units	300,041	46,911	16%	33139 (Miami Beach), 33141 (Ochopee), 33040 (Key West), 33140 (Miami Beach), 33009 (Hallandale Beach)
Road Miles	2,555	305	12%	33040 (Key West), 33042 (Hollywood), 33043 (Big Pine Key), 33050 (Marathon), 34448 (Homosassa)
EPA-listed sites	978	140	14%	33040 (Key West), 33139 (Miami Beach), 33004 (Dania Beach), 32084 (St. Augustine), 33050 (Marathon)

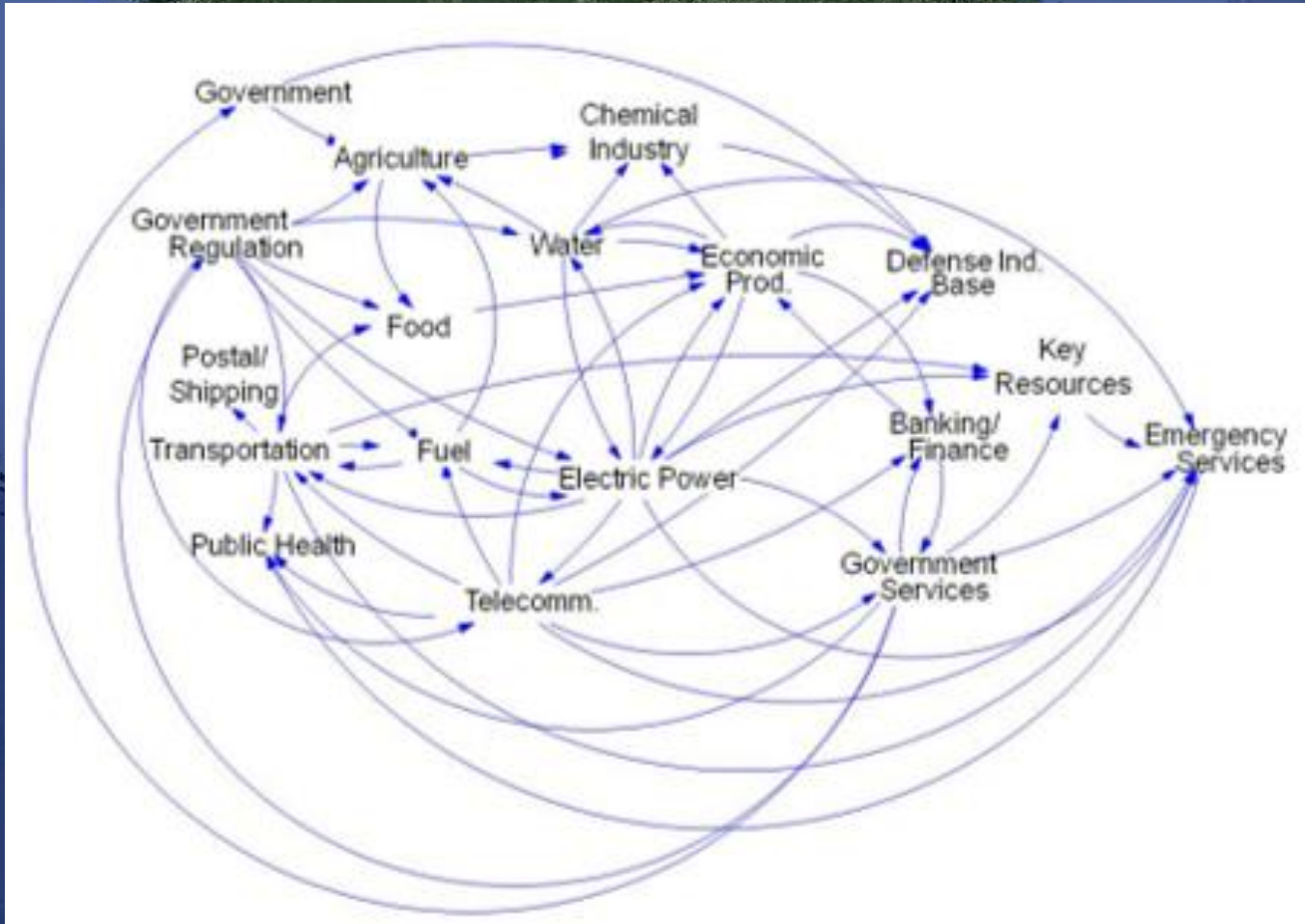
Source: Strauss, 2014. Florida and the Surging Sea: A Vulnerability Assessment with Projections for Sea Level Rise and Coastal Flood Risk

Top Florida Zip Codes At Risk From SLR, < 6 ft.

