

# Coastal Ecosystem Services and Sea Level Rise in Florida: Understanding Public Perceptions, Values, and Policy

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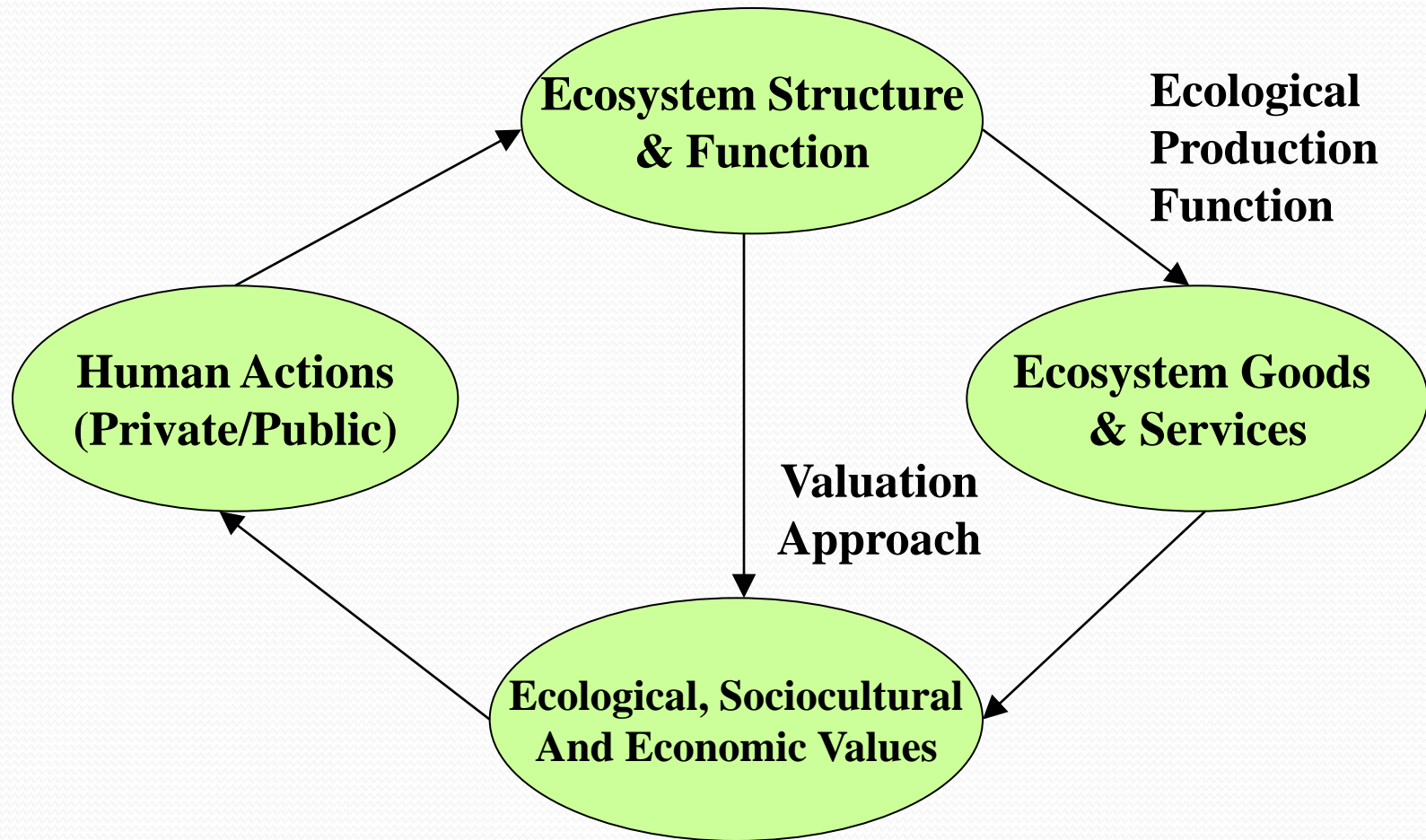
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# Sea Level Rise & Coastal Ecosystems

- Global sea level rise has serious implications for coastal ecosystems & human infrastructure – especially for coastal states like Florida
- SLR adaptation – rapidly evolving policy and planning environment, but little information on policy/program development processes or their effectiveness
- Lots of work on modeling, predictions, cost estimation and vulnerability assessments, but little to no work on policy analysis, public perceptions, values for ecosystem services associated with SLR

