

# Opportunities for Enhancing Community Resilience

Jessica Grannis & Katie Spidalieri

Marine Affairs Institute Legal Strategies Forum

November 16, 2018

GEORGETOWN  
CLIMATE CENTER

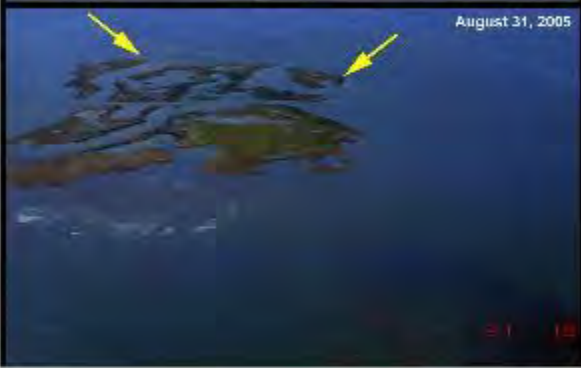
Convenes and  
serves as  
resource to  
states on  
climate and  
energy issues

Brings  
together  
academics and  
policymakers  
to improve  
climate policy

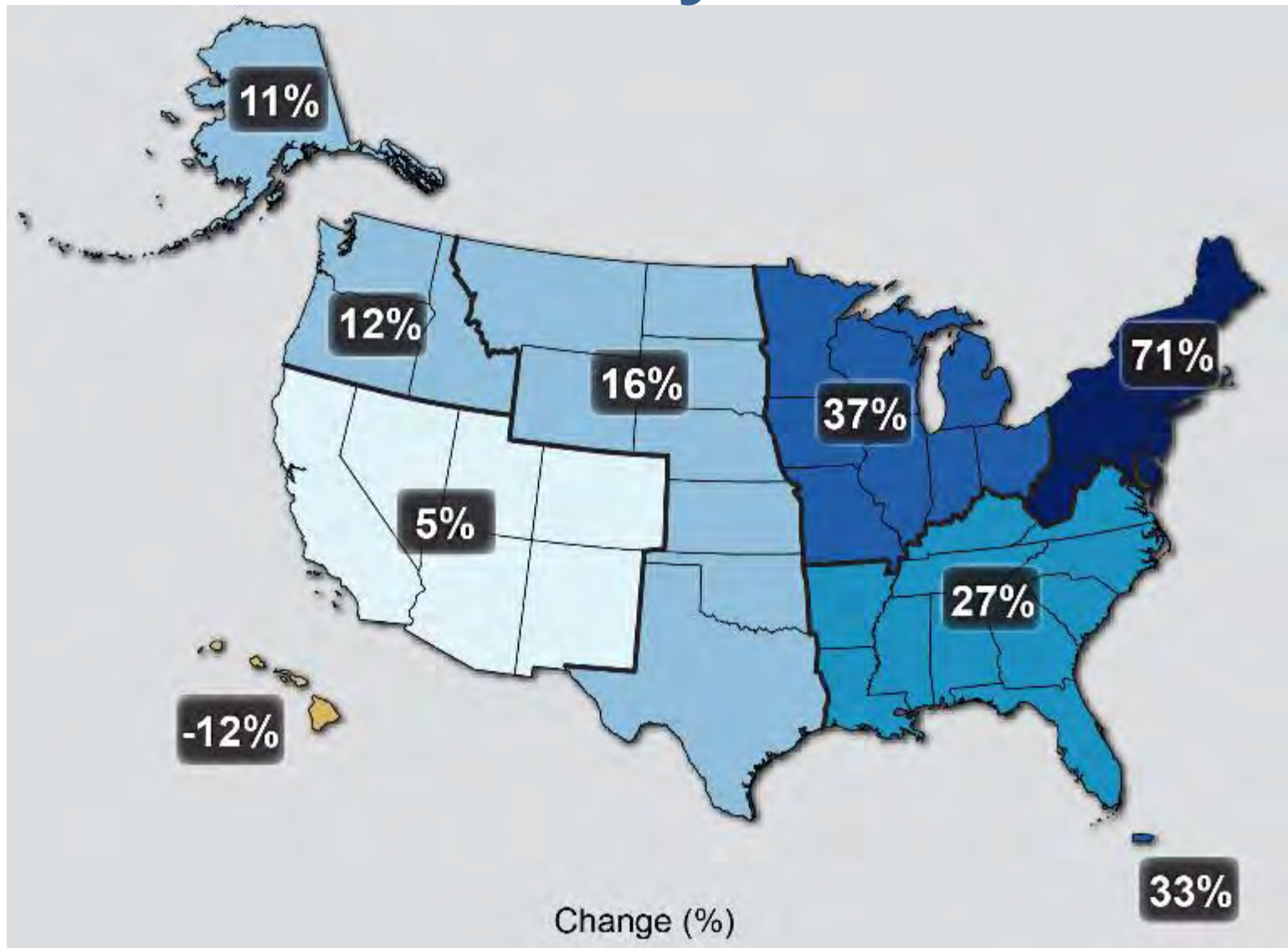
Informs the  
development of:

