Reality Check: Why Are Living Shorelines Projects Needed?

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Why are Living Shorelines Projects Needed?

- Standard Shoreline Practices
  - Bulkheads
  - Revetments
  - Riparian Buffer Removal
- Cumulative Impacts of Shoreline Hardening
- Maryland Shoreline Inventory

How many shoreline miles are armored?
Standard Shoreline Practices & Ecosystem Effects
Standard Practices

Bulkheads

Bulkheads are vertical retaining walls.

They do not reduce wave energy, they reflect it.

Upland and wetland habitats are abruptly disconnected.

They define a line for human landscapes.
Ecosystem Effects of Bulkheads

Beach Erosion

“Bathtub Effect”
the gradual disappearance of intertidal areas next to structures
leaving only riparian and sub-tidal habitats
Tidal marshes in front of bulkheads may gradually disappear due to reflected wave action and/or if they cannot retreat landward with rising sea levels.
Storm erosion caused by wave reflection over top of bulkhead – repeated backfill with topsoil
Ecosystem Effects of Bulkheads

Habitat Connections Severed

Sharp divide between upland and wetland habitats prevents integrated vegetation buffer

Wildlife cannot easily move between aquatic and terrestrial habitats
Failed bulkheads become solid waste in the marine environment

Chemically-treated products continue to leach toxics
Standard Practices

Revetments or Riprap

Revetments provide protection with less impact than bulkheads.

Slope allows for wave run-up.

Spaces between stones reduce wave energy.

Upland and wetland habitats not as severely disconnected.
Ecosystem Effects of Revetments

Unnecessary Structures and Wetland Loss

No erosion problem

House located >500 ft landward

Tidal marsh covered by unnecessary stone

Adjacent marsh erosion from reflected wave energy
Ecosystem Effects of Revetments

Riparian Buffer Removal

Excessive Shoreline Hardening

the replacement of “soft” natural shoreline habitats with “hard” human structures in and adjacent to waterways
Standard Practices

Unnecessary Riparian Buffer Removal

Cleared slope
Unstable

Natural slope
No erosion

Less soil stabilization
Less ability to filter runoff and groundwater
Less wildlife habitat
Wide open views are widely regarded as ideal for coastal homes

The costs of detrimental impacts to the aquatic ecosystem also need to be considered
Cumulative Impacts of Shoreline Hardening
Cumulative Impacts

Collective impact of many individual projects on entire ecosystem

Upland Development

+ 

Shoreline Stabilization Structures
## Recent VIMS Research

### Cumulative Impacts of Shoreline Hardening in Chesapeake Bay

<table>
<thead>
<tr>
<th>Study</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seitz et al 2006</strong></td>
<td>More prey in shallow than deep habitats</td>
</tr>
<tr>
<td></td>
<td>Crucial link between natural marshes, benthic prey and blue crab abundance</td>
</tr>
<tr>
<td></td>
<td>Secondary effects of bulkhead and revetment may be as great or greater than direct effects</td>
</tr>
</tbody>
</table>

## Recent VIMS Research
### Cumulative Impacts of Shoreline Hardening in Chesapeake Bay

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<tr>
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<tr>
<td>Bilkovic &amp; Roggero 2008</td>
<td>Shoreline erosion control structures had negative impact on fish even in areas with low development</td>
</tr>
<tr>
<td></td>
<td>Fish community integrity was lowest along bulkheaded shorelines</td>
</tr>
<tr>
<td></td>
<td>Ecological thresholds in nekton community integrity were evident at &gt;23% developed land use</td>
</tr>
</tbody>
</table>

Cumulative Impacts on Living Resources

Riparian Buffer removal and suppression
  +
Upland-Wetland habitat interruptions
  +
Wetland and Beach Loss from unnecessary structures & reflected waves

= Degraded Water Quality
  +
Degraded Fisheries Habitat
Guiding Principles for Living Shoreline Projects
Preserve and Restore Riparian Buffers

Waterfront Lawn vs. Natural or Created Buffer

Nothing to intercept wave action or floodwaters
Runoff of lawn fertilizers and pesticides

Storm and flood buffering
Surface and groundwater interception
### Guiding Principles for Living Shoreline Projects

**Gradual Slopes and Connected Habitats**

<table>
<thead>
<tr>
<th>Instead of bulkhead or revetment...</th>
<th>Create or enhance integrated vegetation buffers with gradual slopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnected habitats</td>
<td>Connected habitats</td>
</tr>
<tr>
<td>Gradual loss of intertidal area</td>
<td>Dense plant cover</td>
</tr>
<tr>
<td>Reflected wave action and sediment re-suspension</td>
<td>Active biological community</td>
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</tbody>
</table>
Maryland Shoreline Inventory

How many miles are hardened?
Maryland Shoreline Inventory

- VIMS Comprehensive Coastal Inventory program (CCI)
- 4 yr project 2002 - 2006
- All navigable tidal streams and tributaries surveyed from boats
- Remote sensing for inaccessible waterways
- Total shoreline surveyed = 4,118 miles

VIMS Contact: Marcia Berman  marcia@vims.edu  804.684.7188
Maryland Shoreline Inventory

Separate report and maps for each county

Three plates for each map area
- Riparian Land Use
- Bank & Buffers
- Shoreline Features

GIS data available

Web Site Links
- Maryland Shorelines Online
- VIMS

http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/index.html
Maryland Shoreline Inventory

- Riparian Land Uses
  - e.g. forest, agriculture, commercial, residential, etc.

- Bank and Buffer Conditions
  - height, vegetation cover, erosion, tidal marshes, beaches, *Phragmites*

- Shoreline features (number)
  - docks, marinas, boat ramps, groins, jetties, breakwaters

- Shoreline features (miles)
  - bulkheads, revetments, debris (haphazard), unconventional (intentional)
Maryland Shoreline Inventory
Sample Map & Legend

Legend
- breakwater
- bulkhead
- debris
- dilapidated bulkhead
- groinfield
- jetty
- marina, <50 slips
- marina, >50 slips
- riprap
- unconventional
- wharf

- boat house
- dilapidated pier
- outfall
- pier
- private boat ramp
- public boat ramp

Scale
400 0 1:12,000 1,600
<table>
<thead>
<tr>
<th>County</th>
<th>Survey Dates</th>
<th>Miles Surveyed</th>
<th>Miles Bulkhead + Dilapidated Bulkhead</th>
<th>Miles Revetment</th>
<th>Miles Unconventional + Debris + Misc.</th>
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<tr>
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<td>County</td>
<td>Miles Surveyed</td>
<td>Miles Hardened</td>
<td>% Total Hardened</td>
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<td>Baltimore Co. and City of Baltimore</td>
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<td>391.89</td>
<td>22.03</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4117.93</strong></td>
<td><strong>1070.89</strong></td>
<td><strong>26%</strong></td>
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</table>
Summary

- Standard shoreline practices have adverse impacts on beneficial ecosystem services.
- Cumulative impacts of multiple projects on living resources are now evident beyond the footprint of development.
- Recent shoreline inventory revealed the extent of shoreline hardening in Maryland.

This is why more living shoreline projects are needed....
Thanks for your Interest in Living Shorelines

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(804) 684-7159

Visit our living shorelines web site (updates coming soon)
http://ccrm.vims.edu/coastal_zone/living_shorelines/index.html