

# Roadmap for Adapting to Risk Training

Metropolitan Washington Council of Governments

## State of Maryland Climate Adaptation Planning



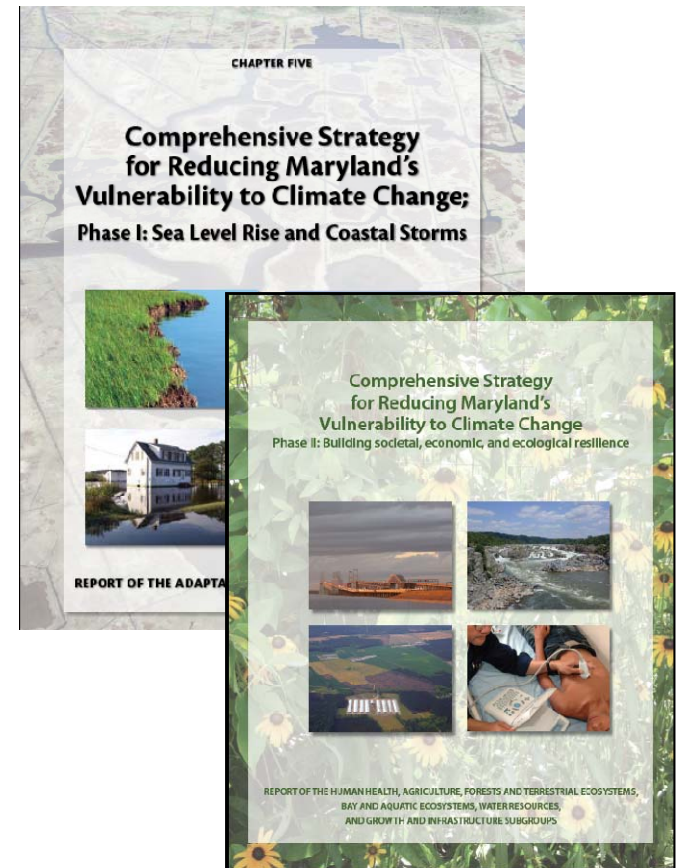
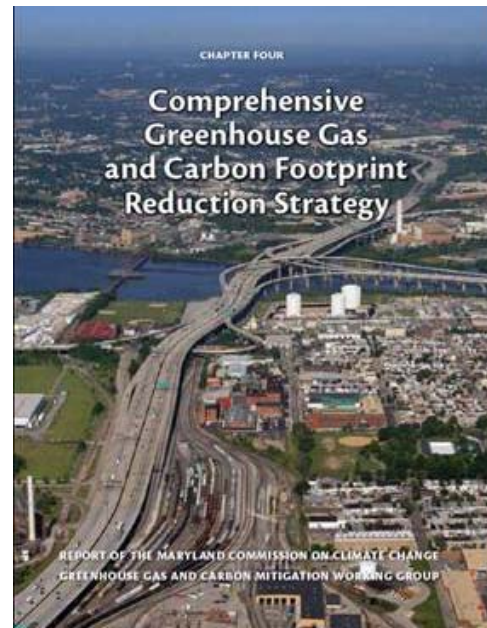
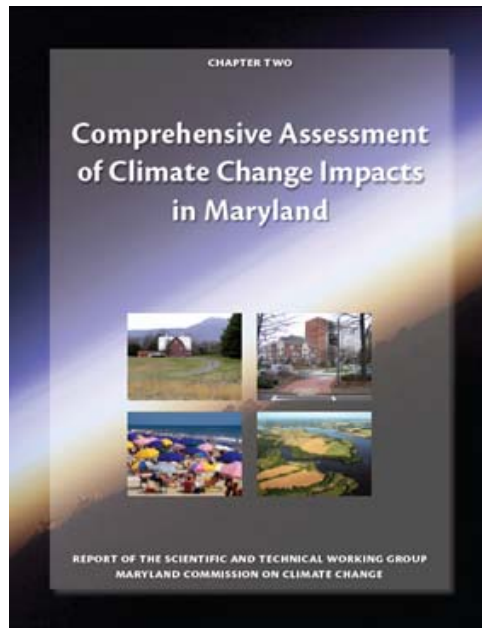


# Climate Change in the Maryland *A 2100 Snapshot*

- ✓ Sea Level Rise: + 3-4 feet (1 to 1.5 meters)
  - ✓ Temperature: + 4 - 7 degrees F
  - ✓ Annual Precipitation: -10% to +20%
    - ✓ Spring Runoff: Higher
    - ✓ Summer Runoff: Lower

