Hudson River Sustainable Shorelines Forensics Analysis

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Overview

- Objectives
- Approach
- Sites
- Individual Site Reports
  - Evidence
  - Conclusions
- Common Findings

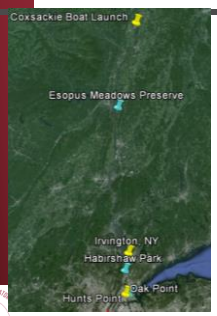
Objectives

- Characterize the conditions of traditional and non-traditional treatments at 4 – 6 sites to understand the determinants of success or failure during extreme weather events.
- Key questions
  - ❑ Determine patterns among structures that survived and those that did not
  - ❑ Determine which aspects of structural maintenance lead to the failure/survival
  - ❑ Determine impacts from large waves, increased water level, and increased currents
  - ❑ Determine the impact of vegetation on the failure/survival of the structure

Approach

- Analyze shoreline stabilization history
- Conduct preliminary site visit
- Collect engineering data and drawings
- Compare hindcast storm conditions to climatology
- Conduct site survey

Sites



- Coxsackie
- Esopus Meadows
- Irvington, NY
- Habirshaw Park
- Oak Point
- Hunts Point

INDIVIDUAL SITE REPORTS

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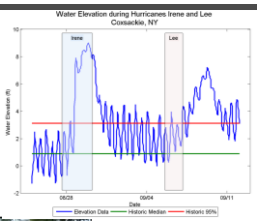
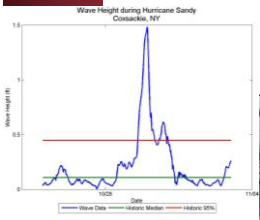
Typical Evidence





Coxsackie Conclusions

- Submerged during major storms - limited damage
- Current lack of maintenance may be contributing to project degradation
- Contractor modified stone size from the design
- Ice/debris and possibly wakes play a significant role at the site

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Esopus Meadows Conclusions (analysis incomplete)

- First attempt using vegetated slope failed during spring storm (<1 yr)
- Well established vegetated embankment withstood Sandy
- Steady maintenance performed
- Ice during winter 2014??

Irvington Conclusions (analysis incomplete)

- Likely submerged during storms
- Revetment experienced some washout of fines
- Wooden cap was not secured to structure properly
- Most of the large stones withstood the storms

Habirshaw Park Conclusions

- Submergence during Irene/Sandy limited damage
- Appropriate slopes utilized
- Sill crest height under-designed
  - Adaptive management used to correct problem
- Maintenance essential to project's performance
- Ice and wakes may dominate design

Oak Point Conclusions

- Slopes inappropriate for wetland establishment (up to 1:2)
- Debris impact during Sandy significant
  - Also a problem in non-storm conditions
- Steep offshore slopes and strong currents
- Immaturity of vegetation may have played secondary role
- Competing regulations (FEMA/DEC)

Hunts Point Conclusions

- Much of the "structure" appears to have held
- Slopes more appropriate than at Oak Point (1 on 7 vs 1 on 2)
- Part of site inundated during Sandy
- Debris impact during Sandy significant
- Moderate offshore depths
- Immature vegetation likely played secondary role

COMMON FINDINGS

Common Findings

- Vegetation Establishment
- Slope Compatibility
- Debris Impact

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- Leeside Erosion
- Adaptive Managem
- Stone Sizing

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- Adaptive Management/ Maintenance
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- Vegetation Establishment
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Recommendations (for discussion)

1. More research needs to be done on the performance of various stabilization approaches during heavy ice and debris conditions.
2. Proper monitoring and maintenance is important to the long-term performance of all projects; however it is critically important for ecologically enhanced shoreline projects.

Recommendations (for discussion)

3. Temporary stabilization measures should be provided to allow vegetation to mature.
4. Terracing or other measures should be used to avoid unnatural slopes.
5. Backside forces should be addressed in design/construction of coastal structures.

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