Recurrent Coastal Flooding: How Should Virginia Respond?

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Recurrent Coastal Flooding: How should Virginia respond?

Hampton Roads Sea Level Rise/Flooding Adaptation Forum

March 13, 2013

M. Mitchell
Recurrent Flooding Study

Goals

• Review and develop a comprehensive list of strategies for dealing with recurrent flooding
• Convene a stakeholder advisory panel
• Offer specific recommendations on options for sea level rise adaptation which merit investigation

Collaborators: VIMS, ODU, HRPDC, City of Norfolk, A-NPDC, Wetland Watch
Causes of Flooding

- Precipitation based flooding
  - Issue throughout Virginia
- Tidal and storm surge flooding
  - Issue in tidal areas
Storm & tidal interaction

Stormwater drainage outfalls at low elevation may be flooded during high tides or storm surges.

This prevents the pipes from draining, stormwater backs up and flooding occurs.
Expected sometime 2040-2060

Typical size storm surge

<table>
<thead>
<tr>
<th></th>
<th>Accomack</th>
<th>Northampton</th>
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<tbody>
<tr>
<td>Total area (acres)</td>
<td>289,612</td>
<td>132,032</td>
</tr>
<tr>
<td>total area flooded</td>
<td>41%</td>
<td>46%</td>
</tr>
<tr>
<td>flooded area that is</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road miles flooded</td>
<td>362</td>
<td>44</td>
</tr>
</tbody>
</table>

Data Source: LiDAR and VBMP elevation data
Adaptation Strategies

Management/Retreat
Accommodation
Protection

Controllable: Methods to reduce vulnerability to flooding.

ADAPTATION STRATEGIES
Management
Accommodation

Emergency Siren Proposed Locations

Elevated house in Mississippi
Photo by Robert Harris/FEMA
VIMS Eastern Shore Seawater Lab

FEMA Zone VE (Coastal High Hazard)

Waterproof envelope provides flood protection up to 14 ft. above msl

Foundation brings floor to 9 ft. above msl

Grade is 6 ft. above mean sea level

Deck designed to hold tanks for outside experiments
Protection

Created marsh in Virginia
Photo by K. Durhing

Photo by DAVID ILIFF. License: CC-BY-SA 3.0
Use multiple protection layers to “buy down” risk and reduce the consequences if adaptation fails.
Monitor 10 indicators: MSL, peak surge tide level, conditions of flood defense structures, developed area, intertidal habitat, etc.

Adaptable because:
- Timing can be changed
- Can switch between options
- Structures designed to be upgraded
- Land planning includes potential future uses
- Considers new infrastructure planning

Flexible adaptation plans
Breakwaters still effective

Low development reduces costs of storm surge

Flooding in this area will require structure or retreat

Agriculture impacts of storm surge / saltwater may require change in crops or landuse

Raise houses to accommodate storm surge?

3.35 feet rise

Expected time frame

SE Virginia sea level rise scenarios

- Highest
- High
- Low
- Current
5.23 feet rise

Accelerated time frame

Floodwall necessary to protect town

Retreat likely

Agriculture impacts of storm surge / saltwater may require change in crops or landuse

Low development reduces costs of storm surge

Raise houses to accommodate storm surge & evacuate
5.23 feet rise

Accelerated time frame

Retreat likely

Shift in land use leads to development of agricultural lands

Floodwall necessary to protect town

Storm surge barrier to protect new development

Raise houses to accommodate storm surge & evacuate
7.53 feet rise

Retreat likely

Raise houses to accommodate storm surge & evacuate

Accelerated time frame
Identify flood hazards (current and future)
Vulnerability and opportunity assessment
Identify potential adaptations
Prioritize vulnerabilities
Prioritize adaptations
Link strategies to capital and rehabilitation cycles
Create an adaptation plan
Monitor and reassess

Flexible adaptation pathway

Adapted from: Climate Adaptation Guidebook for New York State, NYSERDA 2011
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Questions?