*Global Climate Change = Real Consequences*

# Maryland Climate Action Plan



# Sector-Based Adaptation Planning



# Adaptation Planning Process

Review state of the science

Assess climate vulnerability

Identify critical information gaps

Consider and prioritize key issues of concern

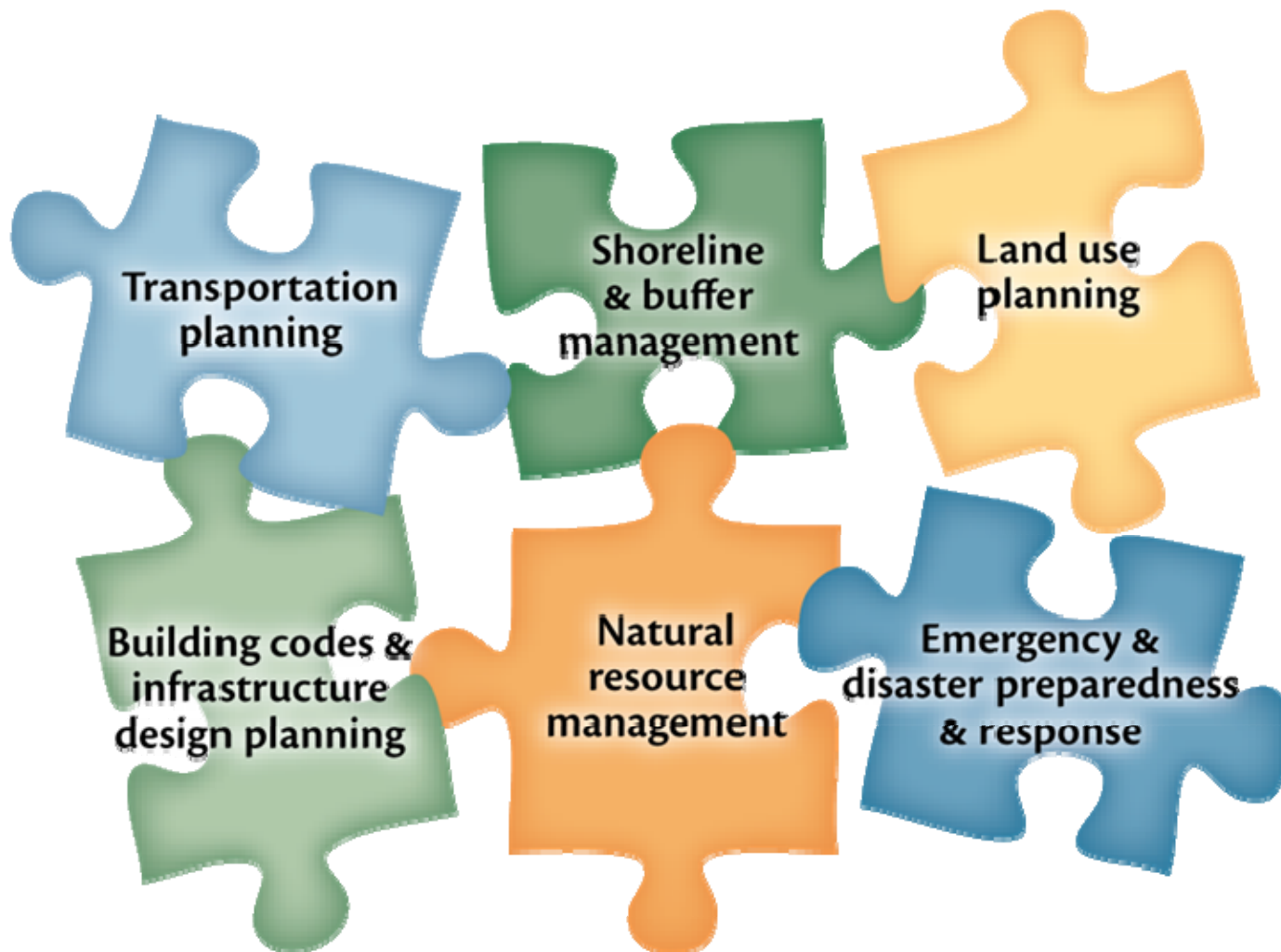
Explore potential adaptation strategies

Evaluate adaptation infrastructure (institutional framework)

