2<sup>ND</sup> ANNUAL CAPE COASTAL CONFERENCE

JUNE 6, 2014



Linking Science with Local Solutions and Decision-Making

## Resilience: To What End? Dr. Jeff Payne Acting Director NOAA Coastal Services Center

# RESILIENCE

the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events

National Academy of Sciences, 2012



NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

# **Coastal Economies**

- 98% of products in U.S come through ports
- 45% of GDP is generated in coastal shoreline counties
  - \$6.6 trillion
  - 51 million jobs
  - \$2.8 trillion wages
- Coastal tourism and recreation a significant portion of economy
  - Beach recreation alone ~\$30 billion annually





# A Coastal Nation





#### Coastal Communities Steadily Growing



Persons per Square Mile

NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

## **Coastal Vulnerability Around the World**

Earth at Night More information available at: http://antwep.gsfc.nasa.gov/ap001127.html Astronomy Picture of the Day 2000 November 27 http://antwrp.gsfc.nasa.gov/apod/astropix.html

#### Billion Dollar Weather/Climate Disasters

Munich RE

- Since 1980, 118 billion-dollar weather and climate disasters in U.S.
- Total losses since 1980 of billion-dollar disasters exceed \$800 billion.
- Is the U.S. becoming more exposed and/or sensitive to severe events?

US Natural Catastrophe Update Loss Events in the US 1980 – 2013 Overall and insured losses

**A CHANGING PLANET** 

**MEANS CHANGING** 

**CONDITIONS** 



## What Does the Future Hold?









NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

## What's at Stake?



Note: Figures are the estimated cost to replace insured and insurable residential and commercial structures, including their contents and business interruption coverage, in coastal counties along the U.S. East and Gulf coasts.

#### COASTS

### Key Issues: Coastal Vulnerability

- Increasing Storm Intensity
- Storm Surge & Flooding
- Salt Water Intrusion
- Sea-level change











## **Determining Risk**



### Managing Risk: A Systematic Approach Planning for Long-Term Resilience

#### Promoting Resilience to Coastal Hazards and Climate Change



#### **Building a Weather-Ready Nation**



#### Supporting Community Livability



State and a second second		fant : Somet 1 South 1 Stat 1 Stat 1 Stat			1
	Establisherem	The second s		No.	
B second	Engloyment		10770	Here's	
	Wages				

#### Ensuring Safe, Efficient, and Environmentally Sound Navigation





13



## Managing Risk: Who Pays?



## Sandy: A Turning Point?





## Change is Here: Time to Act is Now



# Call to Action

 Achieve a more resilient nation

 –NAS 2012 – Disaster Resilience: A National Imperative
 –Presidential Policy Directive-8 on National Preparedness
 –President's Climate Action Plan





## **Coasts and Climate Resilience**

NOAA is investing in next generation tools to improve coastal resiliency

- Investigating a dynamic storm surge inundation model as part of
- ightarrow next generation hurricane prediction system
- → Supplying communities with data, models, tools, and training to understand vulnerability to coastal hazards and how to reduce it
- Providing communities with data to minimize development in high hazard risk areas—floodplains/tsunami inundation zones
- → Helping communities translate information to the public and decision makers about coastal hazards and how to avoid impacts



Hurricane Isabel maximum surge and wind at landfall.



NOAA SLOSH model



Extent of flooding in E. New Orleans after Hurricane Katrina

## Coastal Intelligence: Foundational Data



NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

### Not Waiting for a Disaster to Achieve Better Resilience Today

DIGITAL COAST NOAA COASTAL SERVICES CENTER Data Tools Training Stories A	Apply It GeoZone Blog Q Search
1 More Than Just I	Data
Training Communities Need to Address C	coastal issues.
DATA TOOLS TRAINING	STORIES
What is the Digital Coast?	Top: Data Tools Training Stories
Coastal issues aren't easy. Sea level rise, storms, economics, natural resources, natural disasters, long-range planningThere's a lot going on.	1 Sea Level Rise Viewer.
The Digital Coast provides the coastal intelligence needed to conserve natural resources and make coastal communities more resilient.	2 Coastal County Snapshots
See the "About" section to learn more about the dynamic Digital Coast Partnership that makes this resource possible.	3 MarineCadastre.gov National Viewer
Learn More about the Digital Coast	(4) ENOW Explorer
About the Website Partnership Contributing Partners III Watch the Video	5 Land Cover Atlas