- Legislation
- Regulations
- Transportation policy
- Adaptation policy



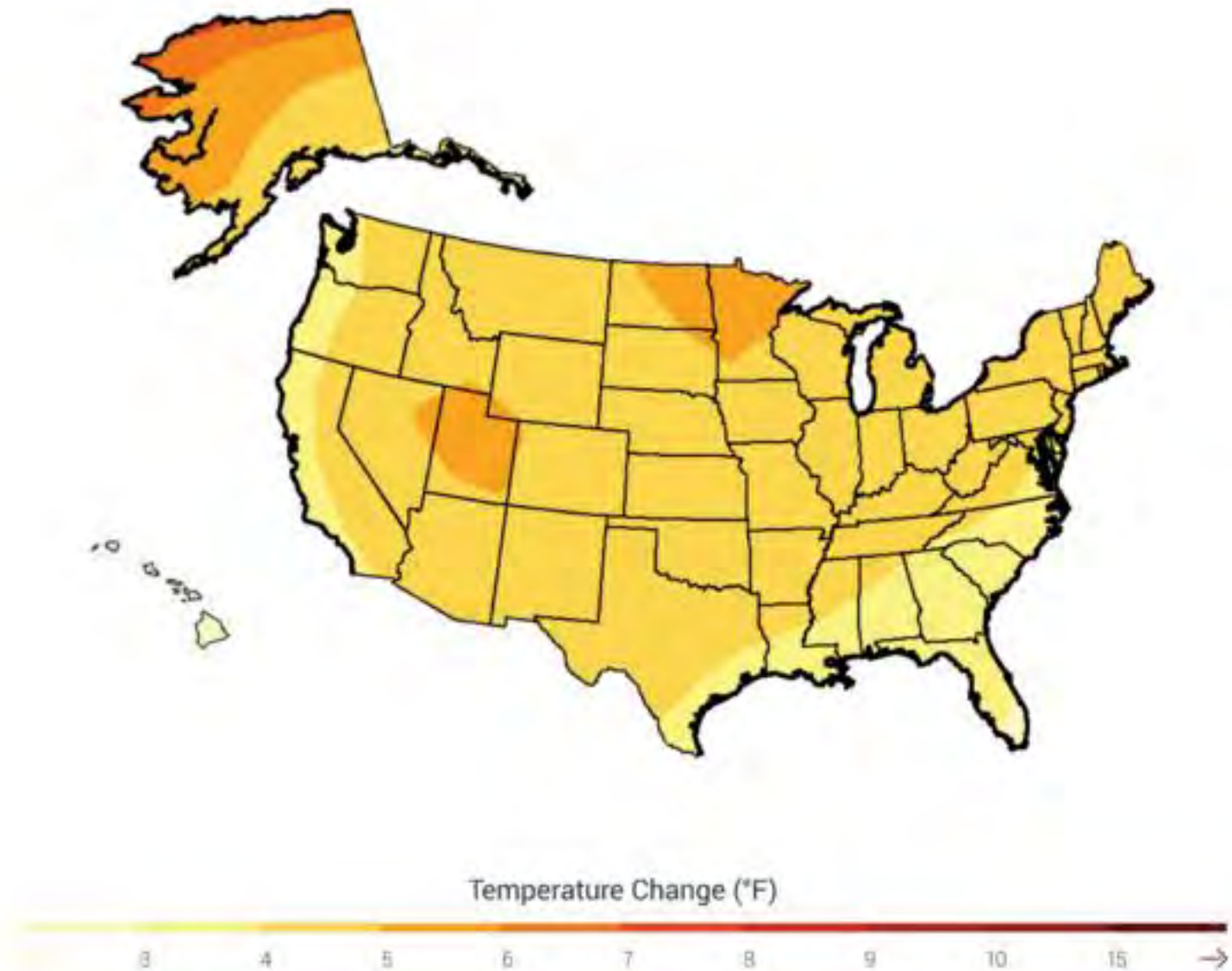


# More Heavy Rainfall

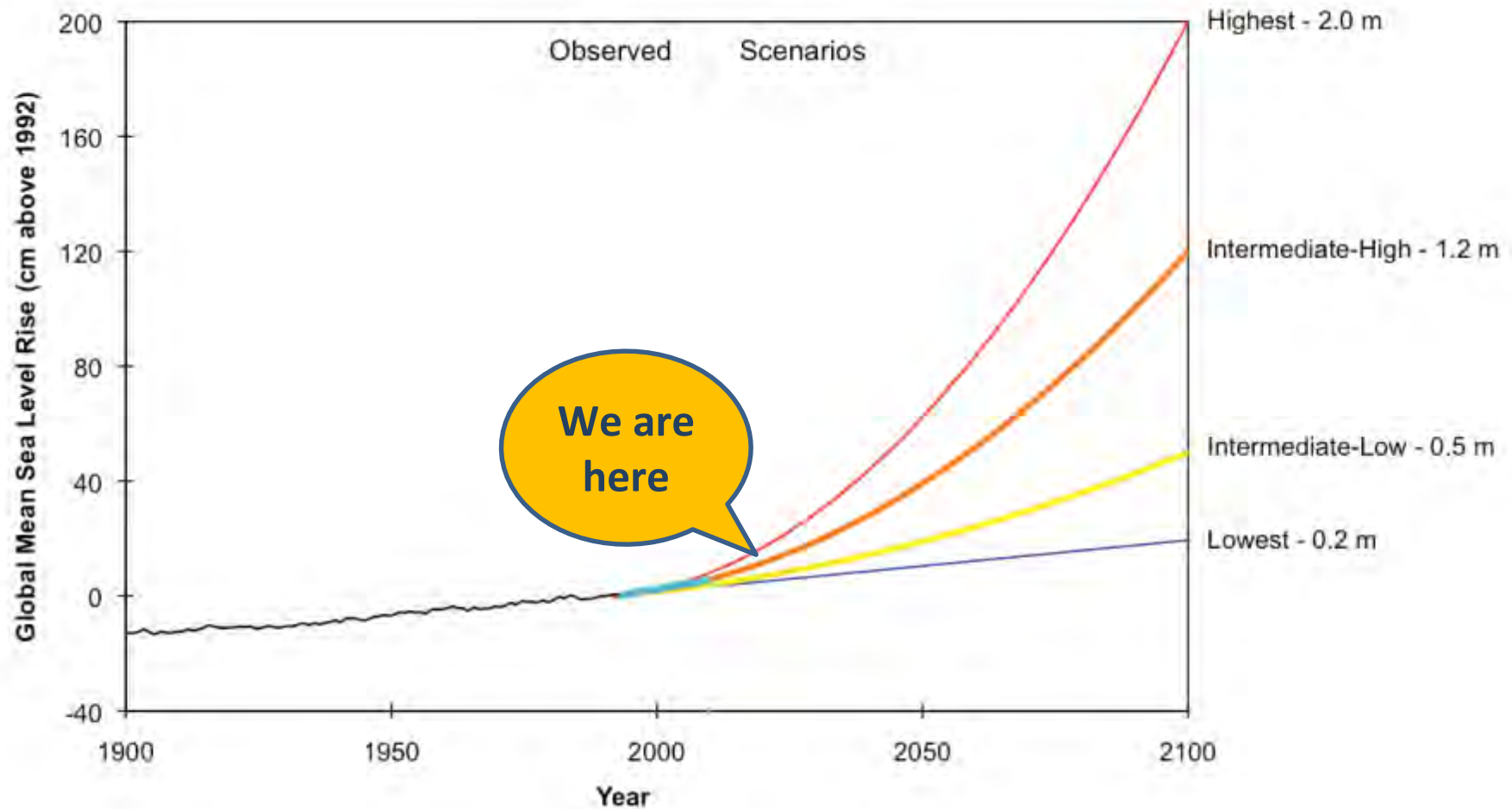




# More Heat Waves



# How Much Sea-Level Rise?



**0.7 – 6.6 feet by 2100**





# Adaptation Options



Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).



# Adaptation Options



Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).

# Adaptation Options

**Accommodate**



**Protect**

Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).

# Adaptation Options

**Accommodate**

**Retreat**



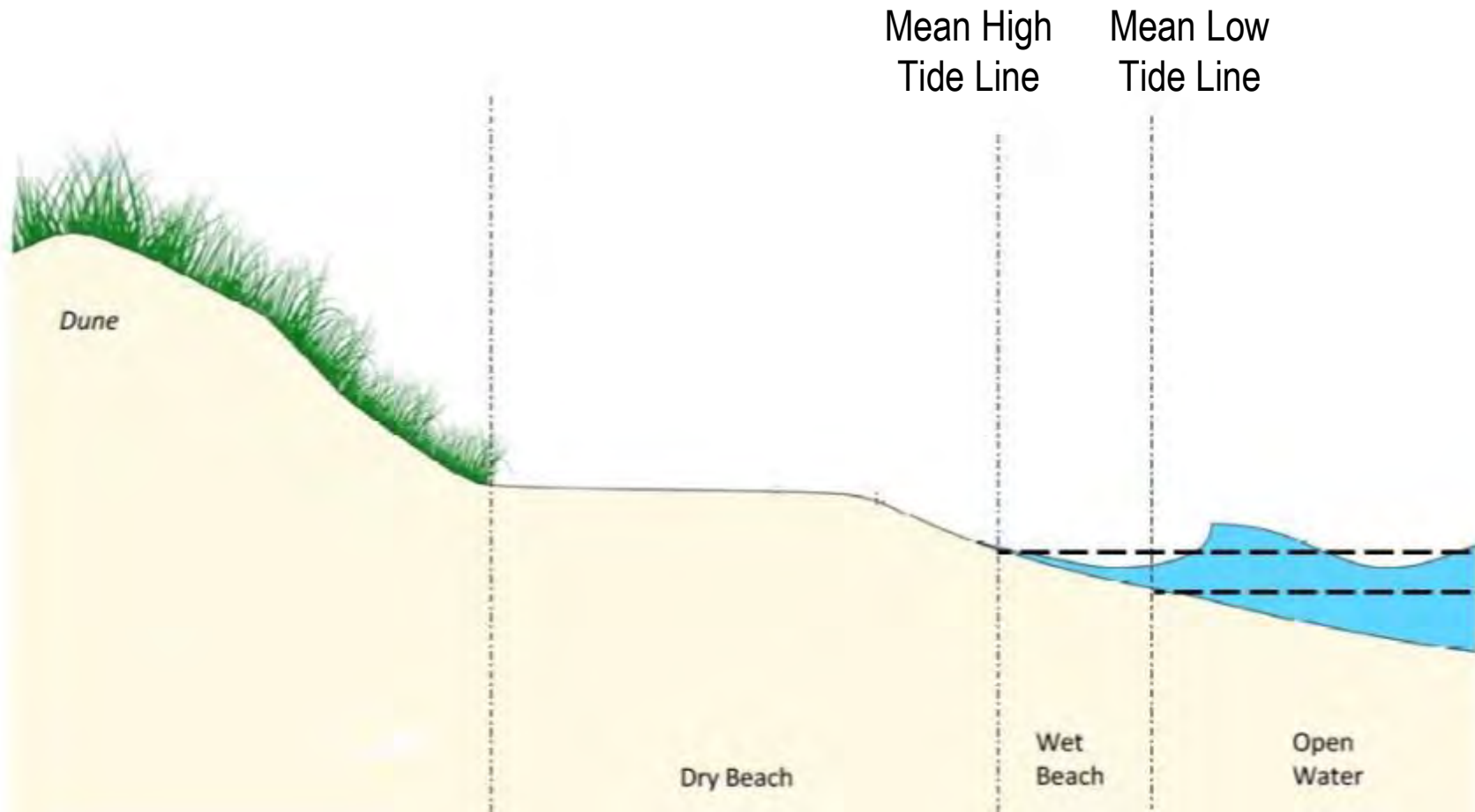
Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).



# LEGAL FEASIBILITY?

Question	Analysis
<b>Authority?</b>	<ul style="list-style-type: none"><li>• Local authority to zone and plan</li><li>• State agency roles</li></ul>
<b>Compliance with state laws?</b>	<ul style="list-style-type: none"><li>• Coastal act</li><li>• Floodplain requirements</li><li>• Wetlands regulations</li><li>• Historic preservation</li></ul>
<b>Compliance with federal laws?</b>	<ul style="list-style-type: none"><li>• National Flood Insurance Program</li><li>• Clean Water Act</li><li>• Americans with Disabilities Act</li></ul>
<b>Constitutional questions?</b>	<ul style="list-style-type: none"><li>• Takings</li><li>• Substantive due process</li></ul>

