Climate Ready and Storm Safe: America's Next Big Goal

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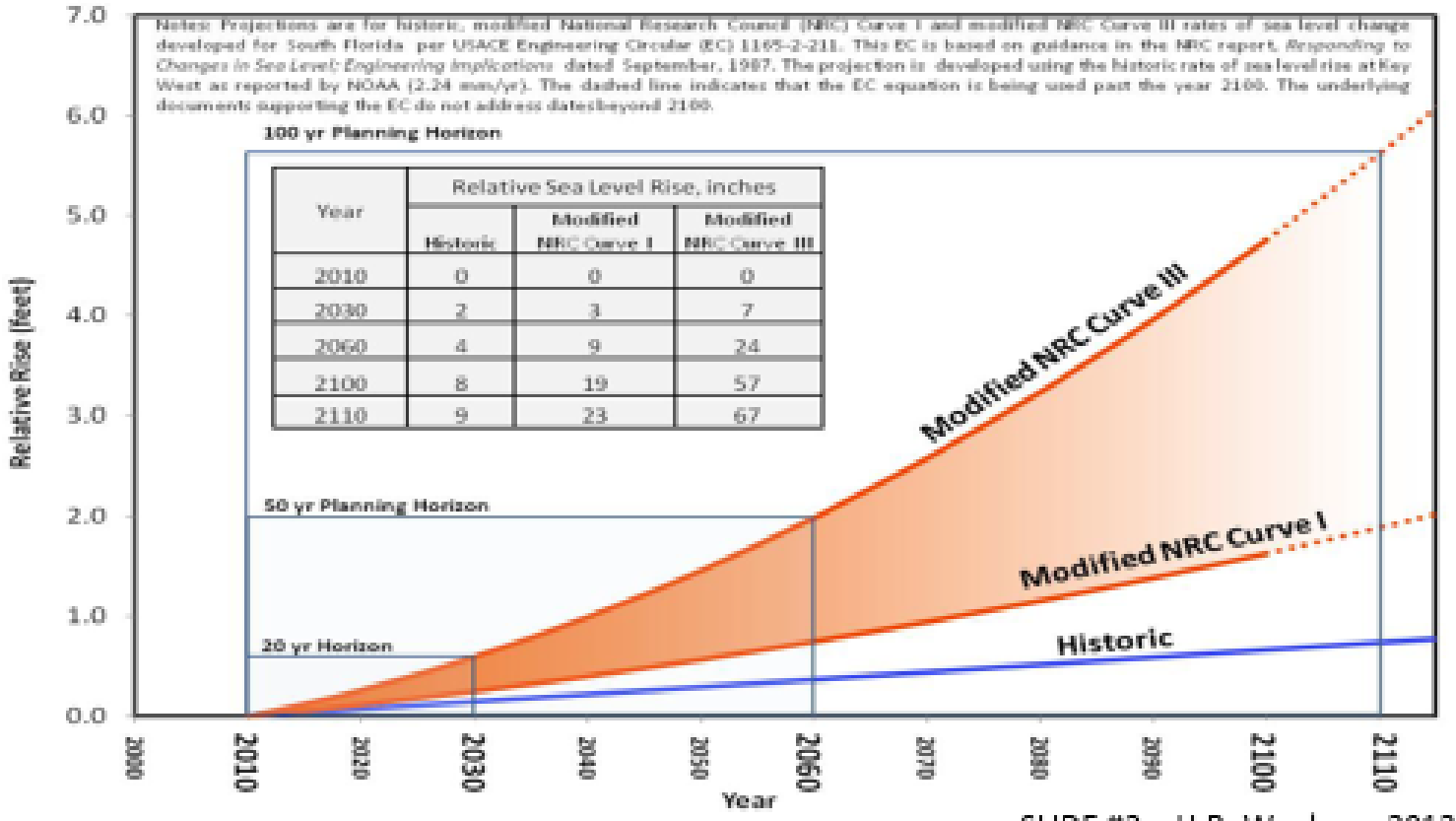
Is America Climate Ready and Storm Safe?

