Chesapeake Bay Shoreline Erosion

The Evolution of Resilience in Integrated Coastal Systems

31 August 2011

Andrew Roach
Baltimore District
Introduction

- Planning effort to influence and guide future work along the Maryland Bay shoreline
  - USACE, State, Locals, and others
- Resilience is an assumed concept for the “Management Guide” and for Maryland’s shoreline regulations which emphasize “living shorelines.”
“Placing a system in a strait jacket of constancy can cause fragility to evolve.”
~ C.S. Holling, ecologist
Study Area

- Maryland Bay Shorelines
  - Immediate land-water interface
  - Boatable access
- Exclusions
  - Large Bay islands
Habitats

- Beaches, Tidal Flats, Bluffs
- Wetlands
- Shallow Water

Jane Thomas, IAN Image Library (www.ian.umces.edu/imagelibrary)

Blackwater National Wildlife Refuge
Effects: Ecological

**Upland**: Inundation causes the conversion of upland to wetland, which may result in no net loss of wetland acreage.

**Wetland**: With direct loss to erosion, wetlands along tidal waterways may convert to other types as salinity changes.

**Open Water**: Energy transferred from waves and water movement causes erosion to occur at the shoreline.

**Erosion Control Structure**: A structure landward of wetlands can stop their natural migration inland.
Socioeconomic

Cultural
Why Now?

- Shifts in approach
  - MD Living Shorelines Act of 2008
- Sea-level Rise
  - Loss of Bay wetland
- Climate Change
  - Increased occurrence of storms?
Addressing Erosion

- Data Inventory
  - Shoreline Condition
  - Erosion Vulnerability Assessment
    • 50-Year Planning Window

<table>
<thead>
<tr>
<th>Structure Type</th>
<th>Miles of Shoreline</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>6,123</td>
</tr>
<tr>
<td>Riprap</td>
<td>521</td>
</tr>
<tr>
<td>Breakwater</td>
<td>9</td>
</tr>
<tr>
<td>Bulkhead</td>
<td>375</td>
</tr>
<tr>
<td>Debris</td>
<td>10</td>
</tr>
<tr>
<td>Unconventional</td>
<td>16</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>7,092</td>
</tr>
</tbody>
</table>
50-Year Planning Window

- **Projected Change:** 1995-2045
- **Based on past erosion rate**
- **No projected erosion with current stabilization**
- **No modeling of interactions (tides, structures, etc.)**
Screening Process
Federal Interest
Screening Process
Screening Process
Screening Process
Screening Process
EVA

http://www.dnr.state.md.us/ccp/coastalatlas/shorelines.asp
Management Guide

- Decision Support Tool
- Over 3,000 acres of wetlands vulnerable to loss from erosion (50-years)
- 12,000 total acres of land vulnerable to loss (50-years)
- Twenty-four areas of high erosion with significant resources may be in federal interest

http://dnr.maryland.gov/coastsmart/shoreline_management.asp
Resilience

- Sea-level Rise and Climate Change (Storms) not explicitly considered in study
Application: Puritan Tiger Beetle
Application: St. George Island, MD
Application: Blackwater NWR