Variable	State Total Below 6 ft	Top Five Zip Codes Affected	% of Total < 6ft	Top Zip Codes (Most to Least Affected)
Land (acres)	2,983,907	492,583	17%	34141 (Ochopee), 33034 (Homestead), 33194 (Everglades National Park), 32465 (Wewahitchka), 34114 (South Naples)
Population	2,655,967	211,241	8%	33012 (Hialeah), 33025 (Miramar), 33024 (Hollywood), 33027 (Pembroke Pines), 33139 (Miami Beach)
Property Value (\$ Billions)	544	51.4	9%	33139 (Miami Beach), 33480 (Palm Beach), 34145 (Marco Island), 33040 (Key West), 33140 (Miami Beach)
Housing Units	1,444,827	113,494	8%	33139 (Miami Beach), 33160 (North Miami Beach), 33009 (Hallandale Beach), 33141 (Ochopee), 33012 (Hialeah)
Road Miles	16,022	955	6%	33981 (Port Charlotte), 33914 (Cape Coral), 33950 (Punta Gorda), 33024 (Hollywood), 33993 (Cape Coral)
EPA-listed sites	5,509	565	10%	33166 (Miami Springs), 33311 (Fort Lauderdale), 33178 (Miami), 33142 (Doral), 33138 (Miami Shores)

Source: Strauss, 2014. Florida and the Surging Sea: A Vulnerability Assessment with Projections for Sea Level Rise and Coastal Flood Risk

Infrastructure Interdependencies



Source: Wilbanks, 2012. Climate Change and Infrastructure, Urban Systems, and Vulnerabilities

State Efforts – Land Use Policy & Regulatory Measures

- In 2011, the Florida legislature added to Chapter 163 the term “Adaptation Action Area” and authorized local governments to enact code provisions within their comprehensive plans.
- In 2015, the Florida Senate passed SB 1094, which is the first time that state law has required local governments to take into account future forms of flooding, including flooding from sea-level rise, when doing development, redevelopment and engineering plans in coastal areas.
- In 2016, the Board of Directors of The Florida Association of the American Institute of Architects (AIA Florida) unanimously adopted a new position advocating building and community design based on inevitable sea-level rise. As a general guideline, they recommend that building designs, codes, and infrastructure accommodate three feet of sea level rise for projects in all low-lying areas, even those farther inland and up tidal rivers.

Local Efforts – Mitigation & Adaptation Measures

Examples of measures that have been implemented in cities across Florida include:

- Zoning and coding improvements
- Retrofitting existing structures
- Utilizing natural barriers such as dunes and mangrove forests
- Installing stormwater pumps
- Water efficiency upgrades
- Strengthening and raising roads and seawalls to a minimum elevation
- Installing back flow preventers and duckbill valves due to nuisance flooding
- Increasing stormwater fees for system improvements
- Incentivizing and/or requiring adaptation on private property
- Sustainability programs within the community and government operations such as: polystyrene bans, recycling ordinances, litter ordinances, energy and water conservation, public transit initiatives, increasing electric vehicle charging stations network and greenhouse gas emissions inventories.
- Increasing public awareness and engagement by informing and incentivizing residents, businesses and organizations to assist the community with these best practices.

Miami Highlight – 100RC Network

In May of 2016, Miami-Dade County Mayor Carlos A. Gimenez, Miami Mayor Tomás P. Regalado, and Miami Beach Mayor Philip Levine, joined by The Rockefeller Foundation Chief Operating Officer Peter Madonia and Amy Armstrong, Director of City Relationships at 100 Resilient Cities, celebrated their region's selection to the 100 Resilient Cities (100RC) global network. The mayors noted that by participating in the 100RC network, the Miami region will be better equipped to solve local challenges around transportation, economic equality, sea level rise, aging infrastructure, and more (The Miami Foundation, 2016).



Source: 100ResilientCities.org

Public Officials Survey Results

The FIU Metropolitan Center interviewed 27 public officials, 18 being from the Southeast region.