# Ecosystem Services, Values, and Human Behavior



*Adapted from NRC 2005*

# Project Goals

1. To improve understanding of sea level rise adaptation strategies and policies in Florida, other U.S. states, and other countries
2. To improve understanding of public perceptions, attitudes, and values related to sea level rise and its effects on coastal ecosystem services in Florida
3. To develop a set of realistic and publicly acceptable sea level rise adaptation scenarios for priority coastal habitats in Florida (focus on submerged aquatic vegetation)

# Approach

- 1. Policy review and analysis**
- 2. Stakeholder surveys and interviews**
- 3. Focus groups**
- 4. Public surveys**

# 1) SLR Adaptation Policy Review: International Examples

- **International agency reports and guidebooks**
  - USAID, *Adapting to Coastal Climate Change: A Guidebook for Development Planners*
  - National Adaptation Program of Action (NAPA) of the UN Framework Convention on Climate Change
  - The World Bank series on *Economics of Adaptation to Climate Change*
  - Food & Agriculture Organization of the UN, comprehensive guide on climate change adaptation
  - The World Resources Institute
    - WRI U.S. State and Regional Climate Change Policy Program

# 1) SLR Adaptation Policy Review: International Examples

- European Union Climate Action Division
- Netherlands National Climate Change Research Programme
- United Kingdom Department of Energy and Climate Change
- Australia
  - Department of Climate Change and Energy Efficiency
    - *Local Government Climate Change Adaptation Toolkit*, ICLEI Oceania
    - *Climate Change Adaptation Actions for Local Government*

# 1) SLR Adaptation Policy Review: United States

- US Dept of Energy Office of Climate Change Policy and Technology
- NOAA Climate Program, sea level rise adaptation – Digital Coast
- USDA Climate Change Office
- US Dept of Transportation – Transportation and Climate Change Clearinghouse
- US EPA: Urban Heat Island Community Actions (database) and *Coastal Sensitivity to Sea Level Rise* (report)
- Pew Center for Climate Strategies – State & Local Climate Blackboard



# 1) SLR Adaptation Policy Review: Resources for Local Governments

- *Preparing for Climate Change: A Guidebook for Local, State and Regional Governments* (U of Washington)
- *Adaptation Toolkit: Sea Level Rise and Coastal Land Use* (Georgetown Climate Center)
- Sea Level Rise Library (Florida Institute of Technology)
- Climate Community of Practice in the Gulf of Mexico
- Other states addressing SLR: CA, CT, DE, MD, NY, NC, VA

# 1) SLR Adaptation Policy Review: Florida

- **State**

- Florida Department of Economic Opportunity, Adaptation Planning Program
- Florida Fish & Wildlife Conservation Commission, Climate Change Initiative; Sea Level Rise coordinator recently hired
- Florida Sea Grant
- Florida Oceans and Coastal Council

- **Regional**

- Regional Planning Councils (SE, S, SW), climate reports and vulnerability assessments
- Southeast Florida Regional Climate Compact
- Regional Climate Leadership Summit, 2011

# 1) SLR Adaptation Policy Review: Florida

- **County**

- **Monroe Co** Board of County Commissioners – recognition of “Adaptation Action Areas” for regions vulnerable to climate impacts, including SLR
- **Sarasota Co** – recognizes SLR in local comprehensive plan and long term plan to 2050 includes SLR
- **Lee Co** – Climate Change Resiliency Strategy through the Southwest Florida Regional Planning Council
- **Miami-Dade, Broward, Palm Beach, Volusia** – climate reports and vulnerability assessments

- **City**

- **City of Punta Gorda** – development of detailed, comprehensive adaptation plan with community input
- **City of Satellite Beach**, Municipal Adaptation Plan

## 2) Stakeholder Survey

- Administered to 27 individuals from local, state, and federal agencies, as well as non-profit organizations
- Participants work in some capacity with SLR research, preparedness, and/or planning in Florida
- Written survey conducted and collected during stakeholder workshop on SLR modeling results, Crystal River, FL, Oct 2011
- Goal was to learn about stakeholder perceptions and prioritization of SLR adaptation approaches, tools, and biggest challenges, and to inform policy scenario design

