This is a set of slides from a presentation given at

RISING WATERS
Maryland Prepares for Floods & Sea Level Rise

2011 Water Resources Symposium

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(all contact information current as of Nov. 2011)
Sea Level Rise:
Science, Planning, and Policy
Sea Level Rise: The Science

Measured Sea Level Rise

(Feet/century)

Future Projections

Maryland Climate Action Plan (2008)
Impacts to the Coastal Zone

- Inundation of low-lying lands
- Increased flooding/storm surge
- More shoreline erosion
- Saltwater intrusion
- Higher water tables
Maryland’s Vulnerability
Potential SLR Inundation:
2050 - 2100
Potential SLR Inundation: 2050 - 2100
Coastal Flood Impacts
## Loss of Bay Islands and Communities

<table>
<thead>
<tr>
<th>Island</th>
<th>Historic acreage (date)</th>
<th>Recent acreage (date)</th>
<th>% lost</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poplar</td>
<td>1400 (1670)</td>
<td>125 (1990)</td>
<td>91</td>
<td>Abandoned in 1930</td>
</tr>
<tr>
<td>Sharps</td>
<td>890 (1660)</td>
<td>0</td>
<td>100</td>
<td>Drowned in 1962</td>
</tr>
<tr>
<td>St. Clements</td>
<td>400 (1634)</td>
<td>40 (1990)</td>
<td>90</td>
<td>Abandoned in 1920's</td>
</tr>
<tr>
<td>Barren</td>
<td>700 (1664)</td>
<td>250 (1990)</td>
<td>64</td>
<td>Abandoned in 1916</td>
</tr>
<tr>
<td>Hoopers</td>
<td>3928 (1848)</td>
<td>3085 (1942)</td>
<td>21</td>
<td>Submerging</td>
</tr>
<tr>
<td>Bloodsworth</td>
<td>5683 (1849)</td>
<td>4700* (1973)</td>
<td>17</td>
<td>Submerging</td>
</tr>
<tr>
<td>Holland</td>
<td>217 (1668)</td>
<td>140 (1990)</td>
<td>35</td>
<td>Abandoned in 1992</td>
</tr>
<tr>
<td>Smith</td>
<td>11033 (1849)</td>
<td>7825 (1987)</td>
<td>29</td>
<td>Submerging</td>
</tr>
<tr>
<td>* mostly marsh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Leatherman et al., 1995.
SHARPS ISLAND.
Surveyed 20th and 22nd of May, 1848.
Topography by Jno. W. Snow.
Scale 1/10000.

Maryland
Register No. 951.

438 ACRES LOST
6.2 ACRES/YEAR

Courtesy of Curtis Larsen. 1998. USGS
James Island (1847 - 1994)
147 years

Date of Photography: 1994

884 ACRES LOST
6.0 ACRES/YEAR
Smith Island - Today
Human Health Impacts

- 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).

Vulnerable Septic Systems in Anne Arundel County

<table>
<thead>
<tr>
<th>0 – 2 ft Inundation (50-Year Impact Zone)</th>
<th>0 – 5 ft Inundation (125-Year Impact Zone)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,206</td>
<td>7,238</td>
</tr>
</tbody>
</table>

Source: AA County (2010)
Threats to Built Infrastructure

State Maintained Roads & Structures Vulnerable to Sea Level Rise

<table>
<thead>
<tr>
<th>SLR Projection</th>
<th>Road Miles</th>
<th>Structures (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Feet</td>
<td>156</td>
<td>93</td>
</tr>
<tr>
<td>5 Feet</td>
<td>371</td>
<td>132</td>
</tr>
<tr>
<td>10 Feet</td>
<td>792</td>
<td>196</td>
</tr>
</tbody>
</table>

MD State Highway Admin (2010)
Loss of Historical, Archaeological & Cultural Resources

- 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 Paleolithic 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

Source: Maryland Historic Trust (2010)
Loss of Coastal Ecosystems

Source: MD DNR (2010)
Vision for the Future:
Protect Maryland’s People, Property, Natural Resources, and Public Investments

Promote programs and policies aimed at the avoidance and/or reduction of impact to the existing-built environment, as well as to future growth and development in vulnerable coastal areas.

Shift to sustainable economies and investments; and, avoid assumption of the financial risk of development and redevelopment in highly hazardous coastal areas.

Enhance preparedness and planning efforts to protect human health, safety and welfare.

Protect and restore Maryland’s natural shoreline and its resources, including its tidal wetlands and marshes, vegetated buffers, and Bay Islands, that inherently shield Maryland’s shoreline and interior.
Strategy Development:
An integrated approach
Elevate new and/or replacement structures 2+ feet above the current 100-year base flood elevation
Strategy: Facilitate Landward Movement of Coastal Ecosystems

Conserve and restore habitat migration corridors
Strategy: Promote Sustainable Shoreline & Buffer Area Management

- Living Shoreline Protection Act (2008)
  - Requires non-structural shore protection practices unless proven infeasible
- Chesapeake & Coastal Bays Critical Area Amendments (2008)
  - Increased vegetative buffers
  - Updated jurisdictional boundaries to account for sea level rise
  - Allows for consideration of coastal impacts during growth allocation decisions
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.
Strategy: Lead by Example

Building Resilience to Climate Change

DNR policy to guide investments in and management of land, resources and assets so as to better understand, mitigate and adapt to climate change.

- New Land Investments
- Facility Infrastructure Siting & Design
- Habitat Restoration
- Research & Monitoring
- Resource Planning
- Government Operations
- Advocacy
Adaptation 2011 - 2012

- Critical Area Jurisdiction Mapping Update (Lead: DNR)
- Living Shoreline Protection Act-Regulation Development (Lead: MDE)
- DNR “Lead by Example” Policy
  - Land Conservation Assessment & Targeting Criteria
  - Infrastructure Siting & Design Criteria
- Local Government Technical & Financial Assistance: Building Coast-Smart Communities: (Lead: DNR)
- Maryland State Hazard Mitigation Plan – Climate Change Risk Analysis (Lead: MEMA)
- SHA Transportation Vulnerability Assessment and Risk Policy (Lead: MDOT)
- Maryland Port Administration Vulnerability Assessment (Lead: MDOT)
- Historical, Archaeological, and Cultural Resources Vulnerability Study (Lead: MDP)
- Climate Change Insurance Advisory Committee (Lead: MIA)
- Wildlife Action Plan – Climate Change Element (Lead: DNR)
- Green Print Update – Incorporation of Marsh Migration Model (Lead: DNR)
- State Development Plan: PlanMaryland – Criteria for “Lands Subject to the Impacts of Climate Change” (Lead: MDP)
- Adaptation Toolbox: The Coastal Atlas (Lead: DNR)
Acknowledgements:
It takes a collective effort
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