- Most of the interviewed officials have a clear understanding of the hazards specific to their communities.
- Over half of them are directly involved in a climate change committee or more specifically, a sea-level rise committee, and those participating in the Compact have a Chief Resiliency Officer or equivalent in place.
- The majority work with the leads of their climate initiatives to integrate climate change into their Local Mitigation Strategy, Land Use Plans, Sustainability Plans, Master Plans and Emergency Management Plans.
- Many communities in Florida are implementing similar measures to build resilience, particularly between the Compact counties which are guided by the U.S. Army Corps of Engineers projections.
- Regarding formal evaluations and modeling, the majority stated that either their county officials and/or outside consulting firms have conducted hazard vulnerability and risk assessments or resiliency studies.
- Major Finding: All Regional Planning Councils (RPCs) utilize the Sea, Lake and Overland Surge from Hurricanes (SLOSH) model for evacuation planning which does not include sea level rise projections.
- Most Florida counties have received limited funding for studies and distinct planning projects from agencies such as the DEP and NOAA and the Emergency Management Division receives FEMA and DHS funding.

Public Officials Survey Conclusion

- The need for a coordinated, well-funded approach involving federal, state and local collaboration.
- Leaders at all levels of government have to take seriously the risks facing communities, the urgency of the issues and the need for sustainable action.
- A wide array of solutions that fall into three categories: defending against the sea, accommodating rising water and retreating from the immediate shoreline.
- There is an awareness of what needs to be done and many communities are implementing similar mitigation and adaptation measures, particularly between the Compact counties— Miami-Dade, Broward, Palm Beach and Monroe.
- As for hurricane damage in the context of sea-level rise, the focus has been on defending against the sea (e.g. hard and soft protection) and accommodating rising water (e.g. retrofitting, updating design standards and stormwater management) rather than limiting new development in high-risk areas.
- Overall, the various approaches for risk management that are emerging from initiatives at the state, county and city level can continue to propel Florida in the right direction.

