WEATHER IT TOGETHER

The Annapolis Model for Cultural Resource Adaptation Planning
Weather It Together is a public/private partnership to address the impacts of Climate Change and Sea Level Rise on historic and cultural resources in Annapolis, the Chesapeake Bay and the nation.

Project Partners
City of Annapolis • Annapolis Partnership
Maryland Emergency Management Agency • Maryland Department of Natural Resources • Maryland Dept. of the Environment • Maryland Historical Trust
National Oceanic and Atmospheric Administration • National Park Service
National Trust for Historic Preservation • Preservation Maryland
Union of Concerned Scientists • United States Naval Academy
United States Army Corps of Engineers • Chesapeake Bay Foundation
US ICOMOS • Urban Land Institute
Weather It Together
A State Model for Adaptation Planning

Maryland Commission on Climate Change

Prepared for: Larry Hogan, Governor, State of Maryland and the Maryland General Assembly

December 2015

“a plan of action that addresses the drivers and causes of climate change, to prepare for the likely consequences and impacts of climate change to Maryland and to establish firm benchmarks and timetables for implementing the plan of action.”
The ARWG is charged with developing a comprehensive strategy for reducing Maryland’s climate change vulnerability through both short- and long-term measures that state and local governments may use to plan for and adapt to more extreme weather and a rise in sea levels due to climate change.

Weather It Together

“The Choice is Not Between Mitigation and Adaptation”
Poorer individuals have a greater propensity to be harmed by climate change for a variety of reasons including “their livelihoods are more likely to depend on climate sensitive sectors or on low-income, informal or hourly jobs with little protection against climate-related employment disruptions.”
Weather It Together

Building Resilience: A State Climate Action Plan Priority

- Work to increase and broaden public and private partnerships
- Address the challenge that low-income and otherwise vulnerable communities will likely be disproportionately impacted by climate change
- Assess the impacts that climate change will likely have on the state’s economy, revenues and investment decisions
- Continue to deliver and refine tools and assistance for local governments
The Sea Around Us

Rising Seas – Historical Trends in the North Atlantic

The recession of the northern glaciers is growing... the long trend is toward a warmer earth; the pendulum is swinging.

- Rachel Carson, scientist, ecologist and writer – The Sea Around Us (1952)
“We call on policy-makers and government decision-makers at all levels to support communities in planning for a resilient future, including making informed choices, and assessing the costs of action and failure to act.”
Historic Port Cities

Structural Flood Barriers

MOSE (flood gates) - Venice

Thames Barrier - London
Historic Port Cities

Structural Flood Barriers
Historic Seaport Cities

Tokyo’s Metropolitan Area Outer Underground Discharge Channel

Winding down a series of stairs, you soon come upon a massive hall, resembling an underground Parthenon, or a scene out of a science fiction film.

-- Alex Zolbert, CNN
136 major port cities ranked for the impact of SLR projected to 2070. Of the top 20, six are in the United States.

#1 - Miami with $416 billion worth of assets.
#2 - New York/Newark at $320 billion
#3 - New Orleans at $233 billion.
Historic Seaports: Miami

#1 Economy at Risk

$3.51 trillion and 4.8 million people at risk by 2070
One of the at most risk cities on the East Coast, Norfolk has received government funds to raise one short stretch of road by 18 inches at a cost of more than a million dollars. Meanwhile, Norfolk Naval Base has 14 WWII piers that are estimated to cost $35-40 million to replace.
High Tide on Main Street
Annapolis Prepares for Rising Seas
Ice melts at 32 degrees. It doesn’t care if you are a Republican or a Democrat.

- John Englander, oceanographer and author of High Tide on Main Street
Since 2001, Annapolis has had the highest average number of days a year above flood threshold at 34.
Annapolis has experienced the greatest increase in nuisance flooding in the past 50 years (925%) going from an average of 3.8 to 39.3 days per year. In the next 50 years, nuisance flooding is estimated to occur more than once a day.
“In Annapolis, home to the U.S. Naval Academy, half a foot of water flooded the colonial district, a National Historic Landmark, at high tide on Chesapeake Bay during rainstorms on April 30, May 1 & 16 and Aug. 12.”
Within the next 100 years, sea level rise is estimated to reach 44 inches. To date, 13 islands have been lost in the Chesapeake.
The Chesapeake Bay
Research: Lost Landmarks

Holland, Hooper’s and Sharp Islands – Last structures lost (2010)
Smith Island – Maryland’s last inhabited Chesapeake Bay Island
“Exceptions should be based on an analysis of the scope, function and importance of the project, including historic and cultural preservation considerations.”
Historic Annapolis

