Integrated Vulnerability Assessment in the Chesapeake Bay

Creating Priorities for Coastal Flooding Adaptation

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**Goal:** assess the climate change vulnerabilities of the social, structural, and ecological systems.

**Purpose:** science-based information to help identify adaptation areas for coastal flooding risks for more resilient communities.
Integrated Vulnerability Assessment Framework

1. Assess Vulnerability

2. Assess Flood Risk

3. Intersect Flood Risk and Vulnerability

4. Prioritize Adaptation Areas
Site 1: Town of Oxford and Talbot County, MD
Site 2: Choptank Habitat Focus Area, MD & DE

- Extension to larger Chesapeake Bay area
- NOAA designated Habitat Focus Areas
  - Protect and manage deteriorating natural habitats
- Watershed-level management
Methods & Analysis

**Identified vulnerabilities**
- Social vulnerability
- Structural vulnerability
- Natural resource vulnerability (measured via potential loss of highly valued resources)

**Identified flood risks**
- Sea level rise
- Hurricane storm surge
- Stormwater flooding
Results & Outcomes

Distribution of Natural Resources

- Beaches
- Marsh Buffer
- Forested Areas
- Forest Conservation Easements
- Green Infrastructure
- Oyster Sanctuaries
- Wetlands
- Submerged Aquatic Vegetation

Choptank Study Area

This map displays the distribution of natural resources and their spatial extent throughout the Choptank HPA. In total, eight natural resources are displayed: wetlands, beaches, marsh, green infrastructure, submerged aquatic vegetation, oyster sanctuaries, forested areas, and forest conservation easements.

Figure B-12
Results & Outcomes

Valuation of Natural Resources

Value Score
- High
- Medium
- Low

Choptank Study Area

Natural resources have been shown to provide monetary value to nearby and adjacent properties that is inherently included in property prices. The above value scores are based on an ordinal scale. Habitats included in this analysis are wetlands, beaches, marsh, green infrastructure, submerged aquatic vegetation, oyster sand waves, forested areas, and forest conservation areas.

Dark green areas correspond with higher natural resource value, while light green areas correspond with lower natural resource value.
Results & Outcomes

Composite Social Vulnerability

Vulnerability Score
- High
- Medium
- Low

Choptank Study Area

Social composition impacts a community’s vulnerability in the event of flood hazards. Scores are based on a series of components that measure aspects of social vulnerability within the population. These include social class, age, wealth, social isolation, family, and service industry and gender. For example, a younger population with higher social class and low social isolation indicates a lower social vulnerability score.

Dark red areas correspond with higher scores and higher social vulnerability, while light red areas correspond with lower scores and lower vulnerability.
Results & Outcomes

Projected Sea Level Rise of 1 and 2 ft

Sea Level Rise (1 ft)
Sea Level Rise (2 ft)

Choptank Study Area

Projected sea level rise is shown as the amount of the total land area that would be inundated in a sea level rise scenario, at 1 foot and 2 feet above mean high water (MHW).

Light blue corresponds with 1 ft of projected sea level rise impact, while dark blue corresponds with 2 ft of projected sea level rise impact.

Figure B-14
Results & Outcomes

Social Vulnerability and Sea Level Rise Risk of 1 ft

![Map showing vulnerability and sea level rise risk](image)
Results & Outcomes

Coastal Flooding Adaptation Priority Areas (Long Term)

Adaptation Priority Tiers
- Tier 1 - Highest Priority
- Tier 2
- Tier 3
- Tier 4
- Tier 5 - Lowest Priority

Choptank Study Area

Long-term vulnerability scores per block group are determined through a combination of risk analysis (short-term risk and sea level rise 1 and 2 ft) and vulnerability analysis (social, structural, and natural resource). Each census block group is scored as an index value from 0 to 1, and then represented as a tier (Tier 1-Tier 5).

Tier 1 block groups are associated with the highest composite vulnerability and risk, and may indicate areas for prioritization of adaptation action that addresses coastal flooding within the study area.
Applications

• Support for grant applications to secure funds for adaptation and best management practices
• Inclusion of social factors into county-level hazard mitigation plans
• Incorporation of stormwater flood prone areas layer into local flood risk mappers
• Identify areas that may be co-beneficial for community coastal flooding adaptation as well as habitat restoration
Conclusions

• Important Highlights:
  – Benefit of local-state-federal partnership
  – Risks identified by the community
  – Quantification of vulnerabilities and risks creates foundation for decision making

• Next Steps:
  – Finalize technical memorandum and mapbook
  – Propose application of this framework to west coast communities
Thank you

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