- Short Answer: NO
- Without factoring in Climate Disruption:
  - The American Society of Civil Engineers (ASCE) estimates the U.S. needs $2.2 trillion dollars of infrastructure spending during the next 5 years, of which $1.18 trillion has not been budgeted.
  - The Environmental Protection Agency estimates that the 2019 cumulative gap in spending for clean water will be $31 billion and the gap in spending for drinking water will be $45 billion.

US Army COE
Sea Level Rise Model

The U.S. Army Corps of Engineers
has since 2009 been required to incorporate
likely sea level rise into all civil works planning;
this projection is also now used by the Regional Compact of the
Southeast Florida Regional Planning Council

Relative Sea Level Rise Scenarios for South Florida



Year	Relative Sea Level Rise, inches		
	Historic	Modified NRC Curve I	Modified NRC Curve III
2010	0	0	0
2030	2	3	7
2060	4	9	24
2100	8	19	57
2110	9	23	67

Why Get Climate Ready and Storm Safe?

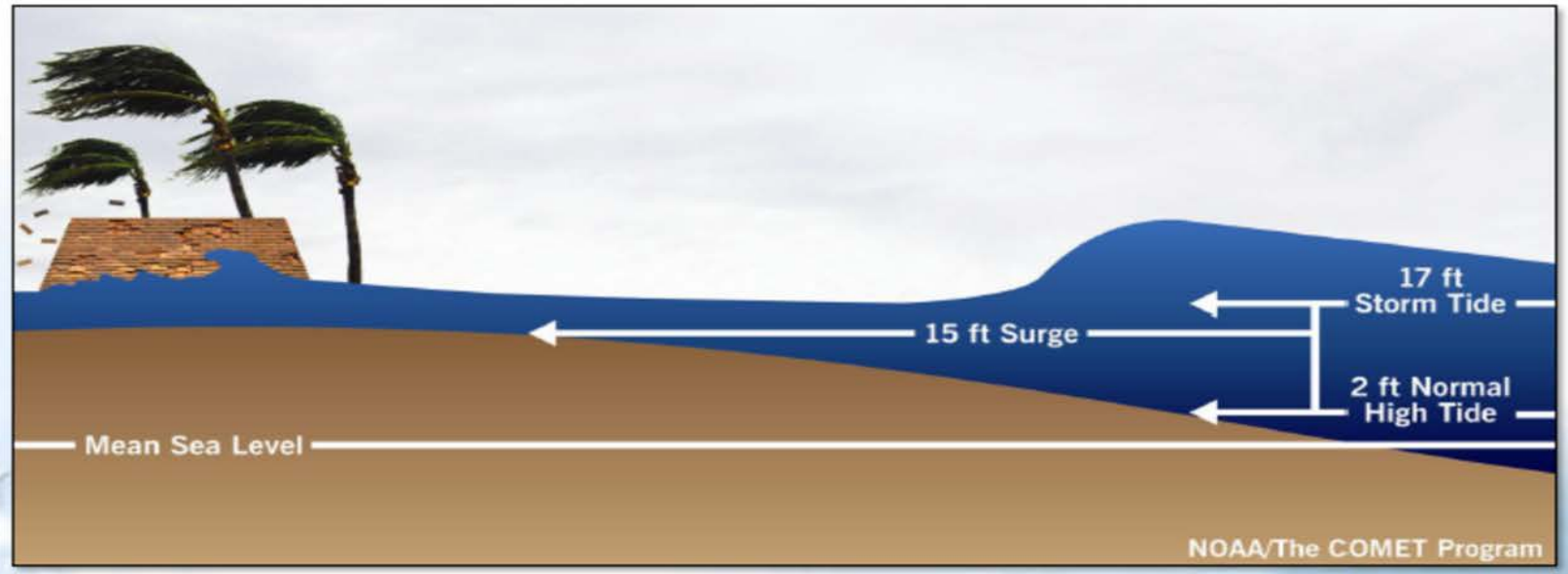
- 123 million people or 39% of the US population live in Coastal Shoreline Counties (Counties that border open ocean or contain a FEMA High Hazard Area).
- Coastal Counties account for almost 50% of GDP.
- They are the fastest growing and most densely populated areas of the US; 27% of national property by value.
- Value of insurable properties in Coastal Counties tops $14 trillion.
- The American economy of the future depends upon resilience of the public, critical infrastructure.