# IS IT LEGAL?

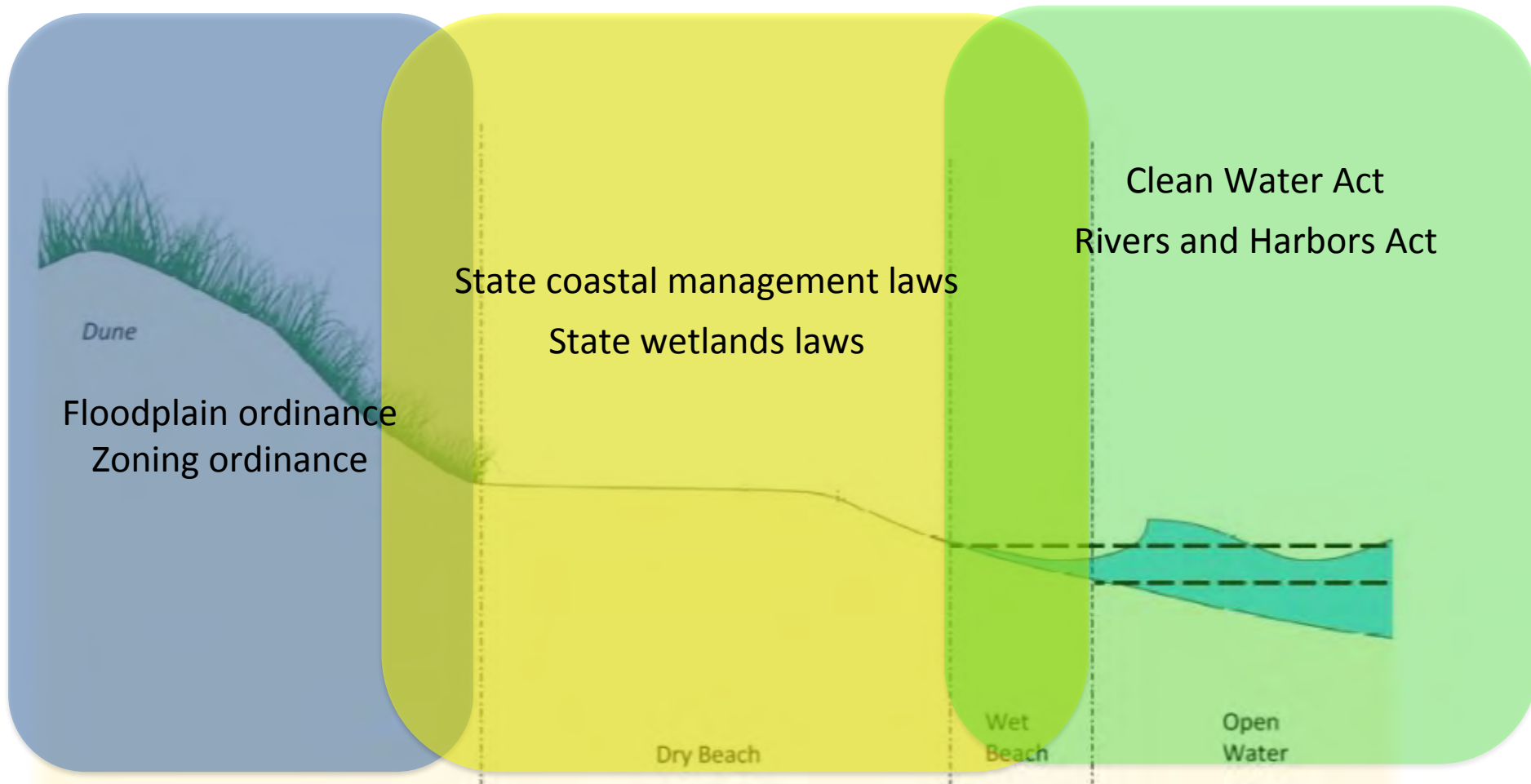


# IS IT LEGAL?

Local

State

Federal





# LEGAL HURDLES

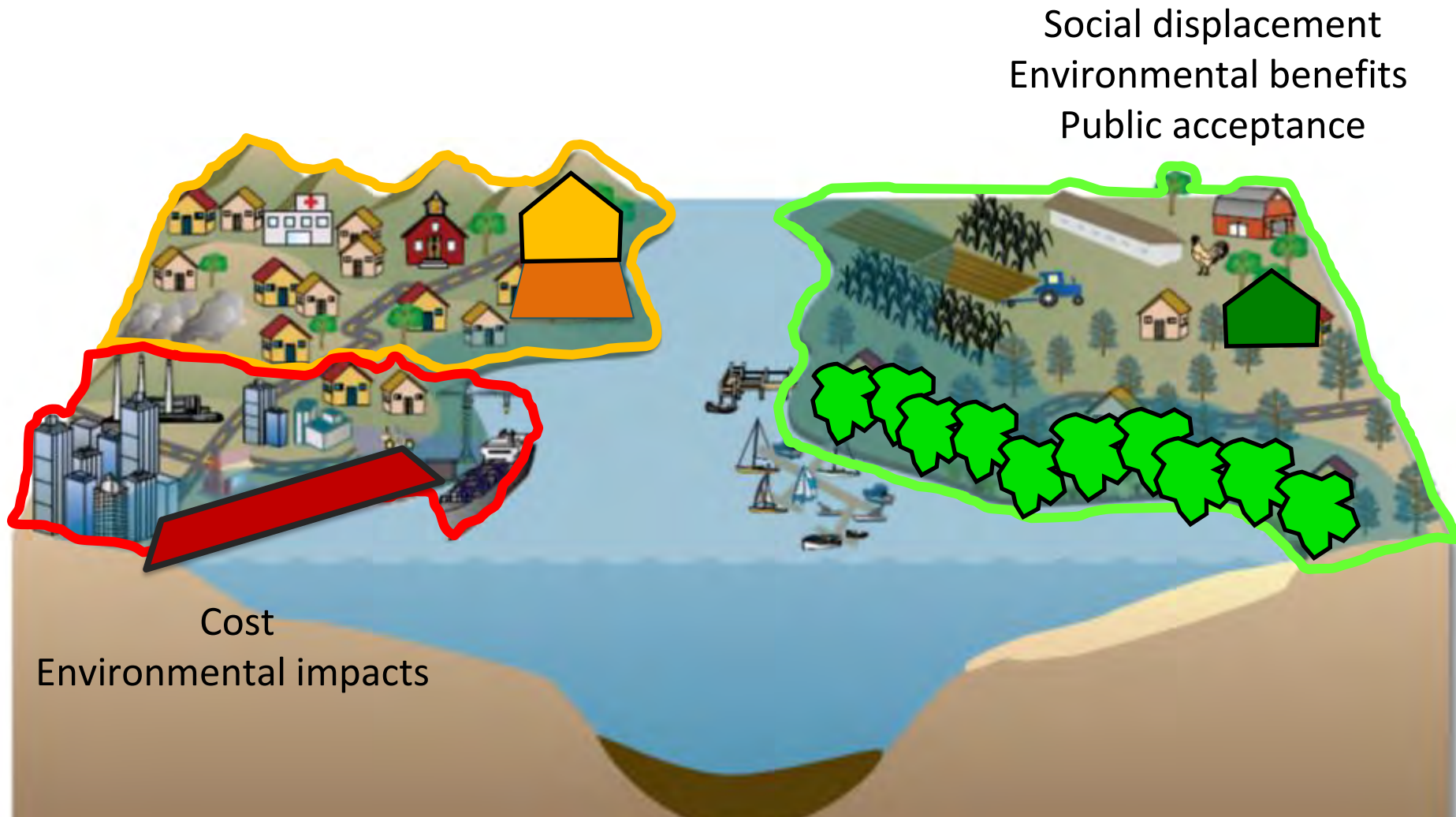
Historic Preservation  
Americans With Disabilities Act

Takings  
Grandfathering



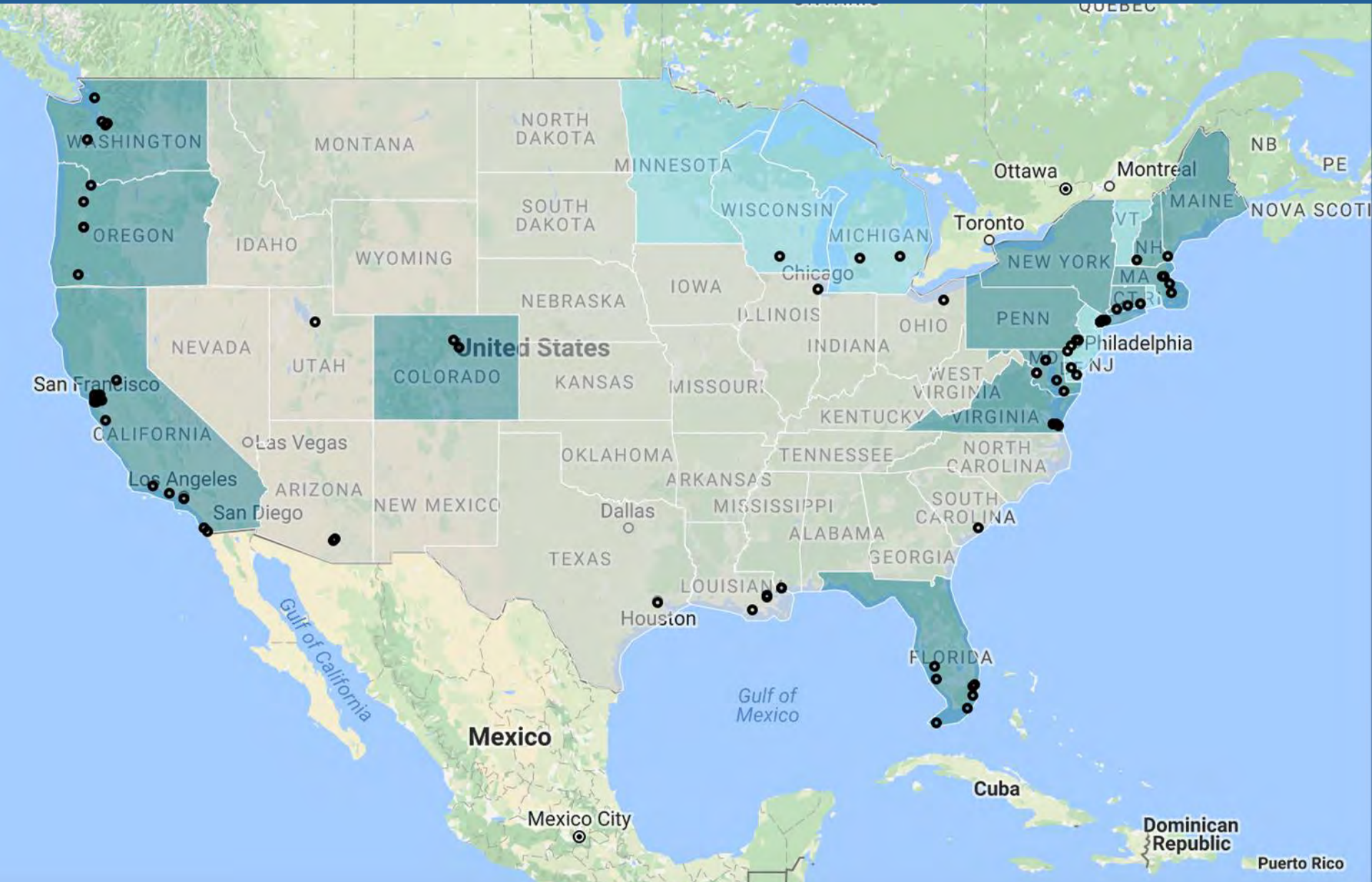
Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).

# POLICY CONSIDERATIONS



Graphic courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/)).