#### Digital Coast Resilience Data and Tools

- Coastal County Snapshots
- C-CAP Land Cover Atlas
- Coastal Lidar
- SLR and Coastal Flooding
   Impacts Viewer
- ENOW
- Social Vulnerability Index

#### http://csc.noaa.gov/digitalcoast/



NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

## Decision Support Tools: County Snapshots

COASTAL COUNTY SNAPSHOTS

www.csc.noaa.gov/snapshots/

#### Miami-Dade County, Florida

People + Floodplains = Not Good High-Risk Populations + Floodplains = Even Worse

The more homes and people located in a floodplain, the greater the potential for harm from flooding. Impacts are likely to be even greater when additional risk flactors (age, income, capabilities) are involved, since people at greatest flood risk may have difficulty evacuating or taking action to reduce potential damage.

Based on 2010 U.S. Census records and 2006-2010 American Community Survey 5year Summary File data.

#### Community Infrastructure + Floodplains = Bad News

40% of critical facilities and 46% of road miles (4429 miles) in Miami-Dade County, Florida, are within the floodplain.

Hospitals. Roads. Schools. Shelters. These facilities play a central role in disaster response and recovery. Understanding which facilities are exposed, and the degree of that exposure, can help reduce or eliminate service interruptions and costly redevelopment. Incorporating this information into development planning helps communities get back on their feet faster.

Based on Critical Facilities from FEMA HAZUS.

Increasing Development in Floodplains = More People in Harm's Way Loss of Natural Buffers = Less Protection

A county with more natural areas (wetlands, forests, etc.) and less development within floodplains typically has lower exposure to flooding. A county that monitors land cover changes within the floodplain will detect important trends that indicate whether flood exposure is increasing or decreasing. Arm ed with this information, local leaders can take steps to improve their safety and resilience.

Based on NOAA Land Cover Data





Amount of Land Converted to Development 2003-2006 (acres) Total: 4,069



Type of Land Converted to

Development 2001-2006 (acres)

#### Coastal County Snapshot Uses

- Demographics information
- Exposure and resilience to flooding (population in/out of floodplain)
- Coastal dependent economy
- Comparison across counties
- Downloads can serve as handout/ educational tool

#### www.csc.noaa.gov/snapshots

TIONING AMERICA FOR THE FUTURE

## Decision Support Tools: Coastal Change

#### C-CAP Land Cover Atlas



http://www.csc.noaa.gov/ccapatlas/

NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

#### **SEA-LEVEL RISE**

#### Local sea level changes aren't uniform globally



mm/yr (feet/century)



Source: http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

#### **Providing Framework Elevation Data and Inundation Exposure Maps**



#### **Providing Framework Elevation Data and Inundation Exposure Maps**



#### **Providing Framework Elevation Data and Inundation Exposure Maps**



#### **Providing Framework Elevation Data and Inundation Exposure Maps**



## We Live in a Built Environment



## Natural and Beneficial Functions of Green Infrastructure





### Green/Gray Rebuilding Concepts Visualizing Living Shorelines



http://www.csc.noaa.gov/digitalcoast/tools/canvis



NOAA'S NATIONAL OCEAN SERVICE POSITIONING AMERICA FOR THE FUTURE

## Shared Flood Risk Management: Buying Down Risk



## Will Your Business Be Open Tomorrow?

COMMON



©Insurance Institute for Business & Home Safety

STRONGER

# Some Final Thoughts

- Is Resilience Always Good?
- National Frameworks Recovery
- Partnerships, Multi-Sectoral
- Regional
- Measurement
- Valuation and Efficacy

BACKUP

NOAA PRODUCTS: SEA-LEVEL RISE

### NOAA's Sentinel Sites Program

A suite of services for understanding and responding to sea level change impacts on coastal ecosystems and surrounding communities.





concern within the category.