DOD Sea Level Rise Preparedness

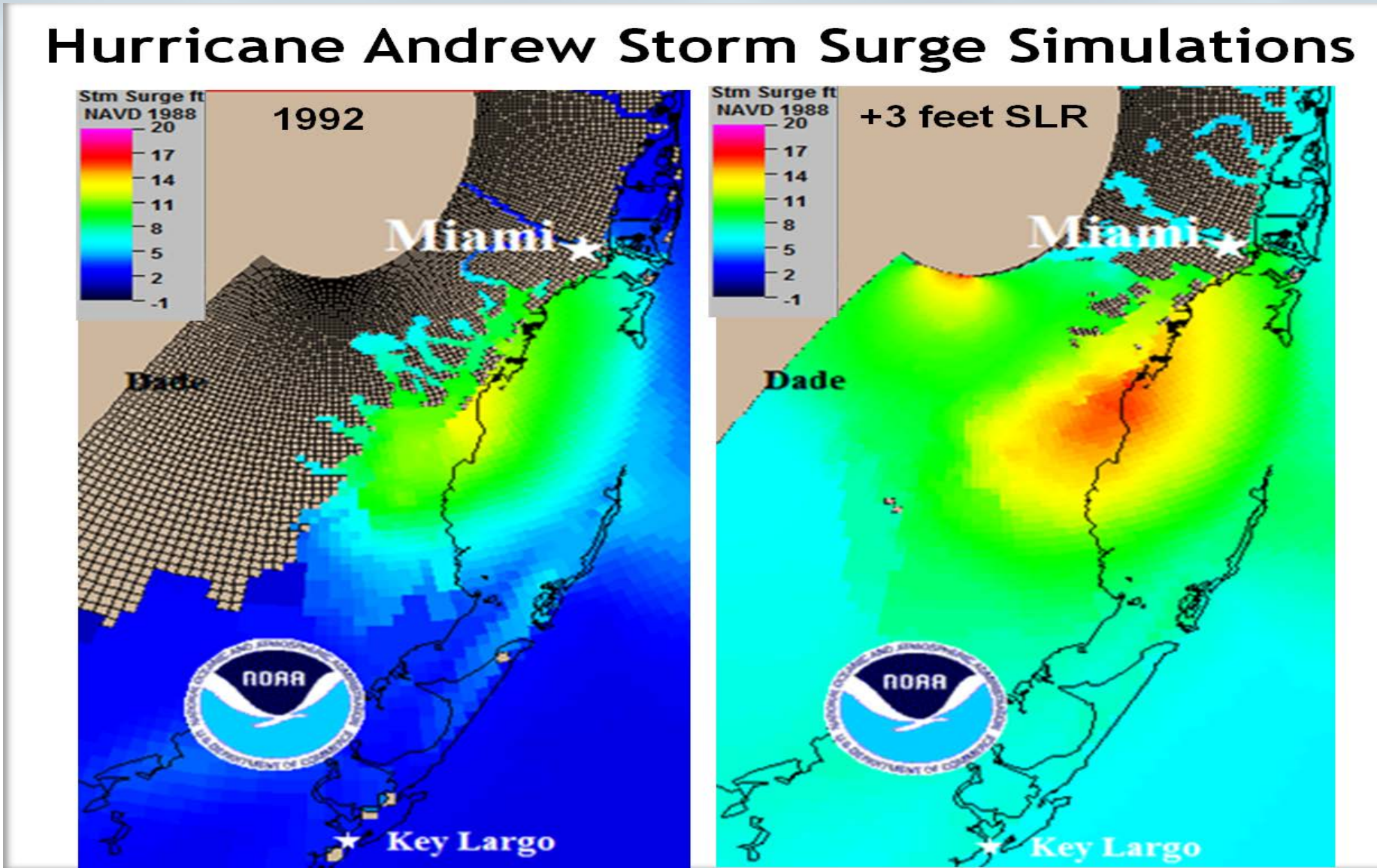
- The Defense Department is already taking preventative measures!
- “Recent studies have demonstrated that, as climate change contributes to inundation, increased shoreline erosion and higher hurricane intensity, coastal DoD installations may experience significant losses in the absence of mitigation and local adaptation.”
- Assessments ongoing at: Naval Station Norfolk, Virginia; Eglin Air Force Base, Florida; Marine Corps Base Camp Lejeune, North Carolina; Marine Corps Base Camp Pendleton and Naval Base Coronado, California