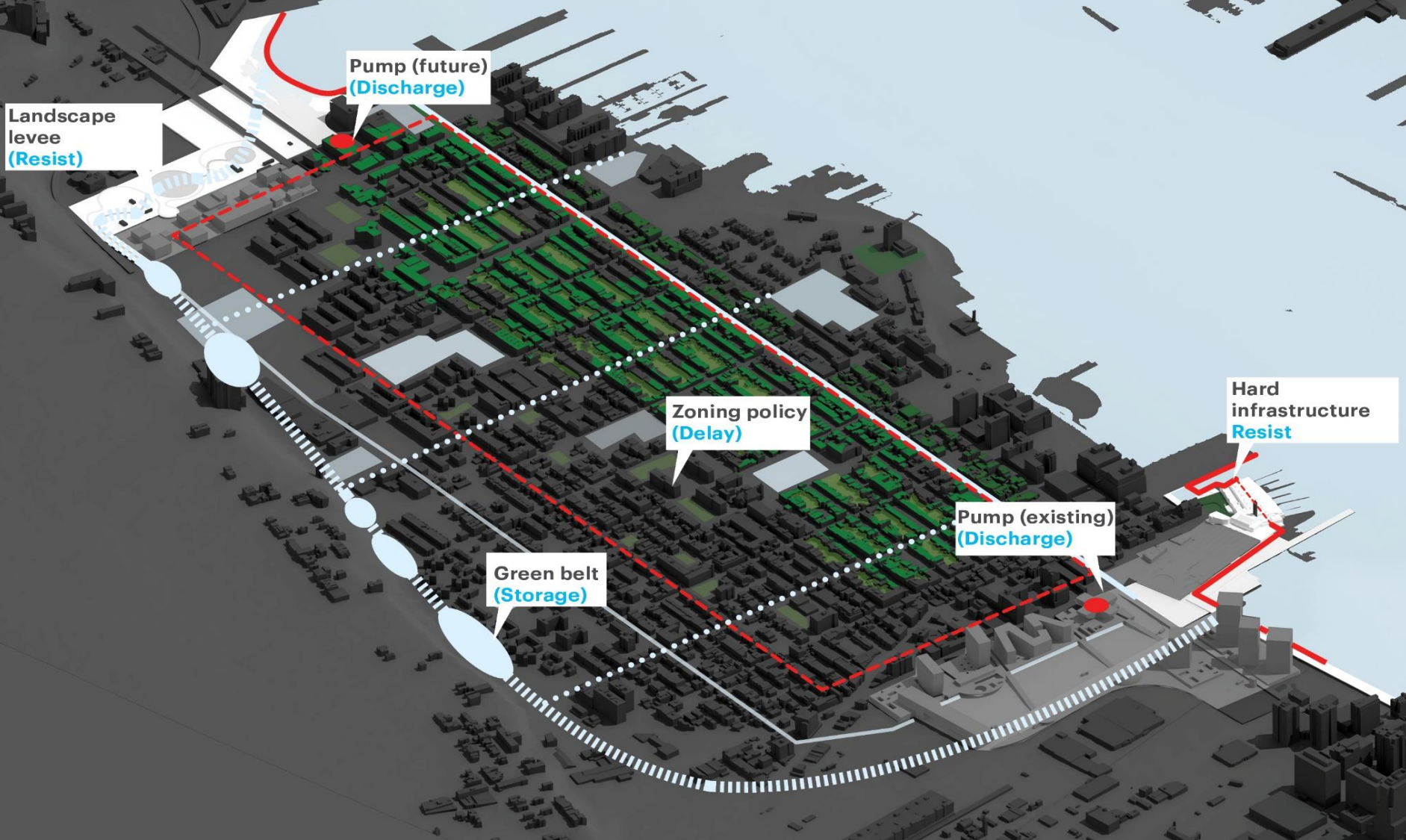
HUD-Innovation Competitions

Rebuild by Design Winners

<i>Project</i>	<i>Locale</i>	<i>Awarded</i>
Big U	Manhattan, NY	\$335 Million
Resist, Delay, Store, Discharge	Hoboken, NJ	\$230 Million
New Meadowlands	Meadowlands, NJ	\$150 Million
Living with the Bay	Long Island, NY	\$125 Million
Living Breakwaters	Staten Island, NY	\$60 Million
Hunts Point Lifelines	Bronx, NY	\$20 Million
	Total	\$930 Million

Resist
Delay
Store
Discharge

Comprehensive Strategy



HUD-Innovation Competitions

National Disaster Resilience Competition

<i>Project</i>	<i>Awarded</i>	<i>Project</i>	<i>Awarded</i>
<i>New York City, NY</i>	\$176,000,000	<i>Shelby County, TN</i>	\$60,445,163
<i>New Orleans, LA</i>	\$141,260,569	<i>Connecticut</i>	\$54,277,359
<i>Virginia</i>	\$120,549,000	<i>Tennessee</i>	\$44,502,374
<i>Iowa</i>	\$96,887,177	<i>New York</i>	\$35,800,000
<i>Louisiana</i>	\$92,629,249	<i>Springfield, MA</i>	\$17,056,880
<i>Minot, ND</i>	\$74,340,770	<i>New Jersey</i>	\$15,000,000
<i>California</i>	\$70,359,459		
		Total	\$1 Billion



THE BRIDGING BERM SECTION



Making a Matrix of Solutions

How to Use:

- Combine multiple tools and policies to create multifaceted long-term plans and strategies
- Rethink traditional methods and utilize national and international innovation and creativity
- Involve community to formulate solutions (residents, public and private stakeholders)

	<i>Governance</i>	<i>Zoning & Code</i>	<i>Transportation</i>	<i>Hardening</i>	<i>Environmental</i>
<i>Short-term</i>	Budgetary Prioritization	Improve Construction Codes	Raise Roads Pervious Concrete	Flood-proofing buildings (flood doors/gates, relocate utilities, temporary barriers)	Beach Renourishment
	Public Awareness Campaign (threats, zoning, mitigation)	Elevate Structures & Utilities	Damage Repair		Dunes & Berms
	Open Data/Documents		Planning & Asset Management		Green Public Space in Flood Zones
<i>Mid-term</i>	Master Plans & Vulnerability Studies	Development Regulations in Coastal Areas or Flooding Zones	Account for SLR & Hurricane Projections in Future Infrastructure	Bioswales & Water Retention	Barrier Islands, Breakwaters, & Coral Reefs
	Retrofitting & Resiliency Grants	Flood & Storm Mapping	Optimize Public Transportation	Sea Walls & Revetments	Wetlands & Mangroves
	Insurance (de)Regulation			Dredging & Leveeing	
<i>Long-term</i>	Comprehensive & Actionable Long-term Strategy	Adaptation Action Areas	Construct Resilient Public Space Connectivity	Surge Barriers	Low-Impact Development
	Regional Commitments & Organizing (public & private)	Commercial or Residential Relocation	Reduce Infrastructure Usage & Reliance	Large Hydrological Systems (networks of pumps, cisterns, & rerouting water flows)	Ecological Restoration Ecological Reclamation

Pervious Concrete



Source: Tarmac (UK)

Flood Proofing Buildings



Source: Flood Panel

Flood Proofing Buildings



Bioswales & Water Retention

Lasalle Bioswale

Scan to learn how to be River Friendly

www.stjohnsriverkeeper.org



A bioswale collects stormwater runoff from roads, rooftops, and parking lots and uses soil and plants to remove pollution before the water reaches the St. Johns River.