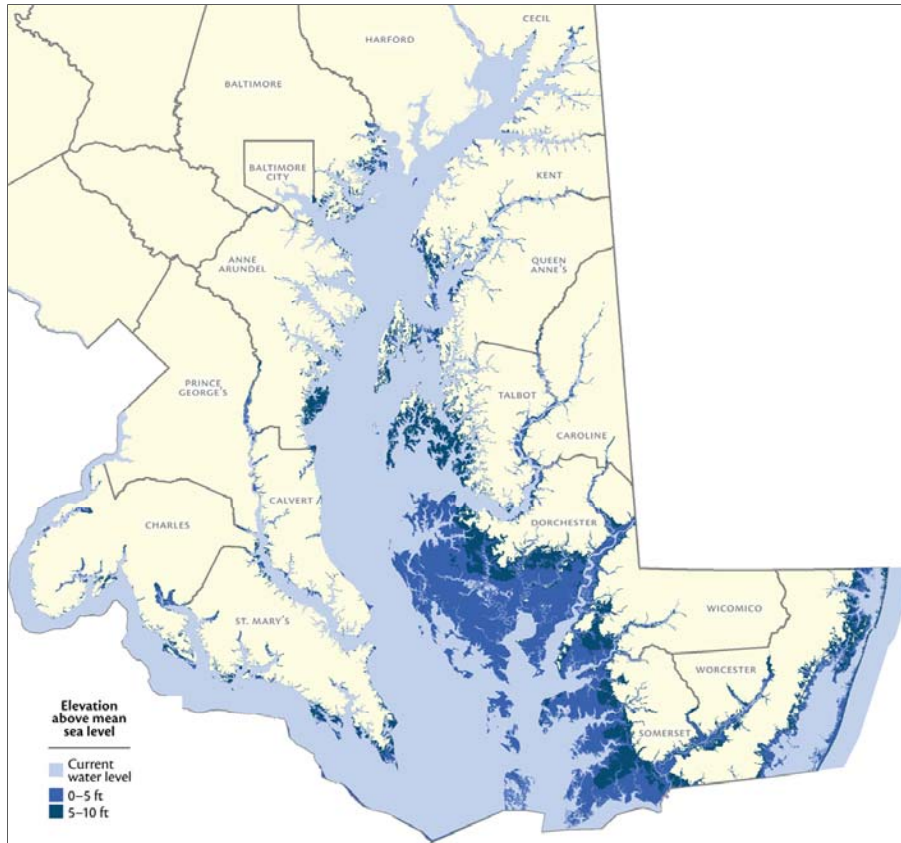
Identify opportunities & mechanisms to affect change

Recommend action strategies (short, medium long-term)

