

Living shorelines: Long term resilience & encouraging use

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Shoreline management & living shorelines

1



Long-term resilience

2

Enhancing use & acceptance

3

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1



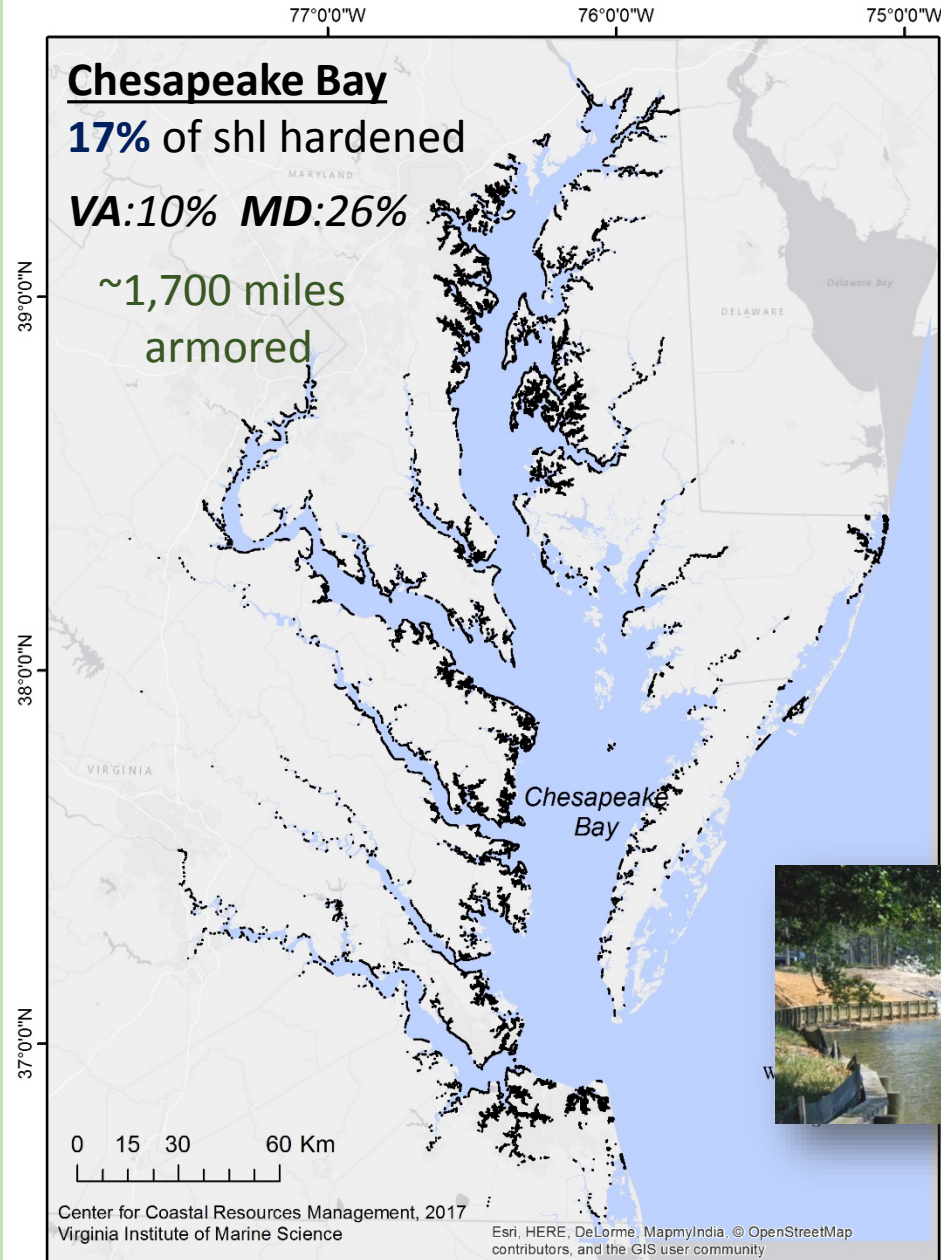
Long-term resilience

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The problem with shoreline armoring



Habitat loss & fragmentation – forest, wetlands ¹

Sediment supply & transport altered, increased scouring, turbidity ²

Increase in invasive species ³

Declines in fish, invertebrate, & marsh bird diversity, terrapin presence ⁴

Prevents natural migration of habitats with SLR

Decline in seagrass resilience ⁵



¹ Peterson and Lowe 2009; Dugan et al 2011, ² Bozek and Burdick 2005, NRC 2007, ³ Chambers et al 1999, ⁴ Peterson et al 2000, Chapman 2003, King et al 2005, Bilkovic et al 2006, Seitz et al 2006, Bilkovic & Roggero 2008, Morley et al 2012, Isdell et al. 2015, Kornis et al. 2017a,b ⁵Patrick et al. 2014