Storm Tides

Storm Surge and Tide = Storm Tide



Hurricane Andrew + 3’



Katrina and Sandy By the Numbers

- KATRINA - Category 3 hurricane; 1833 deaths; 1.2 million housing units damaged; estimated costs $148 billion (2012 dollars).
- SANDY – Tropical Cyclone; 132 deaths; 305,000 housing units damaged; $71 billion (NY & NJ).
- MIAMI? - A direct hit (Category 3 or above) could result in damages >$150 billion.
- Economic damage estimates don't capture the toll of human misery and suffering caused by FAILURE TO PREPARE.

Disparate Impacts of Coastal Storms

- Hurricanes and coastal storms disparately impact minorities, particularly African-Americans and Latinos, the poor, the elderly and the infirm.
- These groups are less mobile and are, therefore, less able to evacuate and to recover from climate impacts.
- Prior to Hurricane Katrina, older adults composed only 15 percent of the population in New Orleans. But, they made up 70 percent of the deaths related to the storm.
- During Hurricane Sandy, half of the victims were older adults.
- Flood insurance rates doubled last year in Florida, Louisiana and other states, while many properties cannot get insurance at any cost. Insurers can be expected to continue this retreat.

“We Were Surprised!”

- We’re all familiar with comments by government officials and survivors alike in the aftermath of Sandy, Katrina, Andrew, Ike, etc.:
- “We were surprised that surge was so high and the waves so big“
- “We didn't expect the surge to reach so far inland...“
- " We expected the storm to turn toward the northeast and the Atlantic...instead it came this way"
- “There was a study by 'xxxxx' that actually predicted what would happen with a direct or close hit...but nothing was done about it.."
- Keep in mind, the probability of a hit exists every year, and with each passing year, the potential intensity of an impact increases as a result of sea level rise and climate change.
- It only takes one hit for all of this to become reality!
- So, LET’S GET READY, NOW…BETTER SAFE THAN SORRY!

Critical Public Infrastructure Must Be Made Climate Ready and Storm Safe

- Critical Public Infrastructure is the “backbone” of any society – It must be resilient and sustainable
- Water and Sewers (sanitary and storm sewers)
- Roads and Bridges
- Energy Transmission and Grid
- Communications
- Health Care and Hospitals
- Emergency Management Systems

Is it “Goodbye, Miami”?

Miami Beach Resiliency Efforts

MIAMI BEACH

Miami Beach to spend up to $400 million to deal with flooding issues

Like 409

Moses Schwartz calls a tow truck to retrieve his SUV on the 800 block of Alton Road in Miami Beach in October 2013. WALTER MICHOT / MIAMI HERALD STAFF

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- Miami Beach starts new process to redevelop Convention Center

BY CHRISTINA VEIGA
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Miami Beach, which sometimes floods from the bay even on a sunny day, is taking major steps to stay dry, with commissioners voting Wednesday to factor in higher tides and sea levels when planning for city projects.