# Strategy Development: An integrated approach

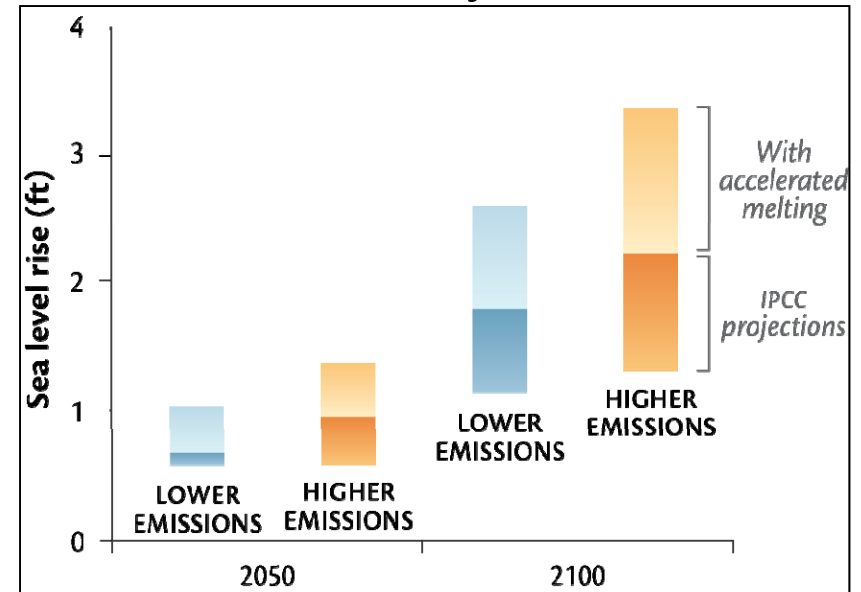


# The Basics: Assess State-wide Vulnerability



Maryland's Risk from Sea Level Rise

## Future Projections



# Drilling Down: Assess Vulnerability at the Community- Scale

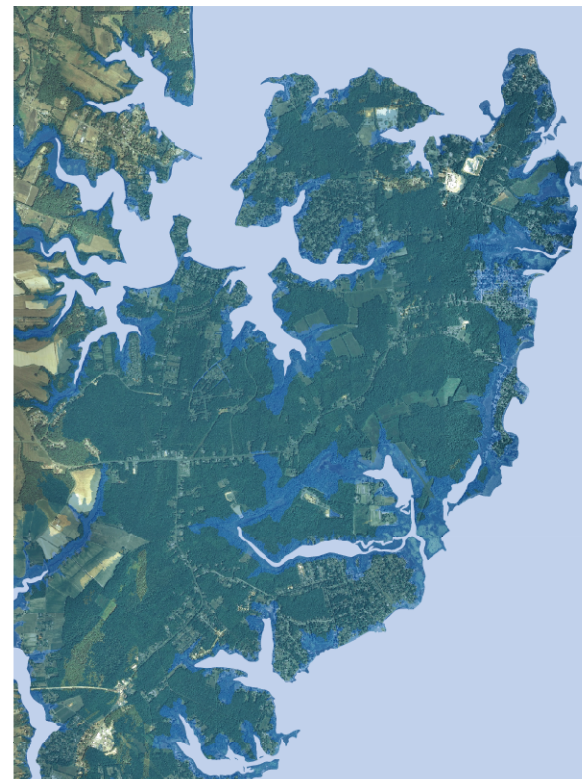
**Annapolis**



**Crisfield**



**Shady Side**



**Elevation  
above mean  
sea level**

- Current water level
- 0-5 ft
- 5-10 ft



# Land Use Planning: Identify coastal hazards & vulnerable populations

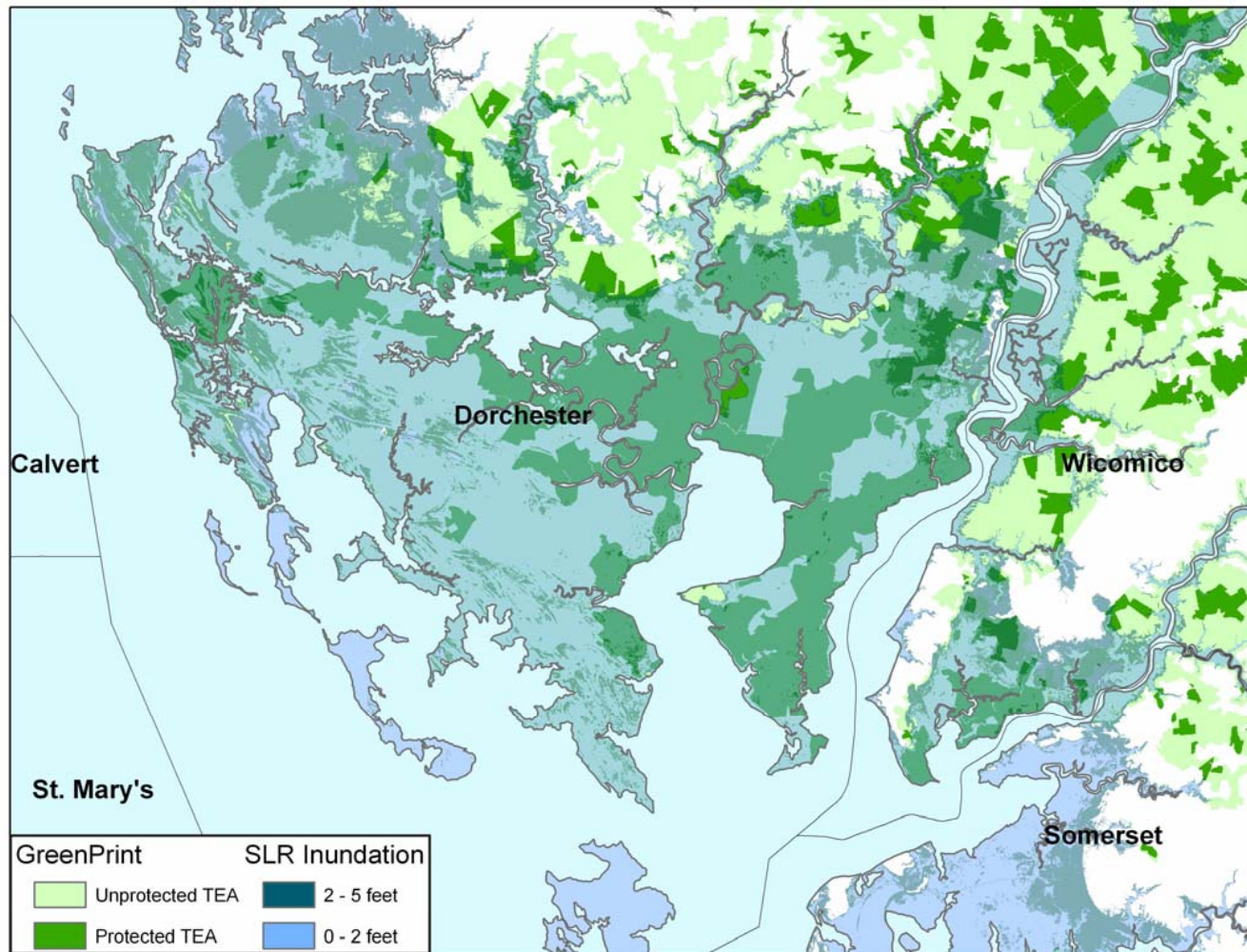
## Shoreline Erosion and Change



## Erosion Vulnerability



# Natural Resource Management: Assess potential loss of coastal ecosystems



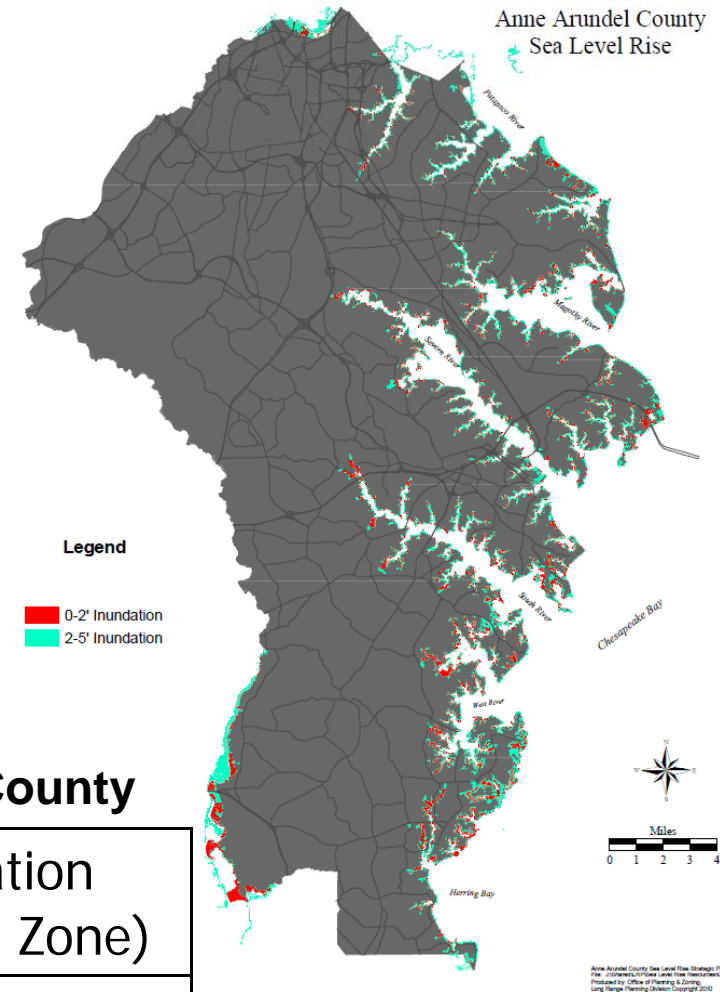
## Transportation Planning: Identify infrastructure at risk

- **Assessment of State Maintained Roads that require further evaluation for impacts due to varying increases in sea-level**
  - 2 ft. – 156 miles / 93 structures
  - 5 ft. – 371 miles / 132 structures
  - 10 ft. – 792 miles / 196 structures
- **Recommendations/Next steps**
  - Must consider more than sea-level rise – need to plan for more frequent & severe storms
  - Must research & consider new construction and design elements
  - Prioritization of assets must consider emergency evacuation planning and system redundancy



# Human Health & Safety: Identify septic systems in SLR inundation zones

- Septic systems located less than 2 feet above mean sea level are at risk of sea level rise inundation in the next 50 years.
- There are thousands of existing systems in this zone across the state (5,206 in Anne Arundel County alone).
- Placement of additional systems in this zone should be avoided.