History: A Colonial Capital

- Nicholson lays out plan for Colonial Capital - 1695
- St. John’s College (3rd oldest U.S. College) - 1696
- Alex Haley’s Kunta Kinte arrives Lord Ligonier - 1767
- Maryland State House (oldest state capitol) - 1772
- Home to Maryland’s 4 signers of the Declaration of Independence - Carroll, Chase, Paca & Stone
- General George Washington Resigns Commission - 1783
- First peacetime Capital - 1783 to 1784
- U.S. Naval Academy established - 1845
Annapolis Historic Districts

Resources at Risk: Colonial Landmark District

Legend
- National Historic Landmark District
- National Register District
- Annapolis Historic District
- Annapolis Historic District - 1969
- Annapolis Historic District - 1971 Expansion
- Annapolis Historic District - 1982 Expansion

Annapolis Historic District (1965)
National Register District (1984)
City of Annapolis / USNA

Risk Assessment: FEMA Flood Insurance Rate Map

Current FIRM

Blue shading 1% annual chance (100-year) flood
Orange shading is 0.2% annual chance (500-yr) flood
Flood elevation 8.2 ft.
1% annual chance flood (4.5') plus 3.7 feet for sea level rise by 2100
Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards.

1. Organizing your efforts to develop a mitigation plan;
2. Identifying hazards and assessing losses to your community;
3. Setting mitigation priorities and goals and writing the plan;
4. Implementing the mitigation plan, including project funding.

Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning

State and Local Mitigation Planning How-To Guide

FEMA 386-6 / May 2005

FEMA
Step 1 - Organize Resources

Research: Flood Mitigation Studies

- Focus on protecting existing structures
- Study downtown to determine the costs and benefits of public decision-making in mitigating property damage
- Evaluate the need and options for protecting historic structures
- Require floodproofing to the extent feasible
"In conjunction with the development of a Hazard Mitigation Plan to protect historic resources... the City will explore and present to the City Council for consideration several strategies for addressing the 100-year flood and sea level rise..."
Organize your efforts to develop an effective mitigation plan... bringing together the appropriate planning team, consultants, technology, community support and financial resources.
Weather It Together Core Team includes 24 local/state/federal agencies & organizations who meet regularly to discuss planning priorities, share findings, host public meetings and hear presentations from experts on climate change, flood mitigation, data management, flood mapping and modeling, flood insurance, cultural & natural resource survey and assessment and state policies.
Step 1 – Organize Resources

Utilize the Necessary Technology (GIS)

Develop a database of historic survey, risk assessment and elevation information for City Dock and Eastport cultural resources.
Step 1 – Organize Resources

Secure the Necessary Financial / In-Kind Resources

- Maryland Historical Trust/SHP0 ($25,000)
- National Trust for Historic Preservation ($25,000)
- Preservation Maryland ($4,000)
- MD Dept. of Natural Resources/NOAA ($48,000)
- Urban Land Institute, Baltimore Chapter ($20,000)
- USACE (est. $120,000+ in-kind)
- MEMA/FEMA ($106,000)
- National League of Cities – ($10,000+)
Step 2 - Identify Hazards

Chesapeake Storm & Tidal Flooding History

1933 – C&P = 6.35’

2003 – Isabel = 7.58’

1972 – Agnes = 3.04’
Step 2 - Identify Hazards

Tropical Cyclone Isabel: September 19, 2003

Naval Academy

Market Space

Eastport
Step 2 — Identify Hazards
Identify & Map the Floodplain Study Area

PROPERTIES IN THE HISTORIC DISTRICT WITHIN 10 FOOT ELEVATION LINE

MEAN SEA LEVEL

17-FT. STORM TIDE
15-FT. STORM SURGE
2-FT. NORMAL HIGH TIDE

ST JOHN'S BOATHOUSE
### Worksheet #3

<table>
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<tr>
<th></th>
<th>SDAT Tax ID Number</th>
<th>Name and Address of Asset Subject to Hazard (same as previous Page)</th>
<th>MHT Inventory Number (AA#)</th>
<th>Date of Construction</th>
<th>Type of Property / Type of Resource</th>
<th>Total Square Footage</th>
<th>Number of Stories</th>
<th>Structural System</th>
<th>Primary Exterior Materials of Property / Resource</th>
<th>Current Function / Use</th>
<th>Current Condition (Excellent / Good / Fair / Deteriora)</th>
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**Step 2 – Identify Hazards / Survey**

Conduct a Cultural Resource Survey
### Step 2 – Survey / Assess Risks

**Assess Property Vulnerability**

#### Flood Hazard Matrix

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<th>Street</th>
<th>OBJECT ID</th>
<th>SDAT</th>
<th>MHT Inventory</th>
<th>Date of Construction</th>
<th>Use</th>
<th>First Floor Elevation</th>
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<th>Total Square Footage</th>
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**147 Properties**

- Property Vulnerability (High, Med, Low)
-Loss to Structure ($)
- Loss to Contents ($)
- Loss of Function / Use ($)
- Displacement Cost ($)