Thanks to the partners who made this project possible:

ST. JOHNS RIVERKEEPER®



City of Jacksonville

City Council Member Lori Boyer

Content Design Group

EnVision Design + Engineering

Greenscape of Jacksonville

Jacksonville Zoo and Gardens

Media Works

MetroVerde

PBM Constructors

Petticoat-Schmitt Contracting

San Marco Preservation Society

Superior Trees



Source: St. Johns Riverkeeper

- 1 When it rains, stormwater runs off roofs, sidewalks, and roads.
- 2 Stormwater washes pollutants like oil, fertilizers, and pesticides into gutters and storm drains.
- 3 Instead of going directly into storm drains, stormwater is diverted into the bioswale.
- 4 Storm drains often carry untreated stormwater straight to the river.
- 5 The use of native plants and trees in the bioswale helps slow down the stormwater, start the filtration process, and reduces the need for irrigation, fertilizer, and pesticides.
- 6 Plant and tree roots and soil microbes help clean the water.
- 7 Detained water also filters through the soil, helping to recharge the groundwater.
- 8 Water table

The use of native plants and trees also creates important habitat for wildlife.

Public Space as a Flood Zone



Source: DE URBANISTEN

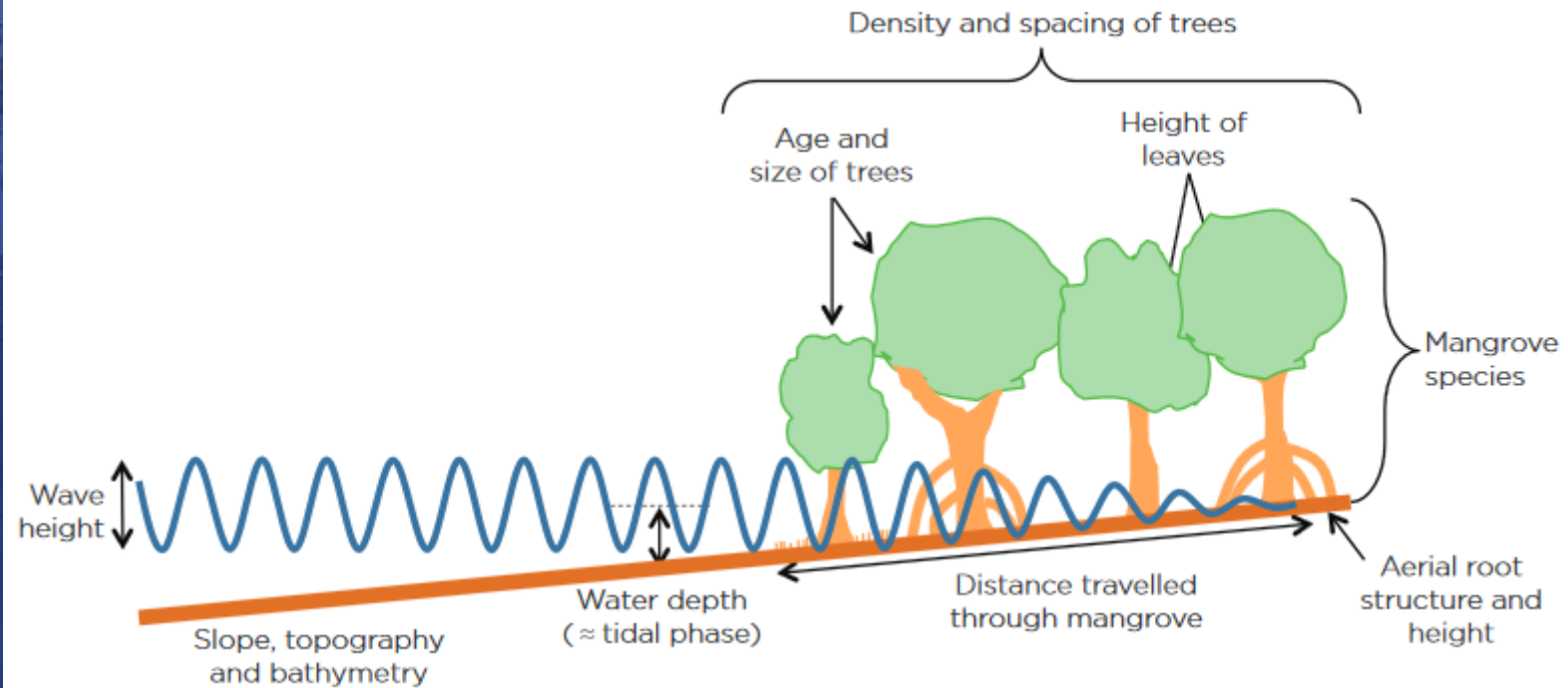
Public Space as a Flood Zone



Source: DE URBANISTEN

Wetlands & Mangroves

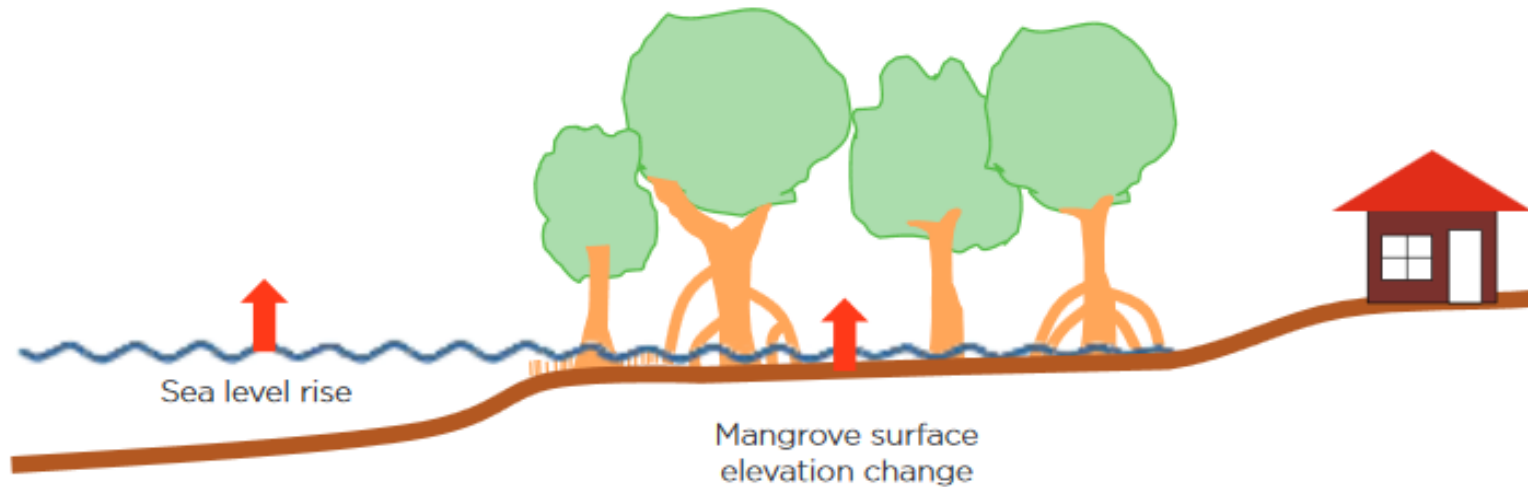
Figure 2.1: Factors Affecting Wave Attenuation through Mangroves



Source: WAVES, World Bank Group

Wetlands & Mangroves

Figure 2.8: Diagram Showing how Mangrove Soil Surfaces can Rise with Sea-level Rise, Potentially Allowing Mangroves to Keep Pace with Sea-level Rise