The move is expected to double to $400 million the cost of keeping water out of Miami Beach's streets.

The city still isn't entirely sure how it will pay for the costly improvements, but hopes to tap into federal and state funds, grants and possibly borrow money against its utility accounts.

"There is a lot of money going into these resiliency issues, so we are hoping to tap into that," City Manager Jimmy Morales said Wednesday evening.

Miami-Dade Sea Level Rise Task Force 2014

- “Sea Level Rise is an inevitable consequence of the warming of the oceans and the accelerated melting of the planet's ice sheets -regardless of cause. It is a measurable, trackable and relentless reality. Without innovative adaptive capital planning it will threaten trillions of dollars of the region's built environment, our future water supply, our unique natural resources, our agricultural soils, and our basic economy.”

Miami-Dade Sea Level Rise Task Force 2014

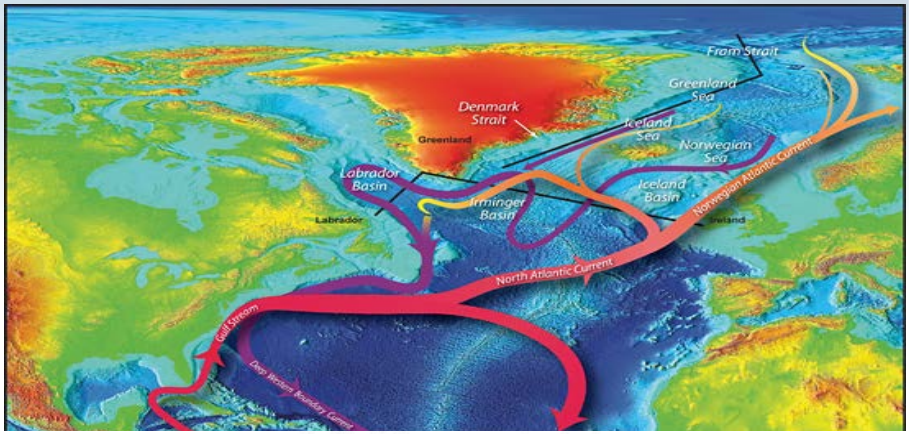
- “RECOMMENDATION 1: The Sea Level Rise Task Force recommends accelerating the adaptation planning process by seeking and formally selecting the engineering and other relevant expertise needed to develop the robust capital plan, vetting the elements (i.e., flood protection, salinity structures, pump stations, road and bridge designs, etc., just to name a few possibilities) as well as what measurable indicators will trigger timely sequencing.”

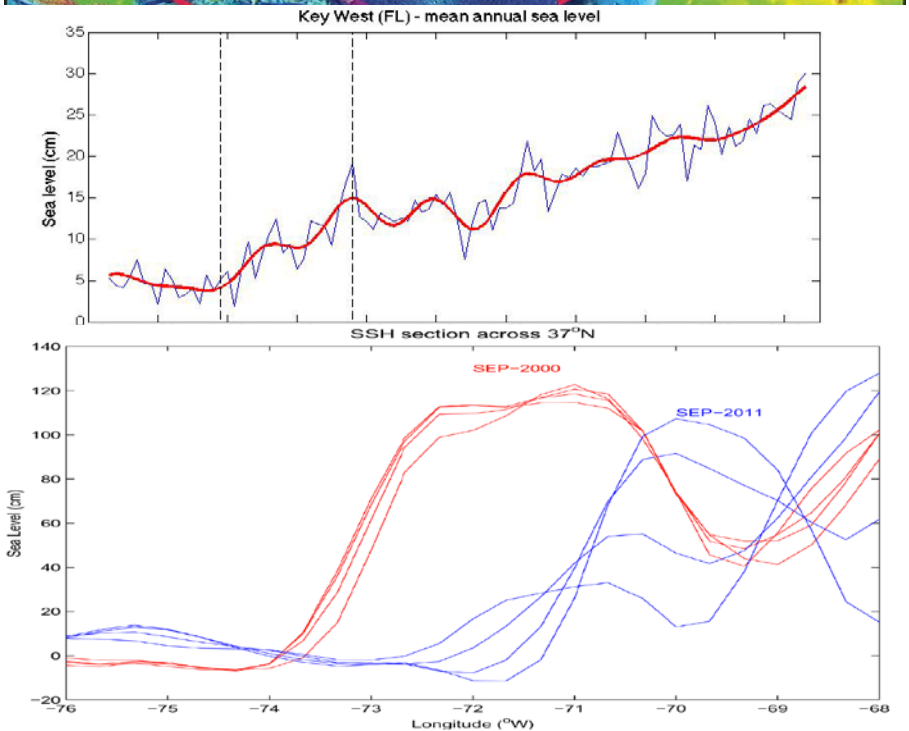
Planning for the "New Normal"

