Climate 101

A Quick User's Guide to Understanding Sea Level Rise

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Miami-Dade County – Sea Level Rise Task Force
November 21, 2013
Overview

- Climate Basics
- Climate Concerns in Southeast Florida
- Southeast Florida Regional Technical Tools
Atmospheric Carbon Dioxide

- 24%↑ measured [CO₂] since 1958
- 42%↑ [CO₂] since Industrial Revolution
Leading Indicators of Change

**Leading**
- ↑ CO₂
- ↑ Air Temp
- ↑ Ice Melt/TE

**Lagging**
- ↑ Air Temp
- ↑ Ice Melt/Thermal Expansion
- ↑ Sea Level Rise
Climate Change Impacts in SE FL

- Increasing Temp (2 to 10°F) by 2100
- Increasing occurrence of extreme weather
  - hotter summers
  - drier droughts
  - wetter rainy seasons
  - cold snaps
- ↓ frequency with ↑ intensity of tropical storms
- Sea level rise (2-5 feet) by 2100
Climate Change Impacts in SE FL

“Of all the regions, in all the towns, in all the world, sea level is affecting mine.”
Sea Level Rise Implications for SE Florida

- Saltwater intrusion into the aquifer
- Drainage and flood control compromised
- Impacts to public and private infrastructure
- Beach erosion
- Impacts to coral reefs
- Impacts to Everglades
SECTION 6: Each county shall work with other counties party to this compact in developing a Southeast Florida Climate Change Action Plan. The Action Plan shall, at a minimum, include the following components:

Regional Climate Change Action Plan. The Action Plan could, at a minimum, include the following components:

(a) A baseline of greenhouse gas emissions for Southeast Florida;
(b) Strategies for coordinated emission reductions throughout the built environment to include the use of energy efficiency, energy conservation, and the use of demand-side renewable energy resources;
(c) Strategies for coordinated emission reductions from the transportation sector to include increased reliance on public transit, emerging vehicle technologies, and advanced biofuels;
(d) Strategies for coordinated emission reductions resulting from changes in local and regional land use;
(e) Strategies for coordinated regional preparation for and adaptation to a rapidly changing global environment based upon regional mapping of projected sea-level rise and any resulting amplification of localized impacts of tropical cyclone events. Such strategies shall incorporate climate preparation concerns for the regional economy, regional infrastructure and the built environment, social and cultural needs, and natural systems within the four counties party to this compact.

SECTION 7: Each county shall commit to participating with other counties party to this compact in hosting the Second Southeast Florida Regional Climate Change Summit in October, 2010.

[Signatures]

Commissioner Kristin Jacobs
Broward County

Commissioner Katy Sorenson
Miami-Dade County

Mayor George Neugent
Monroe County

Shelley Vana
Palm Beach County
Compact Commitments

Use Regional Resources on:

- Policy Collaboration
- Technical Planning Tool Development
- Regional Climate Change Action Plan
- Annual Climate Leadership Summits
Common Concerns/ Different Approaches

- Residential: 27%
- Commercial: 24%
- Industrial: 1%
- Transportation: 45%
- Waste: 2%
- Other: 1%
Compact’s Technical Foundation

A Unified Sea Level Rise Projection for Southeast Florida

Southeast Florida Regional Climate Change Compact Counties

Palm Beach
Broward
Miami-Dade
Monroe

Analysis of the Vulnerability of Southeast Florida to Sea Level Rise
Southeast Florida Regional Climate Change Compact Inundation Mapping and Vulnerability Assessment Work Group
August 2012

Southeast Florida Regional Climate Compact

Produced by the Regional Compact GHG Inventory Working Group
November 2011

Industrial
Commercial
Residential
Transportation
Regional GHG Emissions by Sector

- Industrial: 1%
- Commercial: 26%
- Residential: 28%
- Transportation: 44%

Greenhouse Gas Emissions Inventory
Planning for Sea Level Rise

A Unified Sea Level Rise Projection for Southeast Florida

Key West Tide Gauge
8-10'/100 yr

Tourist
Homeowner
Perspective Buyer
Leading Indicators of Change

**Leading**

↑ CO₂

**Lagging**

Rates are Increasing

↑ Air Temp

**Avg Annual Rate of ↑ Mauna Loa CO₂ by Decade**

<table>
<thead>
<tr>
<th>Decade</th>
<th>CO₂/year</th>
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<tbody>
<tr>
<td>1960s</td>
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<td>2000s</td>
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<tr>
<td>2010...</td>
<td>2.3</td>
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</tbody>
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**Decades of Warming**

Average Global Surface Temperature

- **57.1°**
- **58.1°**

NOAA - ESRL

Average Global Surface Temperature
Leading Indicators of Change

**Leading**

- ↑ CO₂
- ↑ Air Temp
- ↑ Ice Melt

**Lagging**

- ↑ Air Temp
- ↑ Ice Melt
- ↑ Sea Level Rise
Loss of Greenland Ice

> 25x than a decade ago

1990s: 7B tons/yr

2000s: 177B tons/yr

Leading Indicator of Sea Level Rise
SE FL Regional Vulnerability Analysis

- Identifies area with elevations below Mean Higher High Water
- Planning tool to identify areas of concern

Timeline for 1 ft SLR Scenario 2040 – 2070
SE FL Regional Vulnerability Analysis

Timeline for 2 ft SLR Scenario 2060 – 2115
Vulnerability to Sea Level Rise is not just a Coastal Issue
Drainage under Average Tidal Conditions
Stormwater cannot drain

Sea Wall

Road

Storm drain

Freshwater

High Tide/ Sea Level Rise
Resulting Coastal (SW) or Inland (FW) Flooding
Local Climate Impact

- More flooding
- Compromised drainage infrastructure

10 inches of SLR results in >60% loss of drainage capacity

Courtesy of SFWMD
Extreme High Tide Events – Not our Future, NOW

Fall 2013 Extreme High Tides Predicted:
- Oct 6-7, 17-20
- Nov 3-6
- Dec 3-6
The No Action Option for Coastal Communities

“Frankly my dear, sea level rise doesn’t give a damn.”

Whether or not we plan to address current or future sea level rise, it will come.
Questions?