Source: WAVES, World Bank Group

	<i>Governance</i>	<i>Zoning & Code</i>	<i>Transportation</i>	<i>Hardening</i>	<i>Environmental</i>
<i>Short-term</i>	Budgetary Prioritization	Improve Construction Codes	Raise Roads Pervious Concrete	Flood-proofing buildings (flood doors/gates, relocate utilities, temporary barriers)	Beach Renourishment
	Public Awareness Campaign (threats, zoning, mitigation)	Elevate Structures & Utilities	Damage Repair		Dunes & Berms
	Open Data/Documents		Planning & Asset Management		Green Public Space in Flood Zones
<i>Mid-term</i>	Master Plans & Vulnerability Studies	Development Regulations in Coastal Areas or Flooding Zones	Account for SLR & Hurricane Projections in Future Infrastructure	Bioswales & Water Retention	Barrier Islands, Breakwaters, & Coral Reefs
	Retrofitting & Resiliency Grants	Flood & Storm Mapping	Optimize Public Transportation	Sea Walls & Revetments	Wetlands & Mangroves
	Insurance (de)Regulation			Dredging & Leveeing	
<i>Long-term</i>	Comprehensive & Actionable Long-term Strategy	Adaptation Action Areas	Construct Resilient Public Space Connectivity	Surge Barriers	Low-Impact Development
	Regional Commitments & Organizing (public & private)	Commercial or Residential Relocation	Reduce Infrastructure Usage & Reliance	Large Hydrological Systems (networks of pumps, cisterns, & rerouting water flows)	Ecological Restoration Ecological Reclamation

Florida Resident Perceptions

- Track changes in homeowner perceptions of hurricane threat, risk and potential mitigation measures
- Sea Level Rise – any effect?
- Trend analysis of hurricane risk in coastal counties

Respondent Characteristics

- ❖ 600 respondents from coastal counties
- ❖ 20 percent of interviews in Spanish
- ❖ 67 percent in single family homes
- ❖ 74 percent homeowners
- ❖ 78 percent residing in Florida for 10+ years

Hurricane Experience:

Tropical Storm: 27%

Hurricane (1 or 2): 15%

Hurricane (3 and higher): 27%

None: 32%

Hurricane Damage:

21% had their home damaged, the majority with moderate or major damage (windows or roof)

Homeowners' Views: Preparedness

- Only 29 percent consider their homes prepared.
 - 56 percent would begin to prepare when a hurricane warning (23%) or a hurricane watch (32%) is issued.
 - Approximately nine percent will not make any additional preparations.

Although 87% of respondents reported their household's preparation as adequate, just 60% of respondents were actually prepared by objective measures, and only with the basics.

Flashlight: 81%

Water (one gallon per person per day): 72%

Food (three-day supply): 71%

First aid kit: 55%

Radio and batteries: 53%

Culture of Preparedness?

Sandy

	2006	2007	2009	2011	2013	2016
Perception of vulnerability	46%	54%	48%	50%	57%	46%
Information access	87%	90%	93%	90%	93%	92%
Plan of action	85%	85%	87%	70%	75%	61%
Evacuate if ordered	28%	37%	40%	40%	38%	38%

Awareness

- One in eight (12%) do not know if their home is in a flood or evacuation zone. Additionally, of those who said they are not (59%), one third actually are.
 - Population in floodplain: Miami-Dade 48%, Broward 79%, Palm Beach 18%
- One in seven homeowners (16.4%) are without home insurance and of those who do, 16% would cancel their insurance once their mortgage is paid off.
 - up from 9% in 2015
 - up from 13% in 2015
- 50% do not receive any discounts from their insurance company for mitigation, and 13% are not aware of any discounts being offered.

Sea Level Rise

- Half either do not believe sea level rise is happening or they do not know.
- Only 22 percent think they will be affected.