Continuum of shoreline protection approaches

Estuarine & coastal shorelines



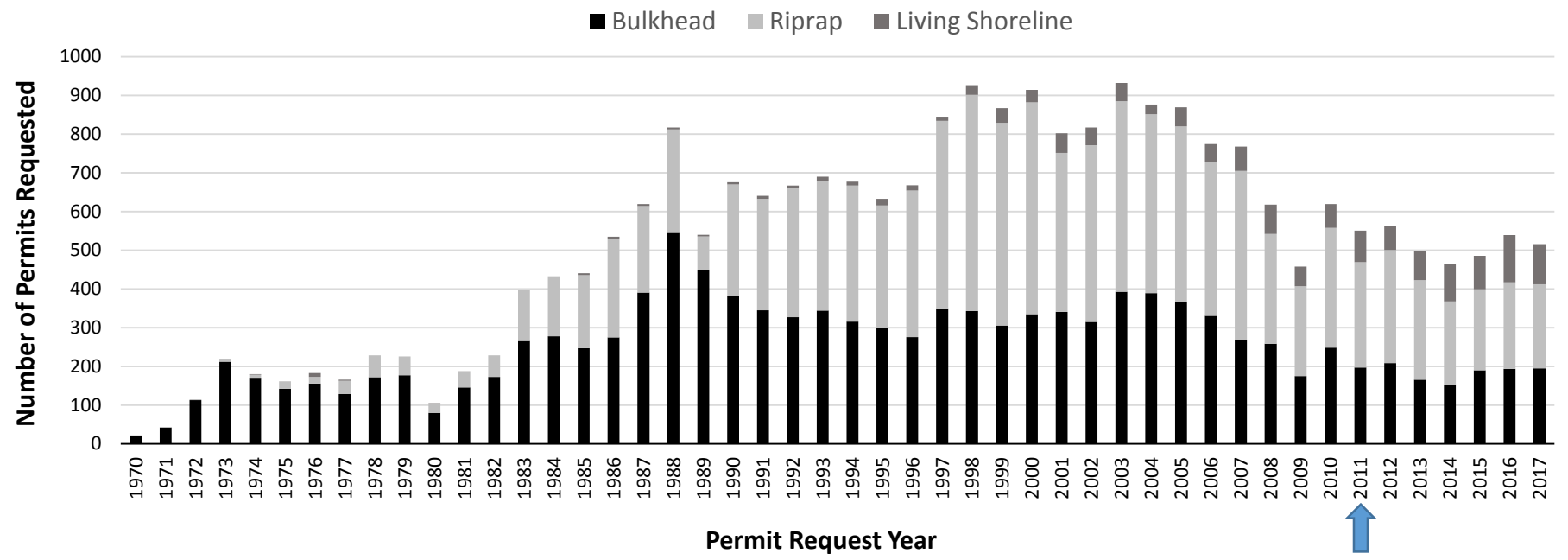
Nature-based protection



Hardened shorelines



Temporal Changes in Shoreline Permit Requests



↑
VA LS Act

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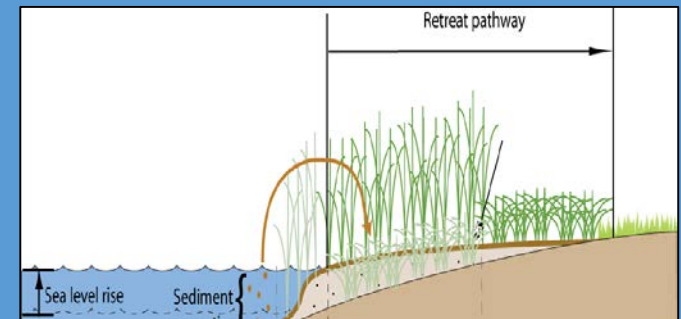
Enhancing use & acceptance

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Enhancing living shoreline long-term resilience