# STATE AND LOCAL ACTION







LOCAL

# PLANNING

## *Baltimore's Hazard Mitigation Plan*

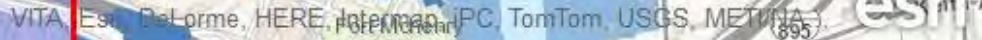


### IMPLEMENTATION GUIDELINES

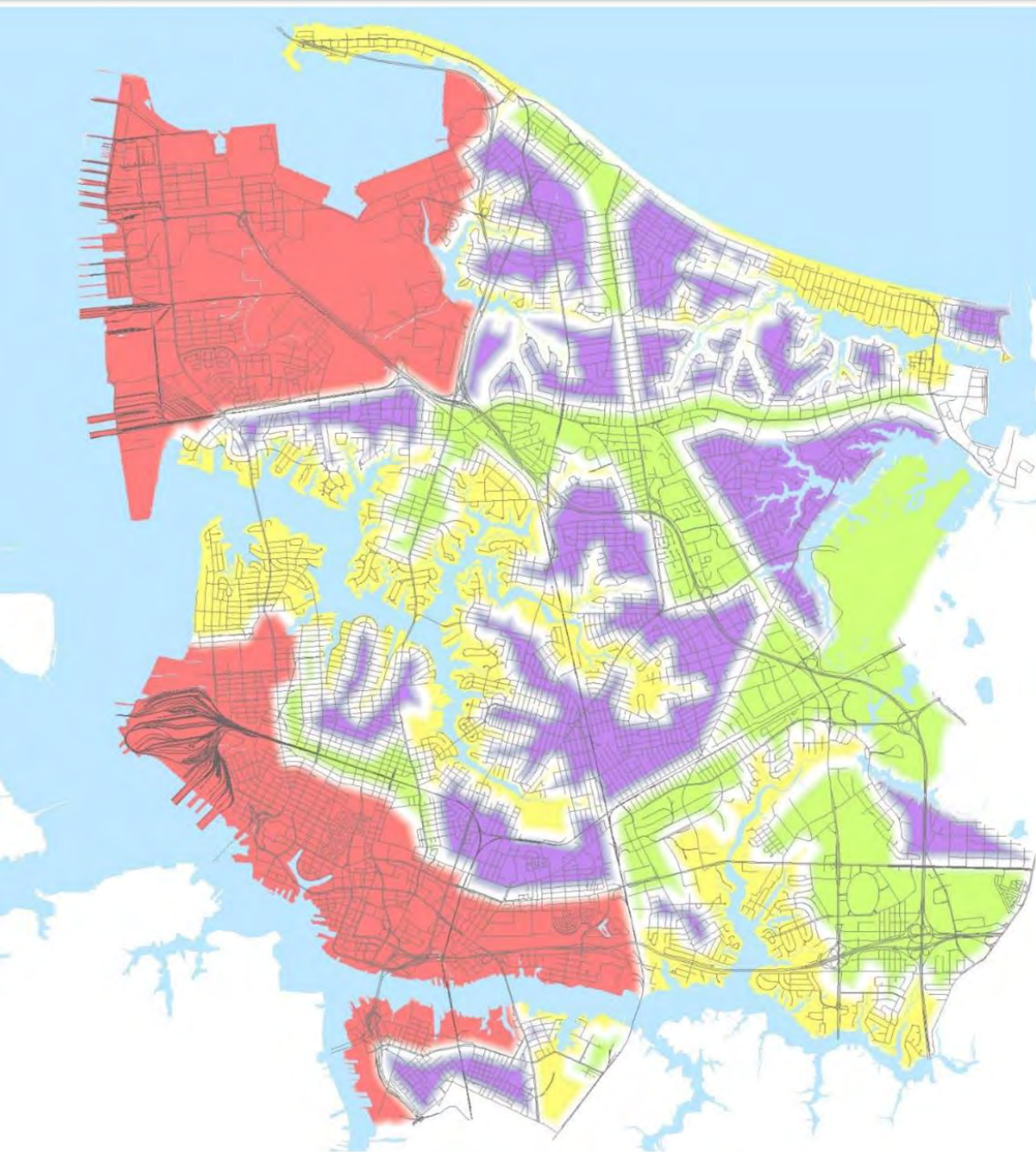
Lead Agency	MOEM
Stakeholders	BCRP (Forestry), BGE, Building Owners, DGS, DOT, DPW, Exelon, PSC, Utility customers, Veolia, Wheelabrator
Alignment with Goals	Goals 2 and 3
Connection with Existing Efforts	 Building Standards and Zoning Codes; CAP; ESF-12; MDNR
Timeframe	



## Baltimore, MD







# PLANNING

*Norfolk, VA*  
*Vision 2100 Plan*



# RESILIENCE QUOTIENT SYSTEM

*Norfolk, VA*



# RESILIENCE QUOTIENT SYSTEM

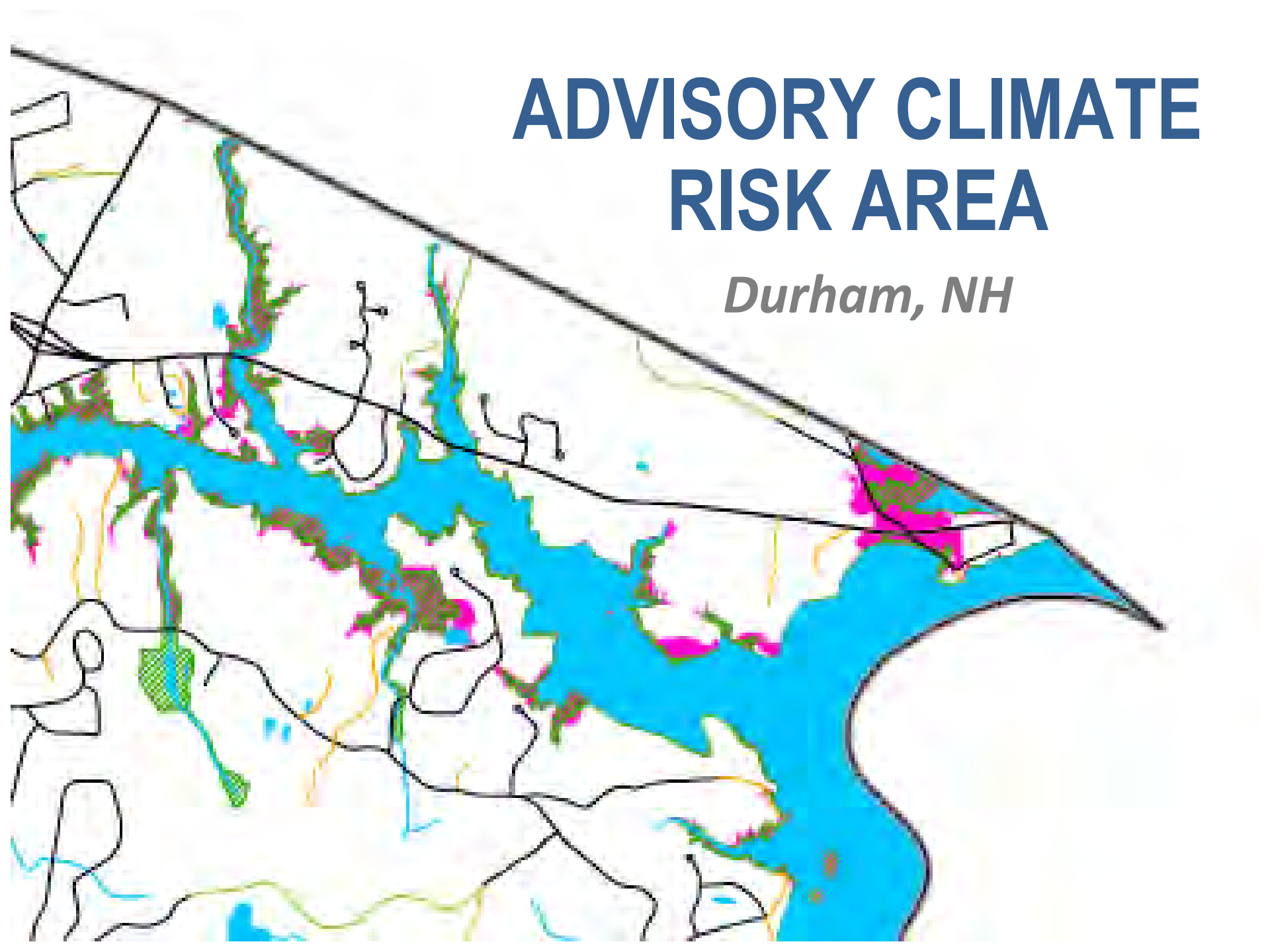
*Norfolk, VA*





# ADVISORY CLIMATE RISK AREA

*Durham, NH*



# ADAPTATION CHECKLIST

*Spaulding Hospital, Boston*

Critical equipment on roof

Elevated to 2085  
100-year floodplain

Operable windows











# Local Taxation

*Measure AA San  
Francisco Bay*



# WE DID IT

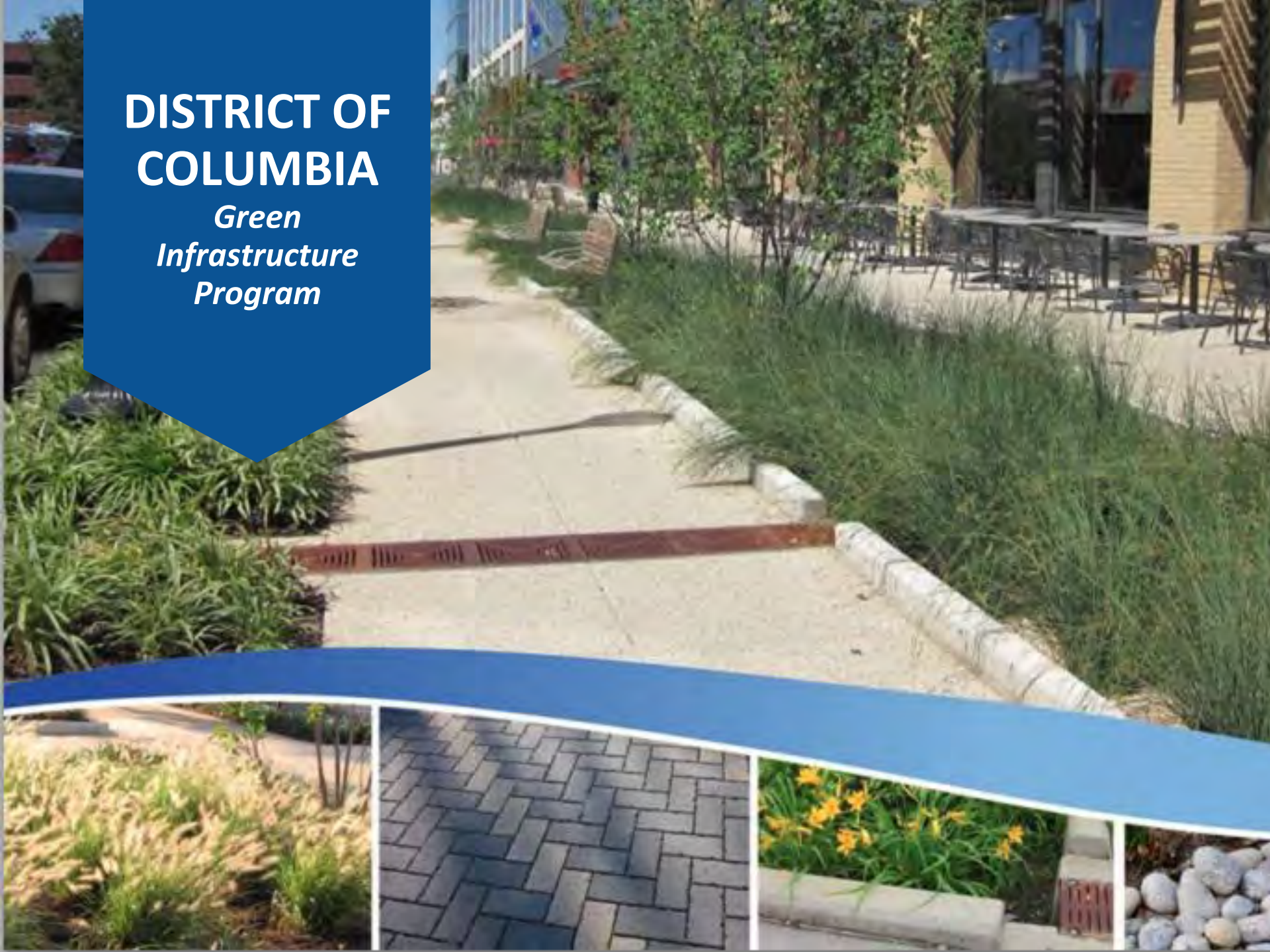
*Thank you Bay Area!*





# DISTRICT OF COLUMBIA

## *Green Infrastructure Program*







STATE



### Video Tour

VIEW THE DIFFERENT TOOLS AND  
DATA AVAILABLE IN CAL-ADAPT




### Explore Climate Tools


INTERACTIVE MAPS & CHARTS



### About Cal-Adapt

 WHAT'S NEW?