- "Sea Level Rise and Inundation Community Workshop," NOAA 2009:
- "The challenge is to have communities begin to internalize the need to plan for a 'new normal' if they are to create resilient communities…
- Communities have experience with storm and hazardous events, and the post-event response typically is to try and return the community to normal (that is, how it was prior to the event). With sea level rise, there will need to be a shift in perception and response from storm events to sea level rise. With sea level rise, the environment is actually changing; it is not a single event that happens and then gives the community time to return to the pre-event state. People must collectively arrive at a new vision for their community in light of a changing environment."

Wdowinski, et al., University of Miami, 2014

- The accelerating rate of SLR in Miami is consistent with similar rates found along the US Atlantic coast, and are caused by the weakening of the Gulf Stream.
- A similar period of accelerating rates of SLR occurred along the US Atlantic coast between 1930-1950. It is correlated with a period of anomalously high surface air temperature in Greenland.
- We suggest that the increasing rate of ice melt in Greenland affects the AMOC, weakens the Gulf Stream, increases the rate of SLR along the US Atlantic shores, and consequently increases flooding frequency in Miami Beach.





Envisioning the Future - At Least 50-years Out

Where do we go from here?

- Miami Beach 2065
- Miami-Dade County 2065
- South Florida 2065
- Coastal US 2065
- Coastal Planet Earth 2065
- **Broad Public Support Will Coalesce Around a Sustainable and Believable Vision of the Future!**

No “Doom and Gloom!”

How Do We Get Here?

What We Need to Do, Now!

- Public Funding (Federal, State and Local) for Climate Ready and Storm Safe Adaptation Must Increase;
- Public Funds Must Be Spent Wisely Using Sound Science, Vulnerability and Cost-Effectiveness Analysis;
- Funding for Public Education and Involvement on Climate Impacts and Adaptation Must Increase Greatly;
- Building, Development and Land-Use Codes Must be Brought in Line with Present and Future Realities;

Tom Friedman's "Resilience Editorial": Memorial Day 2014

- **"In short, by taking the climate threat seriously now, we'd make ourselves so much more economically, physically, environmentally and geopolitically resilient — and, therefore, more free. What containment was for our parents' generation — their strategy to fight for freedom against the biggest threat of their day — resiliency will be for our generation against the multiple threats of our day: climate change, petro-dictatorship and destruction of our environment and biodiversity. Let's act so the next generation will want to honor us with a Memorial Day, the way we honor the sacrifice of previous generations."**

- http://www.nytimes.com/2014/05/25/opinion/sunday/friedman-memorial-day-2050.html?_r=0

Albert J. Slap

- Mr. Slap is President of Coastal Risk Consulting, LLC (CRC). The mission of CRC is to help communities, businesses and government get climate ready and storm safe. Slap is a nationally-recognized, environmental attorney and law professor. He is a board member of Friends of the Everglades and serves on The Nature Conservancy's Caribbean Advisory Council. In 2014, Slap was the recipient of the prestigious Marjory Stoneman Douglas "Defender of the Everglades Award."