## Vulnerable Septic Systems in Anne Arundel County

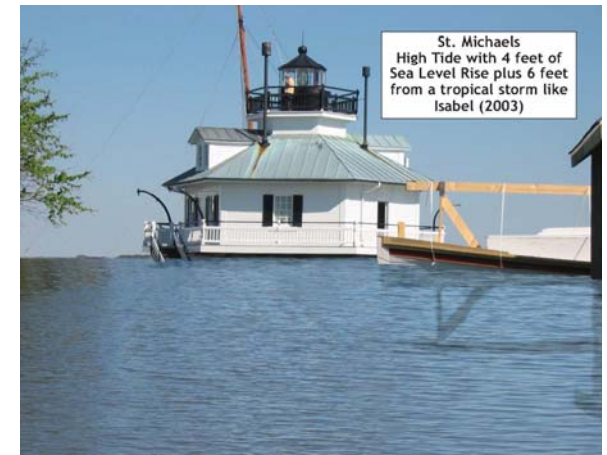
0 – 2 ft Inundation (50-Year Impact Zone)	0 – 5 ft Inundation (125-Year Impact Zone)
5,206	7,238

## Historical, Archaeological, and Cultural Resources: Assess Vulnerability & Loss

- More than 12,600 archeological sites have been inventoried statewide
- 2539 archeological sites are potentially vulnerable within the 0-5 ft boundaries. This represents 20% of all recorded archeological sites statewide, and 32% of all of the sites recorded in the coastal counties studied.
- The types of sites represented are predominantly prehistoric, ranging from Paleoindian to the contact period, but nearly a third have historic components, including 57 with identified 17th century components.
- Most at risk:
  - Paleoindian (9,000-11,000 BC)
  - Contact Period and 17th Century
  - Total of 228 sites statewide
  - 12 are already partially submerged



# Communicating Risk: Visualize Impacts



# Advocacy: Promote Sound Solutions

## Living Shorelines, Naturally

**Who can resist the lure of the water? Shorefronts draw us—on beaches for our work or play on river or bay, in quiet zones of beauty and tranquility.**

**First Person**

**Ronnie Jedin**  
Shoreland Specialist, Technical Support Division

**Frank Verman**  
Project Manager, North Annapolis

**SHORE TO LOSE**

## LIVING SHORELINES IN SOMERSET COUNTY

**A GUIDE FOR PROJECT SELECTION**

**CONTACT INFORMATION**  
Somerset County Department of Planning & Zoning  
11515 Somerset Avenue  
Room 21 (2nd floor)  
Preston, MD 21153  
410-453-4214  
<http://www.somersetcountywash.org/website.html>

**Somerset County Soil Conservation District**  
30730 Park Drive  
Preston, MD 21153  
410-453-4270

**Eastern Shore Resource Conservation & Development Council, Inc.**  
8133 Edin Road, Suite 201  
Towson, MD 21286  
410-822-9300  
<http://www.esrdc.org>

## MARYLAND AT RISK

### SEA-LEVEL RISE ADAPTATION & RESPONSE

September 2006

**WE MUST TAKE ACTION NOW TO PREPARE FOR THE IMPACTS OF CLIMATE CHANGE**

Action is needed now to stem not only the drivers of climate change but also to prepare for the inevitable consequences. With over 3,000 miles of coastline, Maryland is extremely vulnerable to the impacts of climate change. Historic tide-gauge records show that sea levels are rising along Maryland's coast and, due to a combination of global sea level rise and land subsidence, have risen approximately one foot with sea level rise over the last 100 years. As our climate changes, sea levels are expected to continue to rise—potentially twice as fast as they did during the 20th century. Maryland is at risk of experiencing another one-foot or sea level rise by 2050 and as much as three feet of rise by 2100.