 WHAT'S TO COME?

 FAQs

### Access Data

### Resources

INFORMATION, ARTICLES & LINKS




Find out more about how climate change  
in California is relevant to your  
community

### Community

PARTICIPATE IN COMMUNITY BASED  
TOOLS AND ACTIVITIES



Find out how you can share your thoughts  
and findings, communicate with experts,  
and help to collect new data

 Tweet 273

 Like 451

**CALIFORNIA:**  
*Technical Support*

# MARYLAND:

## *Coast Smart Construction Rules*







# FINANCING

*Shoreup Connecticut*



# HAWAII

*Hotel Tax*



6:00



**ROCKY POINT**  
NORTH SHORE

HIGH WATER OVERTAKES DOWNTOWN CEDAR RAPIDS  
THOUSANDS EVACUATED IN UNPRECEDENTED FLOOD  
POWER LOSS WIDESPREAD; WATER IN SHORT SUPPLY



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FRIDAY  
June 13, 2008  
www.gazetteonline.com

75 CENTS

# EPIC SURGE



## IOWA Flood Mitigation Program

MORE FLOODING COVERAGE AT  
[WWW.GAZETTEONLINE.COM](http://WWW.GAZETTEONLINE.COM)

- GET THE LATEST ON FLOODING IN LINN COUNTY, JOHNSON COUNTY AND EAST IOWA
- VIEW PHOTO GALLERIES OF RESCUES, EVACUATIONS AND DEVASTATION
- SEE AERIAL VIDEO TAKEN FROM ATOP A HOTEL IN DOWNTOWN CEDAR RAPIDS
- WATCH VIDEO OF RESIDENTS BEING RESCUED BY BOAT IN THE TIME CHECK AREA

The swollen Cedar River continues to rise Thursday afternoon on its way to an unprecedented crest today, overmaking city bridges, pouring into downtown and encroaching May's Island (right). The island is home to the Linn County Jail (background), Linn County Courthouse (middle) and Cedar Rapids City Hall (foreground).



CREATED BY  
BRIAN R. COLEMAN  
A-00001 2007-0020

Index

Index	42	Chicks	42	Marriage	42	Money	42
Arrests	42	Chicks	42	Marriage	42	Money	42
Arrests	42	Chicks	42	Marriage	42	Money	42

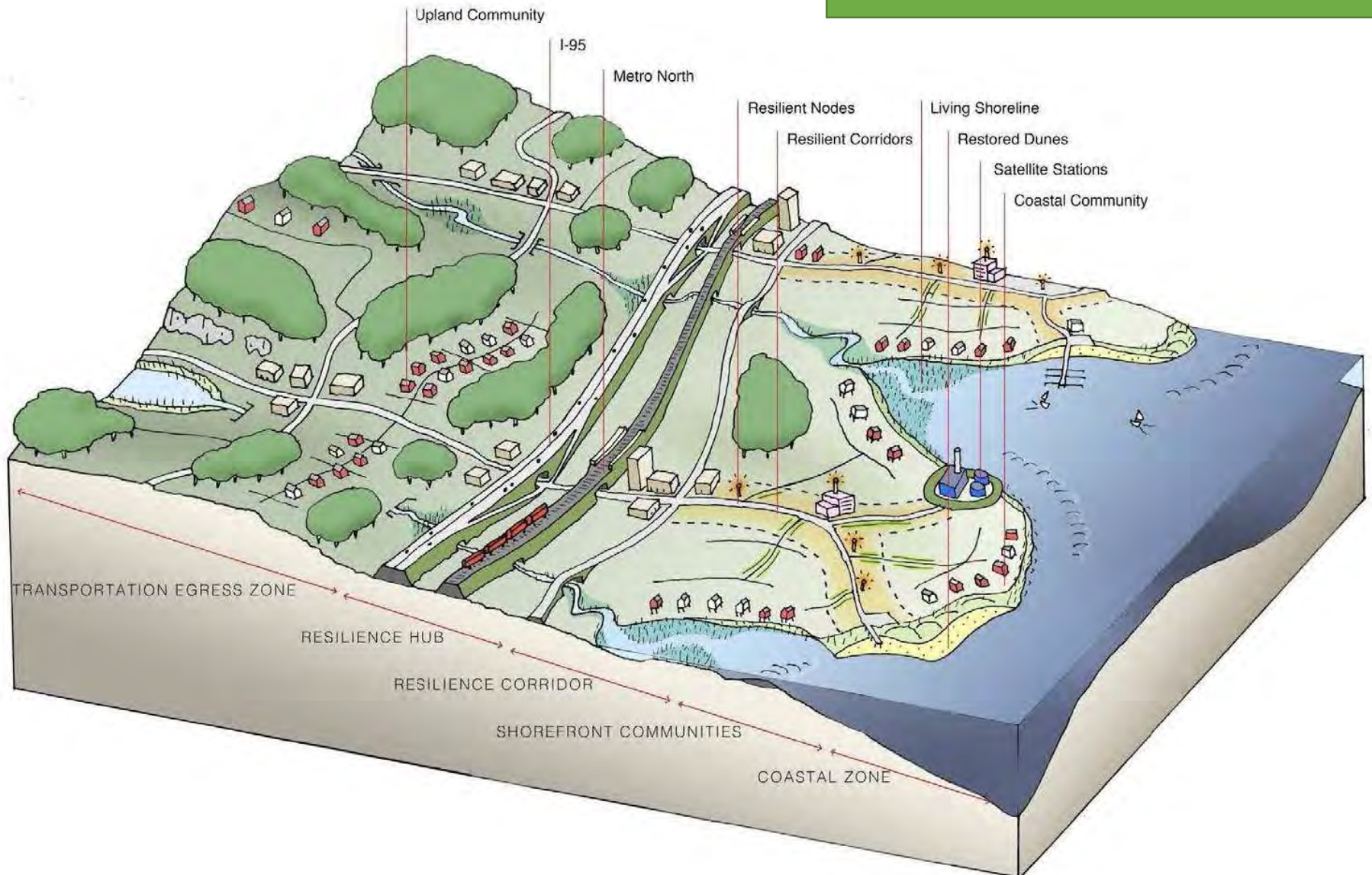
TODAY'S  
WEATHER

Partly to mostly cloudy  
Today 71 to 80  
Friday 70 to 80



# DISASTER RECOVERY

## *Resilient Bridgeport*

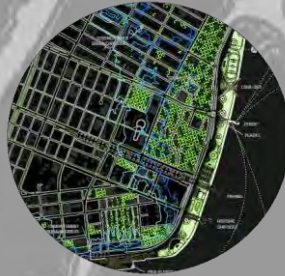




# REBUILD BY DESIGN



Resist, Delay,  
Store, Discharge



Big U



Living with the  
Bay



Living  
Breakwaters

# A Focus on Strategies for Facilitating Retreat

# PLANNING:

## *Resilient Edgemere (New York City)*

### Short-term Vision



### Long-term Vision





# LOCAL BUYOUTS:

*Charlotte-Mecklenburg County, NC*



# SETBACKS:

*Kauai, HI*



# OVERLAY DISTRICTS:

*Chatham and Oak Bluffs, MA*







**TAKINGS**



# STATE CZM PLANS:

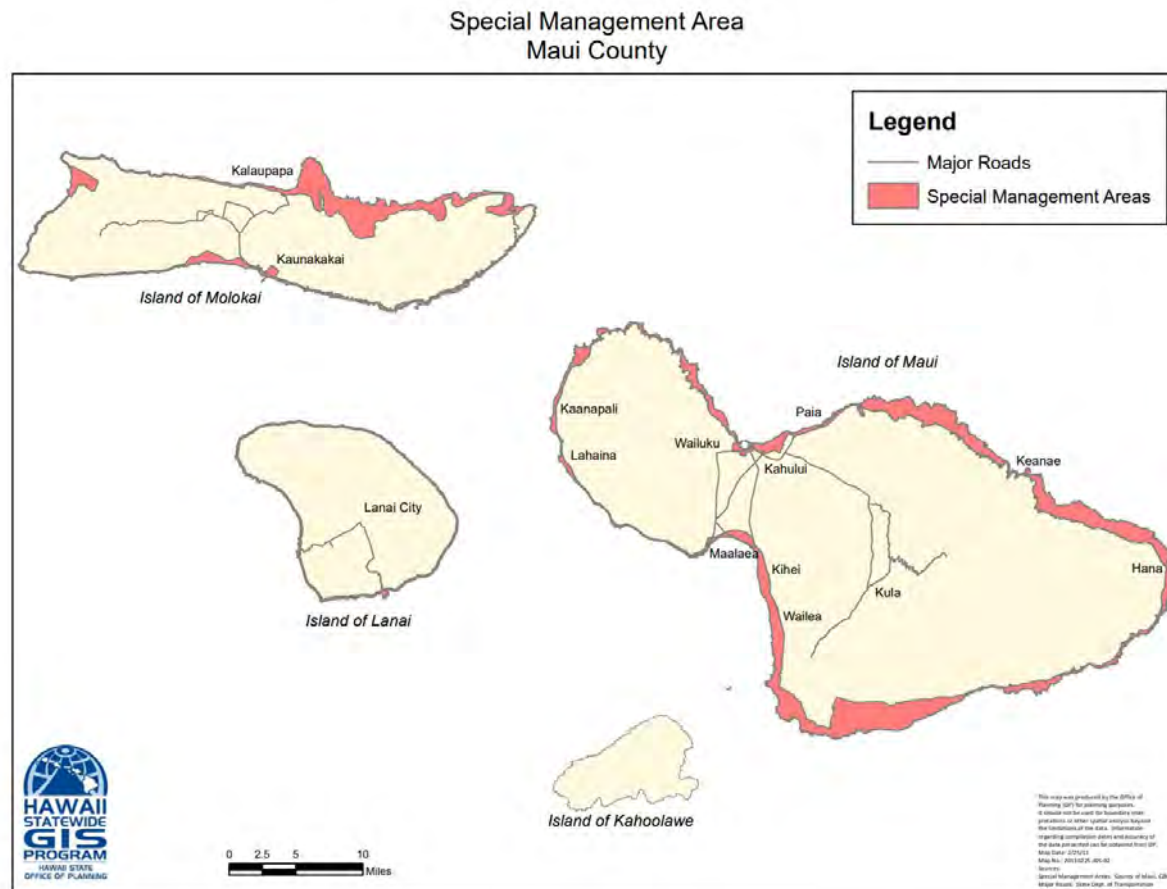
## *Rhode Island Shoreline Change Special Area Management Plan*