## 2) Stakeholder Survey

Priority Rank	Sea Level Rise Adaptation Strategy
1	Education
2	Research
3	Landowner disincentives
4	Land use planning changes
5	Landowner incentives
6	Conservation finance
7	Infrastructure changes

## 2) Stakeholder Survey

Frequency	Greatest 50-100 Year Challenges of Sea Level Rise
20	Flooding / SLR events
18	Changes in wildlife habitats
16	Saltwater intrusion
14	Degradation of ecosystem services
12	Political support/funding

## 2) Stakeholder Survey

### Most Promising Available Tools/Resources to Address SLR

Public participation in planning / community forums

Education

Land use planning (e.g. Comprehensive plans)

Financial incentives

Modeling tools

Public policy reform

Regulation

# 3) Focus Groups

- Three 2-hour discussions conducted in Port St Joe, Milton, and Ft Myers
- Main themes:
  - Port St Joe: Local economic importance of coastal resources, uniqueness of coastal estuarine system, concerns for future of coastal resources
  - Milton: Beach access and recreation, jobs, hurricanes
  - Ft Myers: Beach access and recreation, hurricanes, vulnerability, home values, wildlife
- All 3: General lack of immediate concern over CC & SLR, but when asked, most agreed they would be concerned and willing to pay to do something about it. Most do not see it as impending, immediate problem.



## 4) Public Survey

- Administered by mail to 1,000 households in Franklin, Gulf, and Bay Counties, Florida in November 2011
- 120 usable surveys returned, 12% RR
- Survey questions addressed:
  - Coastal ecosystem services
  - Human infrastructure
  - Coastal resilience
  - Recreational opportunities
  - Local economy
  - Drinking water
  - Human health

# Living and working on the coast

Survey Question	Percent Response		
	Yes	No	Not Sure
Live on or own property on the coast	63%	35%	2%
Work on the coast or water	30%	70%	0
Full-time resident	94%		
Number of years lived full or part-time in FL	31 (average)		

# Importance of natural resources to coastal economy

Natural Resources	Not Important		Very Important			Not Sure
	1	2	3	4	5	
<b>Frequency and Valid Percent</b>						
<b>A. Beaches</b>	1 1%	0 0%	4 4%	9 7%	<b>96</b> <b>84%</b>	4 4%
<b>B. Coastal wetlands / marshes</b>	1 1%	4 4%	17 15%	18 16%	<b>71</b> <b>62%</b>	3 3%
<b>C. Fishing grounds</b>	0 0%	0 0%	0 0%	14 12%	<b>97</b> <b>87%</b>	1 1%
<b>D. Aquatic animals (like fish, turtles, oysters)</b>	0 0%	1 1%	5 4%	17 15%	<b>89</b> <b>78%</b>	2 2%
<b>E. Aquatic plants (like sea grasses &amp; marsh grasses)</b>	0 0%	4 4%	13 12%	13 12%	<b>75</b> <b>68%</b>	5 5%
<b>F. Land animals (like beach mice, birds, &amp; snakes)</b>	5 4%	12 11%	19 17%	17 15%	<b>54</b> <b>47%</b>	7 6%
<b>G. Land plants (like dune grasses)</b>	0 0%	2 2%	14 12%	16 14%	<b>78</b> <b>68%</b>	4 4%

# Effect of Coastal Natural Resources on Risk

Type of Risk	No Effect				Strong Effect	Not Sure
	1	2	3	4	5	
The risk of property loss after a severe storm	6 5.26%	9 7.89%	19 16.67%	23 20.18%	52 45.61%	5 4.39%
The risk of natural resource damage after a severe storm	8 7.02%	7 6.14%	12 10.53%	29 25.44%	52 45.61%	6 5.26%
The risk of local economic problems after a severe storm	5 4.39%	5 4.39%	11 9.65%	26 22.81%	60 52.63%	7 6.14%

# Perceived changes in frequency of weather events

	Yes	No	Not Sure
<b>Saltwater intrusion in local waterways</b>	<b>51</b> <b>45.13%</b>	24 21.24%	38 33.63%
<b>Contamination of local drinking water supplies</b>	<b>59</b> <b>52.21%</b>	32 28.32%	22 19.47%
<b>More damage to cars, buildings, or properties as a result of storms and/or flooding</b>	<b>69</b> <b>61.06%</b>	20 17.7%	24 21.24%