The Comprehensive Strategy to reduce Maryland's vulnerability to Climate Change, a key component of Maryland's Climate Action Plan (August, 2006, [www.dnr.state.md.us/climate/](http://www.dnr.state.md.us/climate/)), set forth the actions necessary to protect Maryland's people, property, natural resources, and public investments from the impacts of climate change. The vision for future preparedness is targeted at: 1) reducing impacts to existing built environments, as well as to future growth and development; 2) shifting to sustainable investments and avoiding financial and economic impacts; 3) enhancing preparedness to protect human health, safety, and welfare; and 4) restoring and protecting Maryland's natural resources and resource-based industries.

**MARYLAND'S PEOPLE, PROPERTY, NATURAL RESOURCES, AND PUBLIC INVESTMENTS ARE AT RISK**

**Sea-level rise vulnerability in Maryland**

On Thursday, September 18, 2003

## Hurricane Isabel

a massive Category 4 storm slammed into the East Coast

**ANNAPOLIS**

**WIND & WAVES**

**Eyewitness**

## SHORELINE POLICES IN KENT COUNTY

Kent County encourages stabilization of eroding shorelines and prefers using living shorelines as the method to restore the shoreline. In many areas, living shorelines have proven effective at stabilizing shorelines while maintaining more of the vital fish and wildlife habitat at the water's edge. When living shorelines are not appropriate, rip rap and stone revetment protect shorelines by the dispersal of wave energy.

When such measures can effectively and practically reduce or prevent shoreline erosion, the use of nonstructural shore protection measures shall be encouraged to conserve and protect plant, fish and wildlife habitat. Kent County prefers construction of shoreline stabilization to be considered in this order:

1. Nonstructural practices shall be used whenever possible.
2. Structural measures shall be used only in areas where nonstructural practices are impractical or ineffective.
3. Where structural measures are required, the measure that best provides for the conservation of fish and plant habitat and which is practical and effective shall be used.
4. If significant alteration of the characteristics of a shoreline occurs, the measure that best fits the change may be used for other in that area.

**CONTACT INFORMATION**  
Kent County Department of Planning & Zoning  
County Government Center  
401 High Street  
Chesapeake, MD 21520  
Tel: (410) 778-1425  
Fax: (410) 810-2392  
E-mail: [smc@kentgov.org](mailto:smc@kentgov.org)  
<http://www.kentcounty.com/gov/planning/>

**Kent County Soil Conservation**  
122 Spear Road, Suite 4  
Chesapeake, MD 21520  
(410) 778-5150, ext. 3  
<http://www.nrcs.nh.gov/soilcons/MSRDC03.html>

**Eastern Shore Resource Conservation & Development**  
8133 Edin Road, Suite 201  
Towson, MD 21286  
(410) 822-9300  
<http://www.esrdc.org>

This publication was written by Elizabeth Schuchman, Assistant Director, Coastal Planning, and Jeremy Musick, Planning Director of Kent County Planning, Planning & Zoning. Financial assistance provided by CZMA of 1972, an amendment, administered by the Office of Ocean Resource Management, NOAA, a publication of Maryland's Coastal Zone Management Program, Dept of Natural Resources pursuant to NOAA Award No. NA46RG0490-04.