# SPECIAL MANAGEMENT AREAS:

## *The Island of Lanai, HI*



# ECOSYSTEM MIGRATION:

## *Yankeetown, Florida Natural Resource Adaptation Action Area*

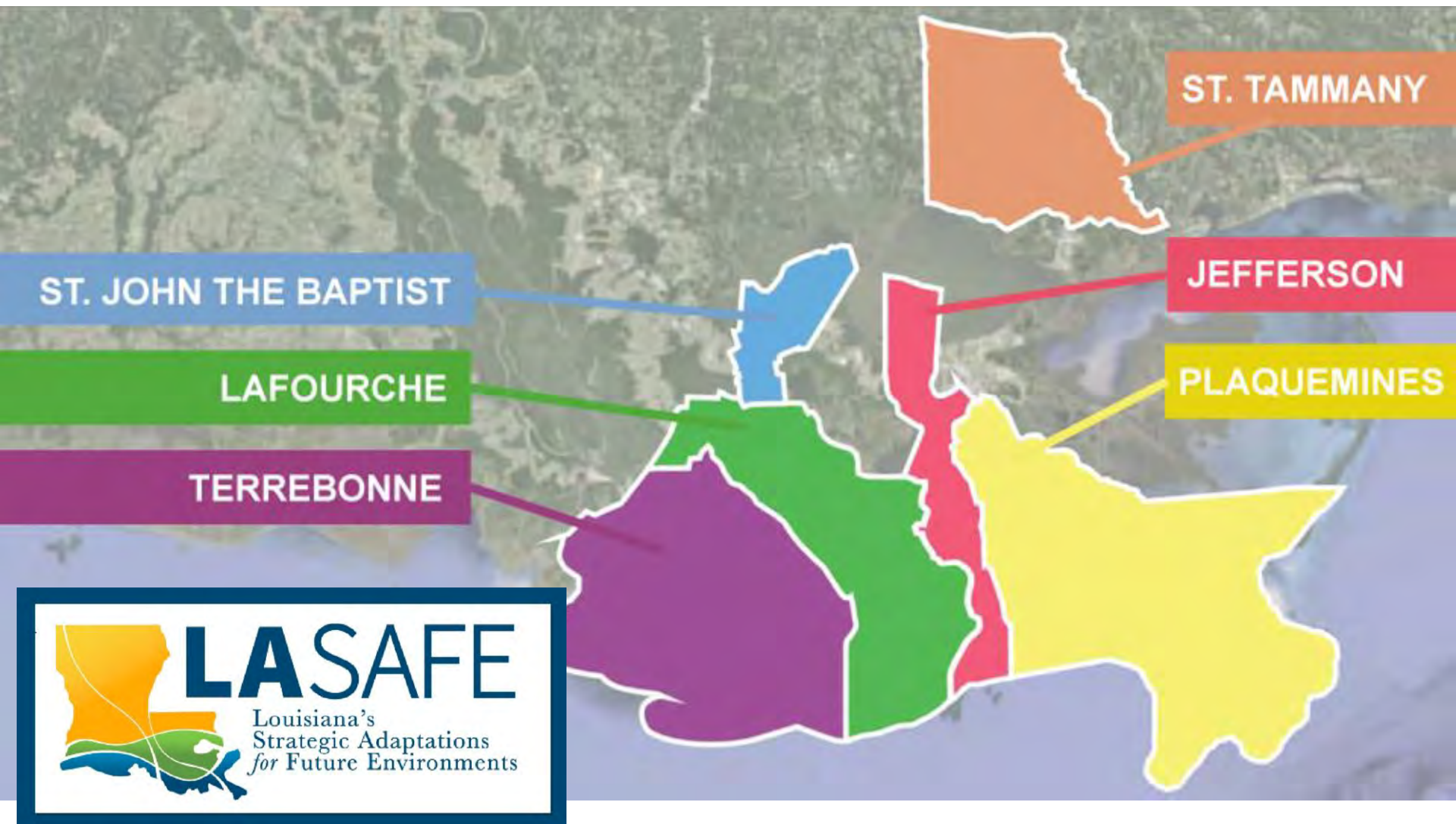


Credit: Isaac Babcock/Special to USA TODAY NETWORK - FLORIDA)

