The Performance of Natural and Nature Based Features in New York and New Jersey

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Hudson River Sustainable Shorelines Project

NEW YORK – UPPER HUDSON
Habirshaw, NY
Habirshaw, NY

- 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...
Coxsackie, NY
Coxsackie, NY

- 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
Esopus Meadows

- First attempt using vegetated slope failed during spring storm (<1 yr)
- Well established vegetated embankment withstood Sandy
- Steady maintenance performed
- Ice during winter 2014??
NYC Parks, NYC EDC, MWA, Stevens, Arcadis, SeArc, many others...

NEW YORK - URBAN ENVIRONMENTS
Oak Point vs. Hunts Point
Oak Point vs. Hunts Point

- Slopes inappropriate (up to 1:2)
- Not inundated during Sandy
- Debris impact during Sandy significant
- Steep offshore slopes and strong currents
- Immature vegetation
- Competing regulations

- Slopes more appropriate (~1:12)
- Inundated during Sandy
- Debris impact during Sandy significant
- Moderate offshore depths
- Immature vegetation
- Much of the “structure” appears to have held
Harlem River
Designing the Edge Project
Modified Materials

(Photos & Info Courtesy SeArc Consultants)
Forensic Analysis - Common Findings

- Vegetation Establishment
- Slope Compatibility
- Debris Impact
- Leeside Erosion
- Adaptive Management
- Stone Sizing
Recommendations

1. More research needs to be done on the impact of ice and debris.
2. Monitoring and maintenance is important to the long-term performance of all projects; however it is critically important for ecologically enhanced shoreline projects.
3. Temporary stabilization measures should be provided to allow vegetation to mature.
4. Use terracing or other measures avoid unnatural slopes.
5. Don’t neglect you’re backside!
NEW JERSEY PROJECTS
Beach Nourishment & Dune Creation
Reeds Beach Restoration

- Horshoe crab / red knot
- ALS, NFWF, Conserve Wildlife Foundation, ...
DELSI PROJECT

Partnership for the Delaware Estuary & Rutgers Haskins Lab

**BEFORE:** Marina in New Jersey's Heislerville Fish and Wildlife Management Area in April of 2010.

**BEFORE:** Day of installation of coconut-fiber (coir) logs and mats in New Jersey's Heislerville Fish and Wildlife Management Area in May of 2010.

**AFTER:** One year later, June 2011, native marsh grass can be seen flourishing in the soil that has collected behind the new "living shoreline." Not only does this defend land against destructive waves, but also it serves as fish habitat during high tides.

**AFTER:** September 2011 - the site remained stable after Hurricane Irene and Tropical Storm Ike.
Thin Layer Spreading

- Beneficial reuse
- $3.4$ million from DOI + matching
- Total of $90$ acres to be restored
Final Thoughts

• Beginning to develop tools/data for design
• General “Eco” - concepts
  – Sinuosity, roughness, mild slopes and terraces, material selection
• New things become important
• Reg’s are trending in the right direction
  – Still need work
• Engineers still skeptical; want guidance
• Metrics and measures
• Unprecedented opportunities to learn
For More Info

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