**Living Shorelines in Kent County**  
**AN INTRODUCTION**

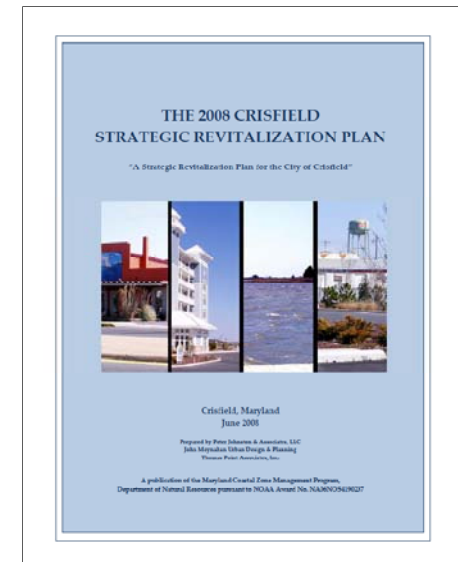
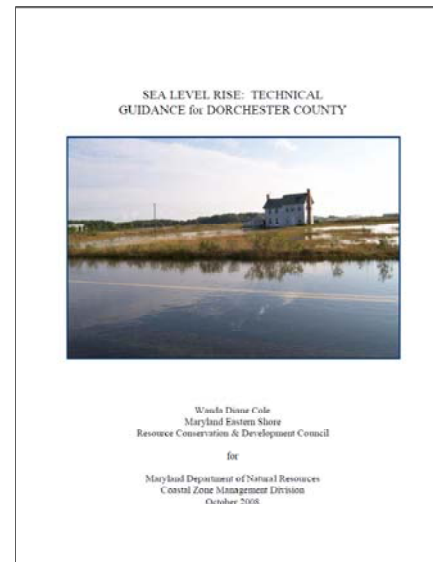
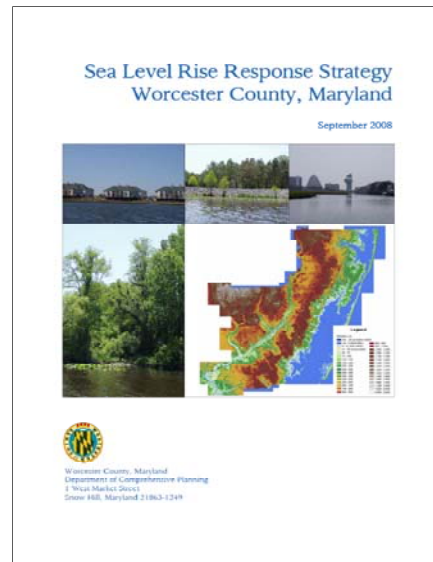
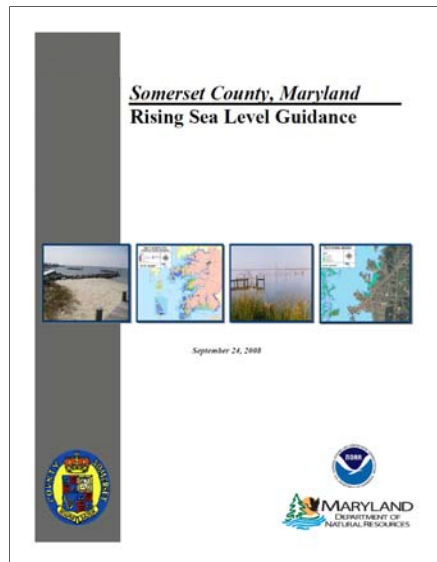
Educational Panels

Pamphlets

Publications & Fact Sheets



The Coastal Communities Initiative (CCI) competitive grant program provides financial and technical assistance to local governments to promote the incorporation of natural resource and/or coastal management issues into local planning and permitting activities.







# Online Resource Center: Pulling it all together

A single source for available products and services to help local communities address the current risks associated with coastal hazards & climate change

The image displays two overlapping screenshots of the Maryland Department of Natural Resources website. The top screenshot shows the main website header with the Maryland logo, the text 'DEPARTMENT OF NATURAL RESOURCES', and a navigation menu with links for 'DNR HOME', 'COAST SMART', 'COASTAL RESOURCES', 'HEALTHY WATERS', and 'GRANTS'. Below the navigation is a section titled 'CoastSmart Communities' featuring a photograph of a coastal structure and a welcome message: 'Welcome to the CoastSmart Communities Online Resource Center. This site has been developed to assist our businesses, communities and local governments access available products and services to address the current risks associated with coastal hazards and the potential increased impacts of those hazards the future due to climate change. Here you will find web-based planning tools, storm surge inundation at sea level rise maps, training programs, staff resources, and access to local grants. The development of the products and services has been, and continues to be shaped by input from local communities and other stakeholders. We welcome your feedback and input.' Below this is a quote from Governor Martin O'Malley: 'With over 4,000 miles of coastline, we cannot wait to tackle this threat,' said Maryland Governor Martin O'Malley. 'Here in Maryland we are aggressively implementing initiatives to reduce greenhouse gas emissions that will provide benefits long into the future; however, we must also ensure our communities are "CoastSmart" now - ready, adaptive and resilient.' - Governor Martin O'Malley. The bottom screenshot shows the 'Coastal Atlas: Shorelines' interface, which includes a map of Maryland with various interactive tools like a globe, compass, and settings icon. The map is titled 'MARYLAND Shorelines Online' and shows the state's coastline with labels for 'Allentown' and 'Washington'. A scale bar indicates 20 km and 10 mi. The footer of the website includes contact information and a copyright notice for 2010.



# Acknowledgements: It takes a collective effort





**Zoë P. Johnson**  
**[zjohnson@dnr.state.md.us](mailto:zjohnson@dnr.state.md.us)**  
**(410) 260-8741**

**<http://www.dnr.state.md.us/climatechange>**