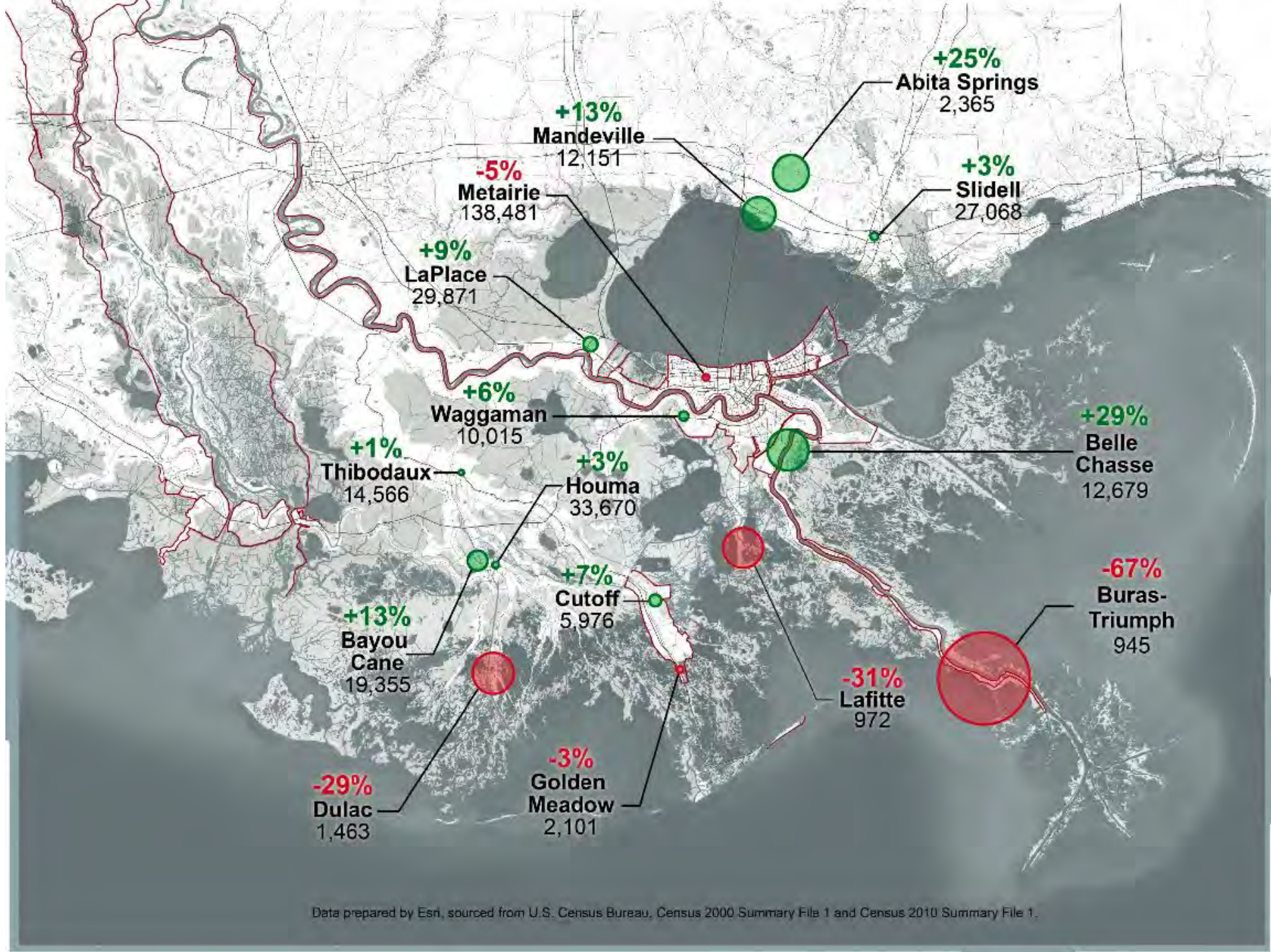


# RECEIVING COMMUNITIES:

*Louisiana*







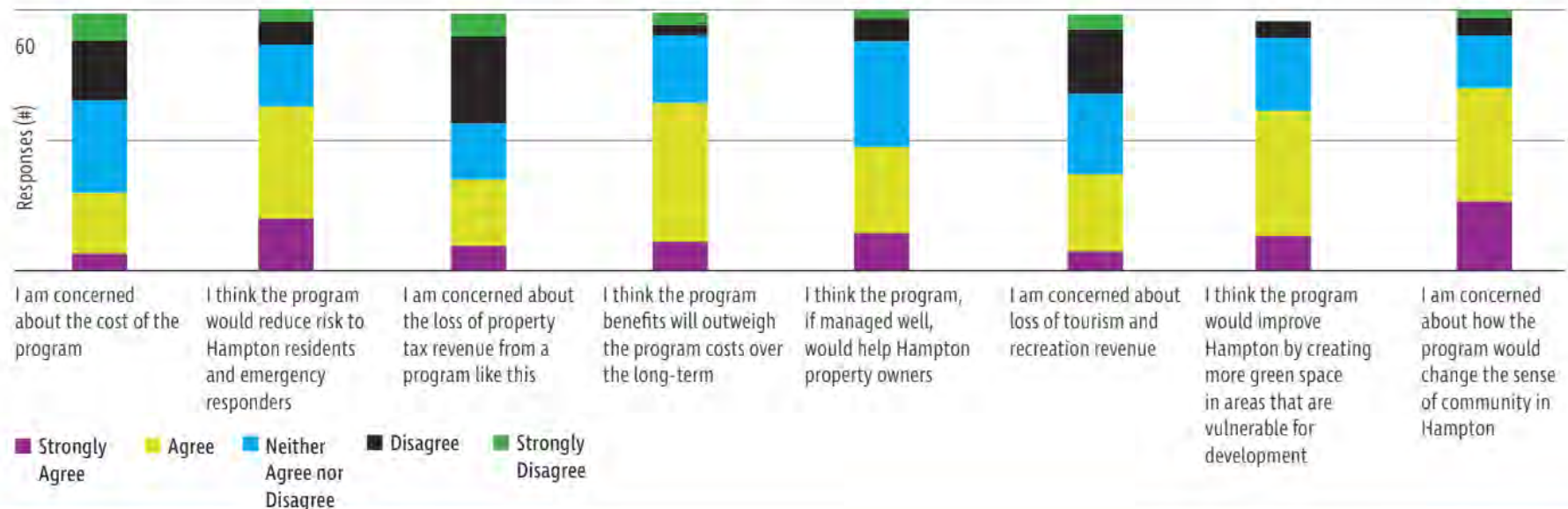
Data prepared by Esri, sourced from U.S. Census Bureau, Census 2000 Summary File 1 and Census 2010 Summary File 1.



# COMMUNITY ENGAGEMENT:

## *Hampton, NH*

### Local Opinions About a Buyout or Managed Retreat Program



# FUNDING:

## *Massachusetts H. 4835*



Credit: State of Massachusetts



Other Georgetown Climate Center

**RESOURCES**

## Welcome to the Adaptation Clearinghouse

An online database and networking site that serves policymakers and others who are working to help communities adapt to climate change

Search the Clearinghouse

By Keyword

By State

### Put the Power of the Adaptation Clearinghouse to Work for You

- Customize the Adaptation Clearinghouse to meet your needs
- Receive updates about new resources that match your interests
- Connect with other professionals

## Green Infrastructure Toolkit



green infrastructure  
toolkit

GEORGETOWN CLIMATE CENTER

## State and Local Adaptation Plans

Select a State

Select State

Go

States and communities around the country have begun to prepare for the climate changes that are already underway. This planning process typically results in a document called an adaptation plan.

Below is a map that highlights the status of state adaptation efforts. Click on a state to view a summary of its progress to date and to access its full profile page. State profile pages include a detailed breakdown of each state's adaptation work and links to local adaptation plans and resources. Please move the map to view Alaska and Hawaii.







## sea-level rise toolkit



# For More Information and Additional Resources:

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202-662-4046

<http://www.GeorgetownClimate.org>  
<http://www.AdaptationClearinghouse.org>

GEORGETOWN CLIMATE CENTER

A Leading Resource for State and Federal Policy



## Welcome to the Adaptation Clearinghouse

– an online database and networking site that serves policymakers and others who are working to help communities adapt to climate change.

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By Keyword

By State

SEARCH FOR: ☐ RESOURCES ☐ ORGANIZATIONS ☐ USERS ☒ ALL

Enter a keyword

SEARCH

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BECOME A MEMBER

LOGIN

### Recently Added Resources

Resource

#### San Francisco Bay Clean Water, Pollution Prevention and Habitat Restoration Measure

June 7, 2016

The San Francisco Bay Clean Water, Pollution Prevention and Habitat Restoration Measure was approved by the nine county San Francisco Bay Area region of California and became law on June 7, 2016. The measure implements a regional tax - approved across the nine counties - to fund coastal habitat rehabilitation programs and adaptations to sea level rise and flooding. The purpose of the measure as stated is "to protect and restore San Francisco Bay to benefit future generations by reducing trash, pollution, and harmful toxins, improving water quality, restoring habitat for fish, birds, and wildlife, protecting communities from flood, and increasing shoreline public access and recreational areas."

**Related Organizations:** San Francisco Bay Restoration Authority

**Resource Category:** Law and Governance

Average Rating



SEE RESOURCE

LOGIN TO ADD TO MY RESOURCE LIST

### Featured Sectors



COASTAL



ECOSYSTEMS



ENERGY



PUBLIC HEALTH



TRANSPORTATION



WATER

Select the  
sectors tab to  
find sector  
portals



## Sectors

This page allows you to explore the resources in the Adaptation Clearinghouse by sector. Each sector page includes curated lists of resources on adaptation efforts in specific sectors.

Sectors covered include agriculture and food, business, coastal, ecosystems, emergency preparedness, energy, land use, public health, transportation, water, and more.

These pages provide easy-to-navigate lists of resources to help policymakers assess vulnerabilities, develop plans, and respond to climate change impacts in that sector. These pages also allow users to see resources that are most popular among adaptation experts.

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BECOME A MEMBER

LOGIN

### All Sectors



#### Agriculture & Food

Climate change is changing our assumptions about agriculture and food production. This page includes resources to help policymakers adapt to climate change impacts to the agricultural sector and to food systems.

If you are interested in the agricultural and food sectors, please sign up for email updates to receive monthly notifications about all of the latest agricultural and adaptation resources.

VIEW SECTOR



#### Business

This page includes resources to help policymakers and businesses understand, plan, and prepare for the impacts of climate change to the business sector, including risks to operations, investments, and profits. Resources describe how climate change consideration in business decisions can promote long-term economic health.

If you are interested in adaptation efforts in the business sector, please sign up for email updates to receive monthly notifications about all the latest business resources.

VIEW SECTOR



#### Coastal

Climate change will have profound effects on resources, communities, and infrastructure in coastal regions. This page includes resources to help policymakers understand, plan, and prepare for the impacts of climate change to the coastal sector, including coastal communities and infrastructure, and coastal and marine ecosystems.

Tabs include climate science & tools, plans, planning guides, funding programs, and other resources tailored for policymakers working in the coastal sector.

If you are interested in coastal issues, please sign up for email updates to receive monthly notifications about all the latest coastal resources.

VIEW SECTOR



#### Ecosystems

This page includes resources to help policymakers understand, plan, and prepare for the impacts of climate change on biodiversity and ecosystems including fish and fisheries, forests, oceans, and wildlife. It also includes resources tailored for natural resource managers pursuing land management and conservation strategies to prepare for the impacts of climate change.

If you are interested in biodiversity and ecosystems issues, please sign up for email updates to receive monthly notifications about all the latest resources in this sector.

VIEW SECTOR



POPULAR RESOURCES

TRANSPORTATION  
BASICS

ASSESSMENTS & TOOLS

PLANS

PLANNING GUIDES

LAW & POLICY

CASE STUDIES

FUNDING

PROJECT DESIGN

OPERATIONS &  
MAINTENANCE

ORGANIZATIONS

GEOGRAPHIC SEARCH



Resource

## Vermont Culvert Rebuilding after Tropical Storm Irene

December 2013

Vermont experienced significant barriers to using disaster relief funding to install larger culverts after Tropical Storm Irene. The storm caused massive damage to the state's transportation infrastructure and warranted a presidential disaster declaration. In the aftermath of the event, the Vermont Transportation agency (VTrans) and localities followed state regulations that required the installation of larger culverts to address increased stream flow and to allow for fish passage. Localities, however, were denied reimbursement for these "improvements" by the Federal Emergency Management Agency (FEMA), the agency that administers disaster relief funding for rebuilding local roads and bridges. Vermont's experience shows one of the challenges of adapting transportation infrastructure during the critical window of opportunity after a disaster.

**Related Organizations:** Vermont Agency of Transportation (VTrans), [Georgetown Climate Center](#)

**Resource Category:** Law and Governance

SEE RESOURCE

ADD TO MY RESOURCE LIST





Select the network tab to find portals tailored for specific audiences

## Networks

Network pages in the Adaptation Clearinghouse are designed to help practitioners quickly find the reports, case studies, model laws, and examples most relevant to their work – a task that is becoming even more essential with the growing number of adaptation resources produced every week.

Join networks to locate and share relevant resources rated by expert users with others working in your field or area of practice.

Want to create a network to share resources in the Adaptation Clearinghouse and on your own website? Find out why organizations like the Urban Sustainability Directors Network, the American Society of Adaptation Professionals, and the EPA partner with us.

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BECOME A MEMBER

LOGIN



### Local Government Professionals

The Local Government Professionals Portal is designed to help local officials in their efforts to prepare for the impacts of climate change. Users can find, rate, and share the adaptation resources that are aimed at and most useful to local government officials. It was developed in collaboration with the Urban Sustainability Directors Network (USDN) and features resources developed by USDN and its members.

VIEW NETWORK



### State Government Professionals

State action to prepare for climate change is essential for preparing the nation as a whole. This network provides state professionals access to resources specifically tailored for state decisionmakers. State climate adaptation leaders can find examples of innovative state policies, agency guidance, and sector specific tools. State actors can also share key resources with one another by uploading resources to the site.