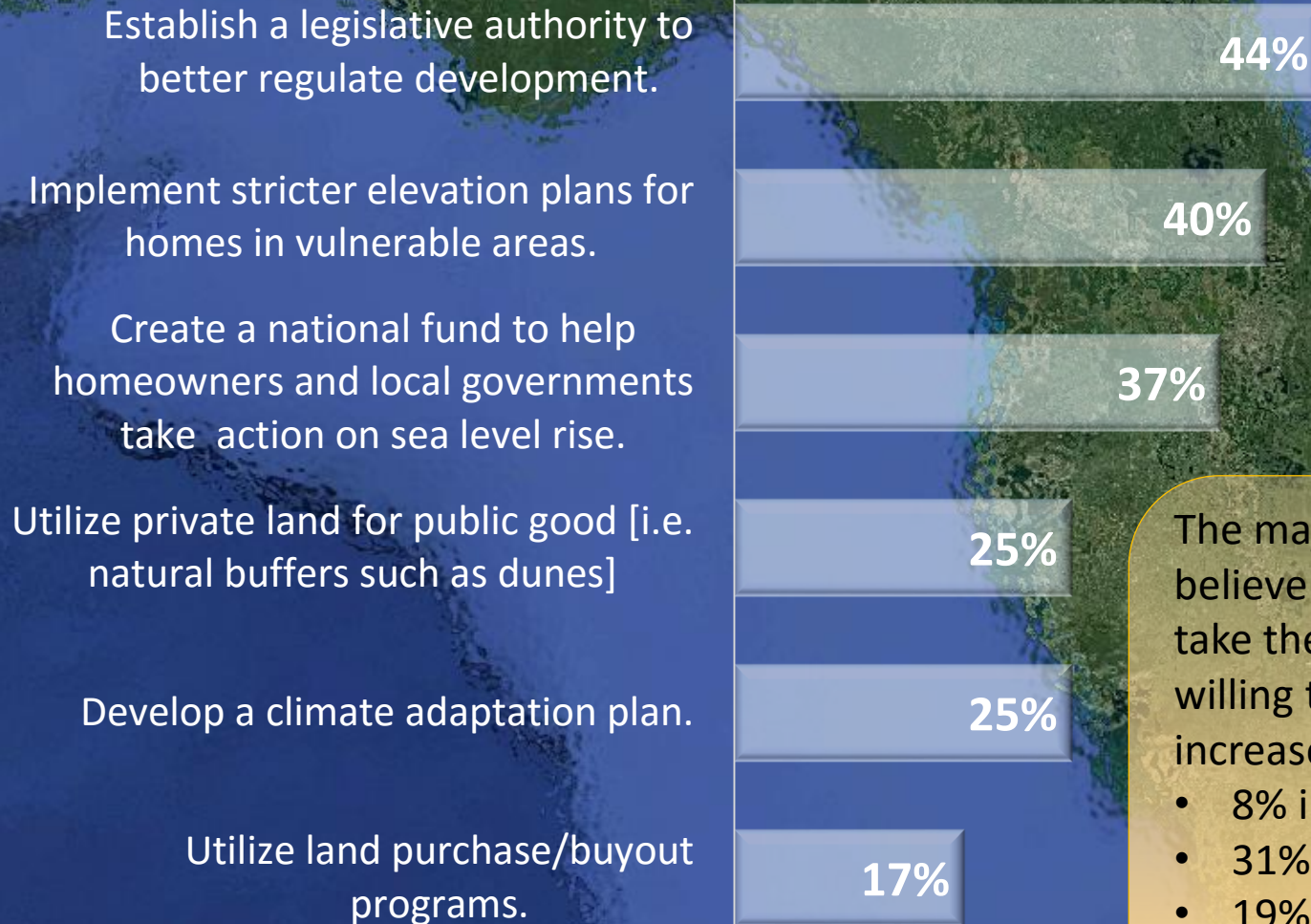
How much do you think each of these actors should do to reduce the effects of rising sea level in the future?

	A great deal (leading role)	Some (supporting role)	A little (minor role)	Nothing
Federal Government	52%	27%	6%	16%
State government and agencies	53%	26%	7%	14%
Local governments near the coast	61%	20%	5%	14%
Businesses near the coast	42%	30%	10%	17%
Homeowners near the coast	48%	26%	10%	16%
Real estate developers	48%	25%	7%	20%
General public	42%	30%	11%	17%
Scientists	66%	15%	6%	13%

Annotations:

- Up from 52% in 2015 (pointing to Federal Government)
- Up from 41% (pointing to Businesses near the coast)
- Up from 35% (pointing to General public)

What should governments do?



The majority of those who believe government should take the leading role are willing to have taxes increased.

- 8% income
- 31% property
- 19% both income and property

Overview of Trends

- Coastal development continues despite the risk.
- There has been a decline in risk awareness and preparedness.
- The majority of Florida homeowners are not aware of the effect of sea level rise or they do not believe they will be affected.
- There is a growing expectation that government, especially local government, should play a leading role in reducing the effects of rising sea level in the future.

Conclusions

- Florida's vulnerability to disasters and their increased impact as a result of sea level rise is encouraging local governments to step up their efforts to understand disaster preparedness and implement measures to mitigate the risks.
- However, market forces are continuing to increase the property and population risks.
- Florida does not have a culture of preparedness as efforts are subject to individual experiences, news cycles and population characteristics.

FIU

Metropolitan Center

1101 Brickell Ave, South Tower 206

Miami, FL 33131

Website: metropolitan.fiu.edu

Connect with us:

