Responses to Climate Change and Sea Level Rise

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Greetings from North Carolina

State Capital in Raleigh

State Flower
the Goldenrod
Why the Controversy?

Economics

Perception

I did not slap you
I high fived your face

Scientific Confusion?
Islamorada, Village of Islands
Nature Conservancy
http://www.coastalresilience.org/geographies/florida-keys/future-scenarios-map
Recorded Rise

Figure 23. Mean tide measurements from tide station KYWF1 - 8724580 at Key West harbor. The mean sea level trend is +2.24 millimeters/year with a 95% confidence interval of +/- 0.16 mm/yr based on monthly mean sea level data from 1913 to 2006 which is equivalent to a change of 0.73 feet in 100 years.
Predicted Rise: IPCC

- IPCC (2007)
  - Projected by 2100
  - 7 - 23”

- IPCC (2013-2014)
  - Projected by 2100
  - 10.8 – 38.4” (3.2’)
  - Does not account for Antarctic ice sheets
  - Low estimate?
Predicted Rise: NRC

National Research Council Update (2010)

Sea Level Change (in)

Year

1950  2000  2050  2100

IPCC 2007

2 – 6'
National Climate Assessment

![Graph showing global mean sea level rise for different scenarios]

<table>
<thead>
<tr>
<th>Scenario</th>
<th>SLR by 2100 (m)*</th>
<th>SLR by 2100 (ft)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>2.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Intermediate-High</td>
<td>1.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Intermediate-Low</td>
<td>0.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Lowest</td>
<td>0.2</td>
<td>0.7</td>
</tr>
</tbody>
</table>
1' is possible
4 Foot Sea Level Rise
Foot Sea Level Rise w storm surge

4 Foot Sea Level Rise w storm surge

Map of the Florida Keys showing areas affected by sea level rise and storm surge. The graph on the right illustrates predicted sea level changes over time.
Why is the Sea Rising?
Why is the Sea Rising?

Natural Cycles: Tides

Yellow rectangle marks a storm drain that is not functioning due to extreme high tide – Fort Lauderdale
Why is the Sea Rising?

Natural Cycles: Carbon Dioxide
The CO2 Effect & Feedback Loops
Why is the Sea Rising?

Natural Cycles: Carbon Dioxide

For 650,000 years, atmospheric CO₂ has never been above this line ... until now.

current level

1950
Mauna Loa Observatory

IPCC - April 2014: Greenhouse gas emissions accelerate despite reduction efforts.

IPCC Temperature Projections

3.5 deg (F)
What does this mean for us?

- Sea level rise
- Food Scarcity
- Altered Weather
- Public Health Changes
- Vegetative Changes
- Ocean Acidification
- Reefs and Fisheries
What does this mean for us?

Climate Refugees

2004 GAO Study – 4 Villages Threatened
2009 GAO Study – 31 Villages Threatened

Neutauk, Alaska
What are we doing about it?

- Majuro Declaration signed on September 5, 2013
- 16 Members including Marshall Islands and Australia
- To spark a “new wave of climate leadership” and highlight the impact of climate change in the Pacific Ocean.
Federal Actions

- Vulnerability Assessment Grants
  Federal Highway Administration administered for MPOs (5) and State Transportation Agencies (14)

- President Obama $1,000,000,000 Climate Resilience Fund (2015 Budget)

- 2015 Executive Order – Sea Level Rise must be considered in federally funded projects, including local government grant funds
Responses in Florida

- Florida Post Disaster Redev. Planning Guidelines/Pilot Communities/Guidebook
- Florida Comprehensive Planning Requirements
- Local Government Responses
Islamorada’s Sea Level Rise Plan

Economic Effects

• Risk to infrastructure?
• Impacts to tourism?
• Rising insurance costs?
Efforts to Date

• Preparing and Planning
  – Sustainability Plan
  – Moved City Hall to higher ground
  – Local Mitigation Strategy
  – Some stormwater projects
1. Take no action.

2. Enter the planning process.
   a) Direct staff to move through the stages of the planning process.
   b) Hire additional staff to move through the stages of the planning process.
   c) Hire an outside consultant to move through the stages of the planning process.
   d) Explore partnership to move through the stages of the planning process.
   e) Seek outside funding sources through grants to implement 2-5.

3. Develop adaptation priorities and projects to pursue without the planning process.