# Concern for protection of coastal natural resources

Types of Coastal Animals & Plants	Not At All Concerned	Somewhat Concerned	Very Concerned	Not Sure
Land plants (e.g. waxweed, Buckthorn, & corkwood)	16 13.68%	<b>43</b> <b>36.75%</b>	40 34.19%	18 15.38%
Aquatic/wetland animals (e.g. seaside sparrows & salt marsh snakes)	16 13.91%	33 28.7%	<b>54</b> <b>46.96%</b>	12 10.43%
Beach/dune animals (e.g. sea turtles & snowy plovers)	11 9.32%	26 22.03%	<b>76</b> <b>64.41%</b>	5 4.24%
Commercial species (e.g. Gulf sturgeon & oysters)	3 2.54%	22 18.64%	<b>88</b> <b>74.58%</b>	5 4.24%

# Sea Level Rise – Awareness and concern

Survey Question	Yes	No	Not Sure
Have you seen evidence of sea level rise in this region?	20 17.09%	64 <b>54.7%</b>	33 28.21%
Are you concerned about sea level rise?	43 37.07%	55 <b>47.41%</b>	18 15.52%

# Concern for effects of SLR

	Not At All Concerned	Somewhat Concerned	Very Concerned	Not Sure
Natural Resources (e.g. coastal wetlands)	28 23.73%	<b>39</b> <b>33.05%</b>	38 32.2%	13 11.02%
Infrastructure (e.g. roads, buildings, bridges)	23 19.49%	40 33.9%	<b>44</b> <b>37.29%</b>	11 9.32%
Cultural Resources (e.g. archaeological sites)	36 30.51%	<b>35</b> <b>29.66%</b>	<b>35</b> <b>29.66%</b>	12 10.17%
Recreational Opportunities (e.g. beach-going)	33 27.97%	32 27.12%	<b>43</b> <b>36.44%</b>	10 8.47%
Local Economy (e.g. fishing, tourism industry)	28 23.93%	29 24.79%	<b>50</b> <b>42.74%</b>	10 8.55%
Drinking water supplies	24 20.34%	25 21.19%	<b>58</b> <b>49.15%</b>	11 9.32%
Human Health (e.g. health effects from polluted areas that get flooded)	27 22.88%	26 22.03%	<b>54</b> <b>45.76%</b>	11 9.32%



# Concern about effects of SLR on coastal natural resources

Types of Coastal Animals & Plants	Not At All Concerned	Somewhat Concerned	Very Concerned	Not Sure
Land plants (e.g. waxweed, Buckthorn, & corkwood)	29 24.58%	<b>41</b> <b>34.75%</b>	28 23.73%	20 16.95%
Aquatic/wetland animals (e.g. seaside sparrows & salt marsh snakes)	28 23.93%	<b>43</b> <b>36.75%</b>	29 24.79%	17 14.53%
Beach/dune animals (e.g. sea turtles & snowy plovers)	26 22.03%	33 27.97%	<b>48</b> <b>40.68%</b>	11 9.32%
Commercial species (e.g. Gulf sturgeon & oysters)	26 22.03%	27 22.88%	<b>54</b> <b>45.76%</b>	11 9.32%

# Proportion of \$1 allocated to hypothetical SLR adaptation program

Aspects of Coastal Life	Average Amount of Support (cents)	Min	Max
Wildlife habitat	14	0	75
Natural Beauty / Scenery	10	0	50
Flood and erosion control	13	0	100
Recreation	8	0	40
Local economy	13	0	100
Water supply	14	0	100
Water quality	16	0	100

80% of respondents willing to pay something greater than zero

61% allocated their dollar across all categories

8% allocated zero cents across all categories

# Conclusions

- Survey of residents of a rural, coastal region revealed strong concern for coastal natural resources
- Results indicate little immediate concern about sea level rise but show potential support for SLR policy to protect water quality, water supply, and wildlife habitat
- Survey results help explain and predict behavior and can help target educational and outreach programs
- Stakeholder and public survey results provide indications of feasibility and support for aspects of SLR policies/programs
- **Next Steps:**
  - Continuation of policy analysis and stakeholder surveys
  - Additional surveys (3,000) to be implemented Summer 2012 in 3 more FL regions, will include non-market ecosystem service valuation component

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**Thank You!**

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