**Total Projected Loss/Cost**

$288.5 million
Step 2 – Survey / Assess Risks

Complete a Non-Structural Mitigation Assessment

Nonstructural Mitigation Assessment for the City of Annapolis Historic District
Annapolis, Maryland

Prepared for: City of Annapolis
145 Gorman Street, 3rd Floor
Annapolis, Maryland 21401

Prepared by: Planning Division
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, Maryland 21203-1715

DECEMBER 2014

Lowest adjacent grade in this example is the front left corner, the lowest point closest to where the water is coming from. Low opening in this example is the basement window, where water would first enter the building during flooding. First floor opening here is the front door, where the most damage would typically occur if flood waters reached this elevation.
Step 3 – Set Priorities
Determine Community Value

Worksheet #4
- Historic Designation (NR, Local)
- Geographic Context of Significance
- Level of Significance (H/M/L)
- Public Sentiment (H/M/L)
- Economic Importance (H/M/L)
- Degree of Integrity (H/M/L)

= Total Level of Community Value
Step 3 – Set Priorities

Assess Public Sentiment – Visual Preference Survey

WHAT PLACES MATTER MOST TO YOU?
Step 3 – Set Priorities

Assess Public Sentiment – Online Survey

The city needs to start immediately to create a plan to address the flooding, natural hazard issues.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
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<th>58.7%</th>
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<td>Strongly Disagree</td>
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www.Annapolis.gov/WeatherItTogether
Goal #1: Public and private property owners in Annapolis will incorporate hazard mitigation improvements into their routine maintenance, repair and rehabilitation projects to protect cultural resources from tidal flooding, sea level rise and other natural disasters.

Objective #1 - The City of Annapolis will develop and implement an economic development plan that will incentivize the protection of Historic District properties as an economic development priority for sustained growth and financial security.
Goal: Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure.... and increase preparedness for response and recovery...

FEMA-Based Adaptation Strategies for Annapolis

Land Use Planning & Building Codes
Public Education & Engagement
Natural Resource Protection
Non-Structural Protection
Structural Protection
Policies & Incentives
Step 3 – Write the Plan

Adaptation: Land Use Planning & Building Codes

- Density controls
- Design Review Standards
- Easements
- Floodplain Overlay Zoning
- Open Space Preservation
- Special Use Permits
- Subdivision & Development Regulations
- Transfer of Development Rights
- Environmental Review Standards
- Building Codes
- Coastal Zone Management
Step 3 – Write the Plan

Adaptation: Public Education & Engagement

- Website / Social Media
- Branding
- High Water Markers
- Interpretive Kiosks
- Videos
- Media
- Publications
Step 3 – Write the Plan

Adaptation: Public Engagement – Graphic Recording

www.Annapolis.gov/WeatherItTogether
Step 3 – Write the Plan

Adaptation: Natural Resource Protection

Before - Erosion

After – Living Shoreline
Dry floodproofing involves sealing building walls with waterproof compounds and using shields (dams or perimeter barriers) to seal off doors, windows and other openings to keep the building watertight. This technique can only be used when the walls are strong enough to withstand the hydrostatic force of the water.
Step 3 – Write the Plan

Adaptation: Non-Structural - Elevation

“Elevation may alter the appearance and scale of a historic building and redefine its relationship to its setting... If the building is raised only several feet, elevation should not severely alter scale.”

“A preservation-sensitive alternative would be the elevation of floors within the building, particularly feasible in historic commercial structures with tall ceilings...”
Step 3 – Write the Plan

Adaptation: Non-Structural/Structural-Barriers

- Temporary Flood Wall
- Permanent Flood Wall
- Temporary Door Dam
- Backflow Preventers
Step 4 – Implement the Plan

Adaptation: Structural - Floodwalls

- Seek FEMA funding for model adaptation projects for priority properties in floodplain area.
- Work with Naval Academy to protect 4,500 linear feet of shared shoreline.
- Work with USACE to design for installation of backflow prevents at each sewer connection.
- Secure funding for floodwalls, coffer dams, pumping station, temporary pumps and valves.
City property tax credit applied to certified expenses for hazard mitigation / adaptation equal to 25% of rehabilitation cost on residential and income-producing properties (including interior improvements)
“MHT is funding the project in part so that we can use it as a model for other communities throughout the state that have cultural resources threatened by sea-level rise.” – Nell Ziehl, Chief of Planning
Weather It Together

2016 Maryland Historical Trust Preservation Award Excellence in Education and Community Engagement

WHAT PLACES MATTER MOST TO YOU?
KEEPING HISTORY ABOVE WATER

WEATHER IT TOGETHER

The Annapolis Model for Cultural Resource Adaptation Planning

HERITAGE AT RISK: CLIMATE CHANGE, COASTAL COMMUNITIES & CULTURAL RESOURCES