VIEW NETWORK



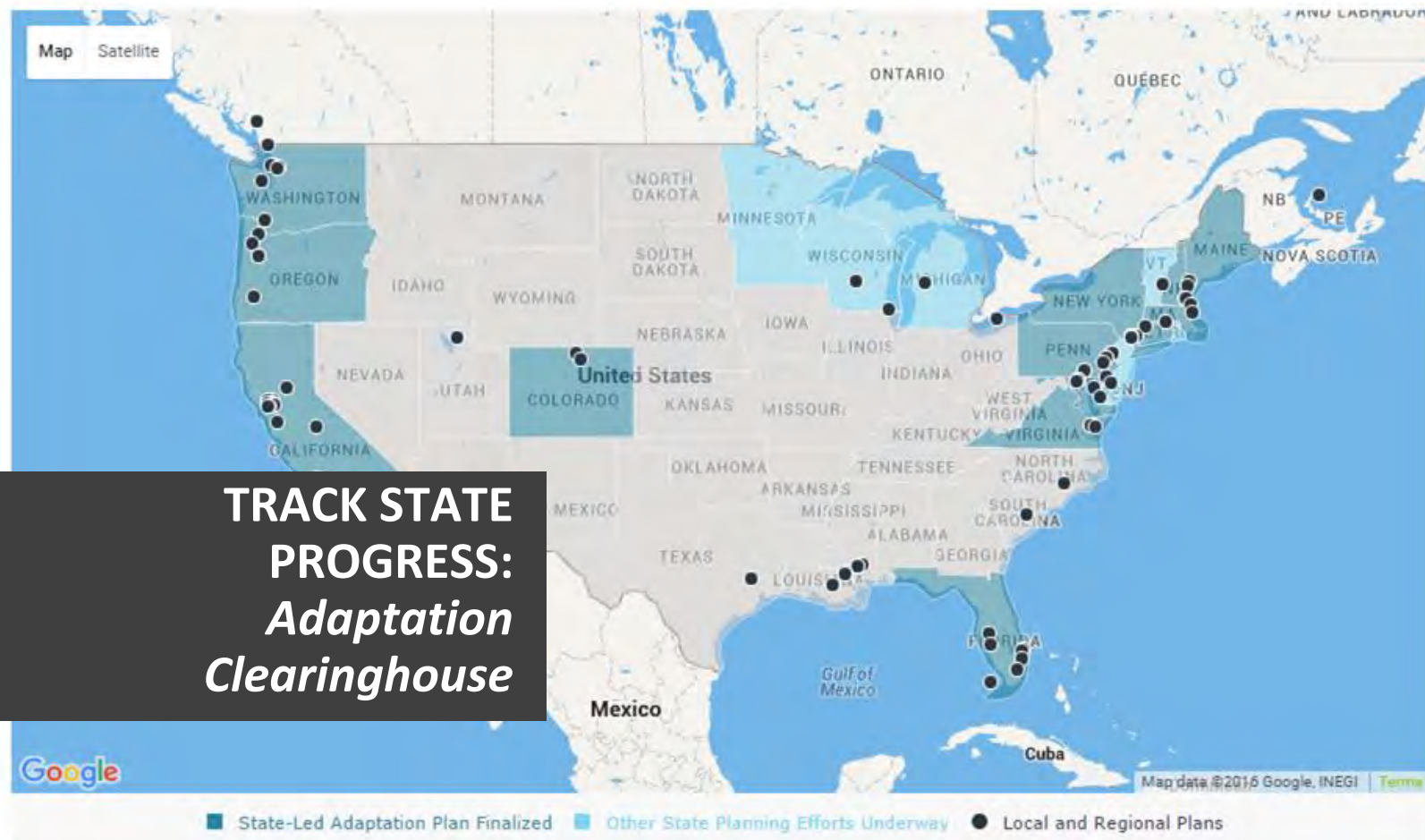
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Select a State

Select State ▼ Go



# TRACK STATE PROGRESS: *Adaptation Clearinghouse*

Adapting to Climate Change

Clean Energy & Reducing Carbon Pollution

## Status of Maryland's Climate Change Preparations

On April 20, 2007 Governor Martin O'Malley signed Executive Order 01.01.2007.07, establishing the Maryland Commission on Climate Change and directing the Commission to create a Climate Action Plan. The Executive Order established the Adaptation and Response Working Group (ARWG) within the Commission to develop the adaptation portions of the state's Climate Action Plan. Maryland's Climate Action Plan includes two climate change adaptation strategies that are currently being used to guide state-level adaptation planning efforts.

The first strategy (Phase I), titled "Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change, Phase I: Sea-level rise and coastal storms," was published on September 12, 2008. The Phase I Strategy, makes up Chapter 5 of Maryland's Climate Action Plan, and addresses the covers effects of sea-level rise and coastal storms on: existing and future built environment and infrastructure; the economy; human health, safety and welfare; and natural resources. It makes recommendations to state lawmakers and policy makers for strategies to mitigate impacts from sea-level rise and coastal storms.

The second strategy (Phase II), is titled "Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change, Phase II: building societal, economic, and ecological resilience" and was published on January 24, 2011. The Phase II Strategy addresses changes in precipitation patterns and increased temperature, and the likely resulting impacts to six sectors: human health, agriculture, forest and terrestrial ecosystems, bay and aquatic environments, water resources, and population growth and infrastructure. It details the findings and recommendations of the ARWG and the Scientific and Technical Working Group on each of the six sectors. Each sector assessed climate change vulnerabilities, and recommended adaptation strategies for the State of Maryland.

Close



VIEW STATE ADAPTATION PLAN STATUS



VIEW ALL COMPLETED GOALS

Maryland



Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change - Phase I: Sea-level rise and coastal storms

Adopted: July 2008



3 out of 20 Goals Completed

16 out of 20 Goals in Progress

Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change - Phase II: Building societal, economic, and ecological resilience

Adopted: January 2011



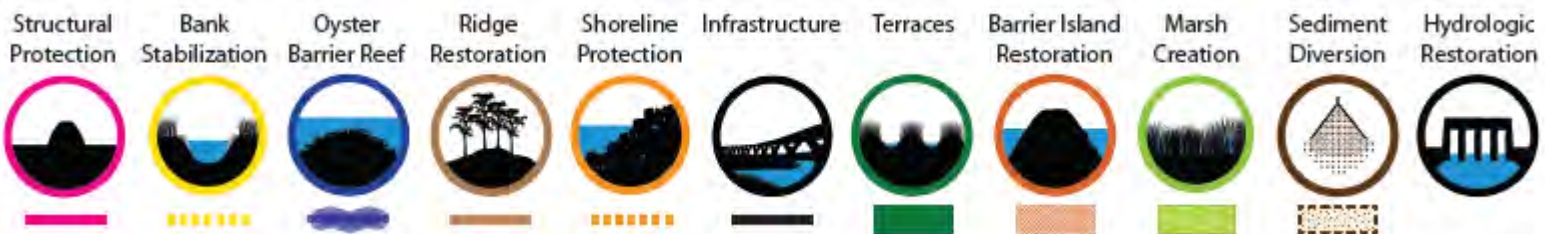
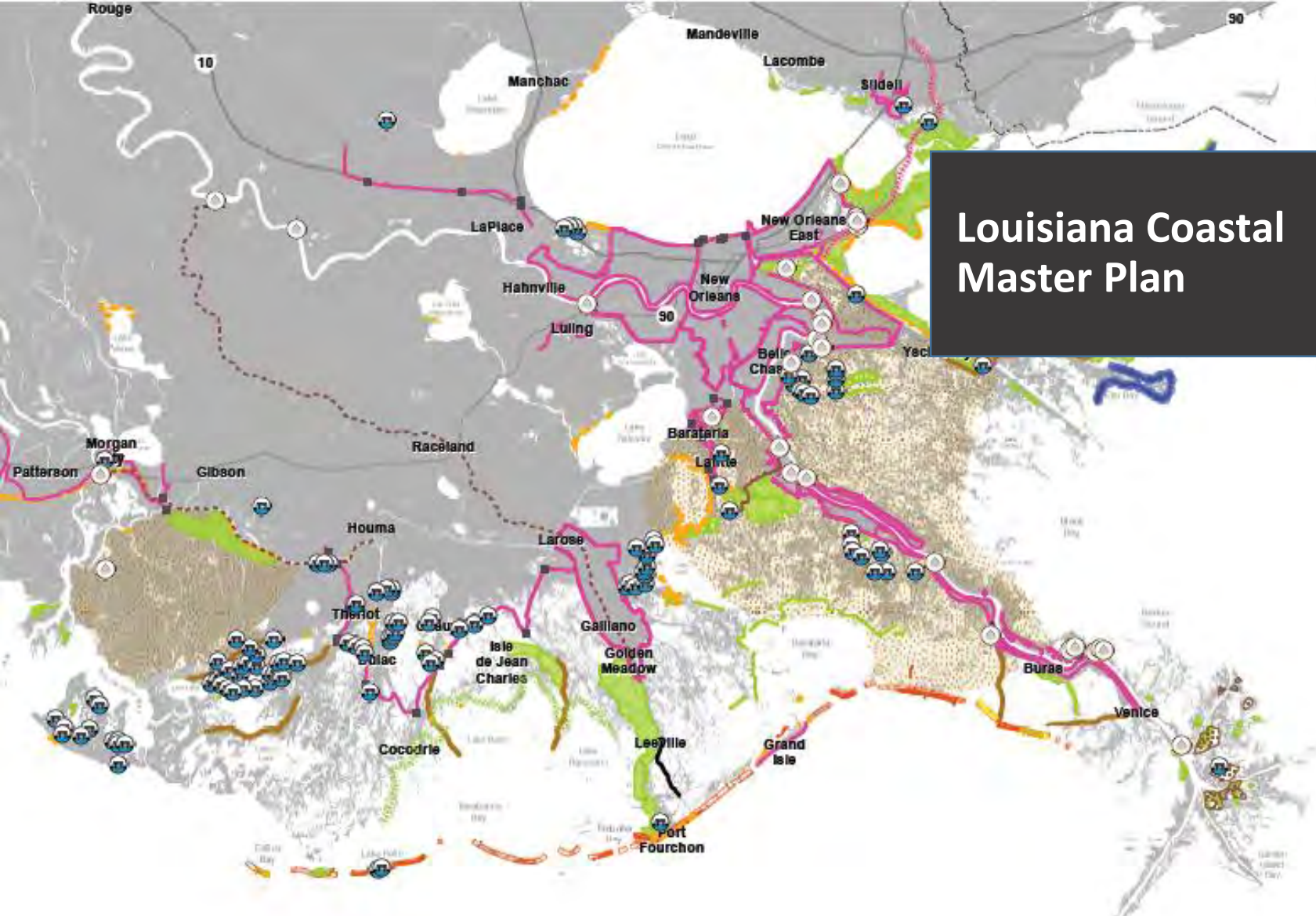
2 out of 154 Goals Completed

92 out of 154 Goals in Progress





# Louisiana Coastal Master Plan







# **CAPITAL PLANNING:**

*Chicago Green Infrastructure Strategy*