Pathways to Long term resilience

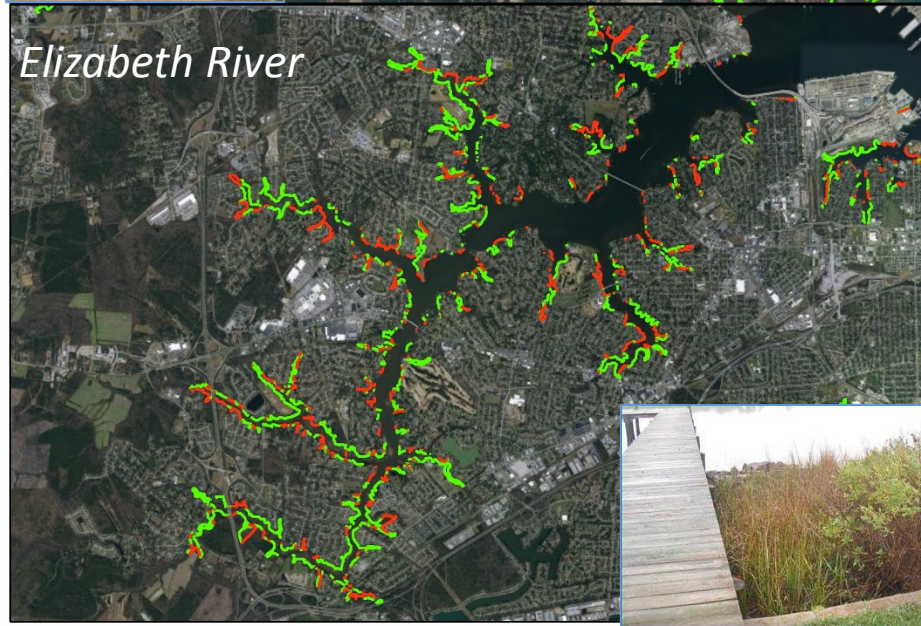
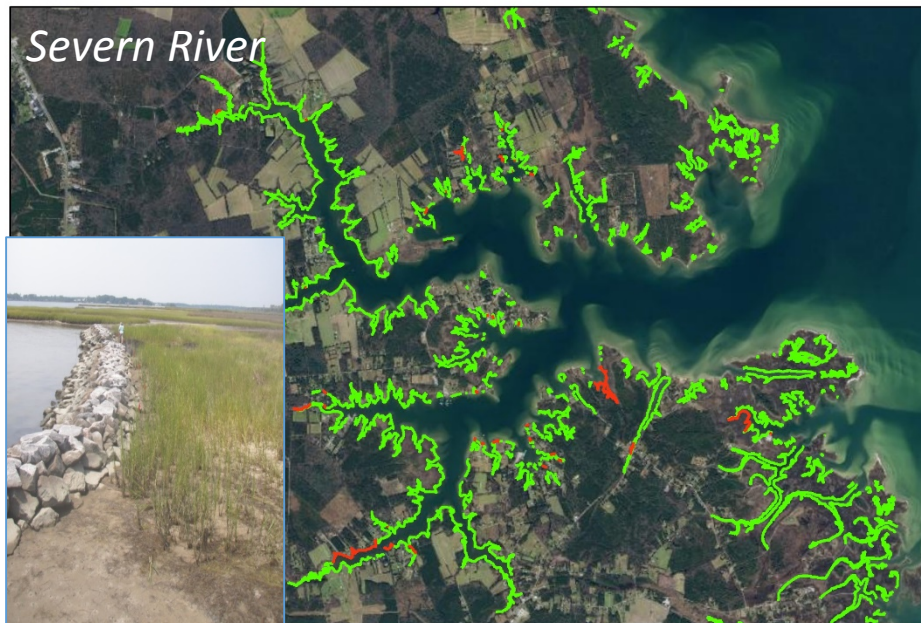
- **Siting** – areas with retreat opportunities likely to have enhanced longevity under sea level rise
- **Allow Dynamic Designs** that take advantage of natural processes that enhance sediment accretion, marsh surface elevation, marsh stability and adaptability
- **Maintenance** – for settings that need a boost – e.g.. raise elevations with sediment deposits



Mitchell & Bilkovic J. Applied Ecology, in press



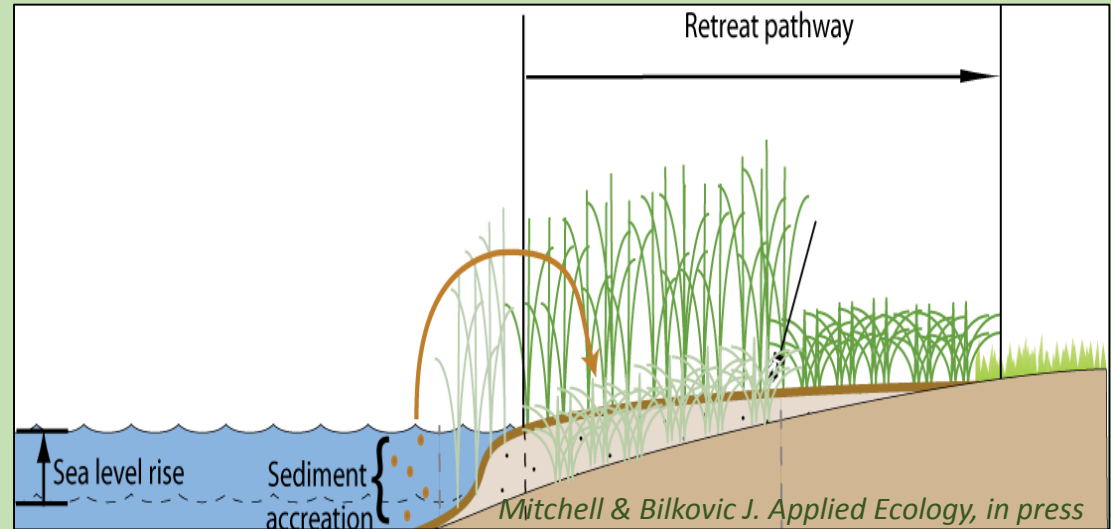
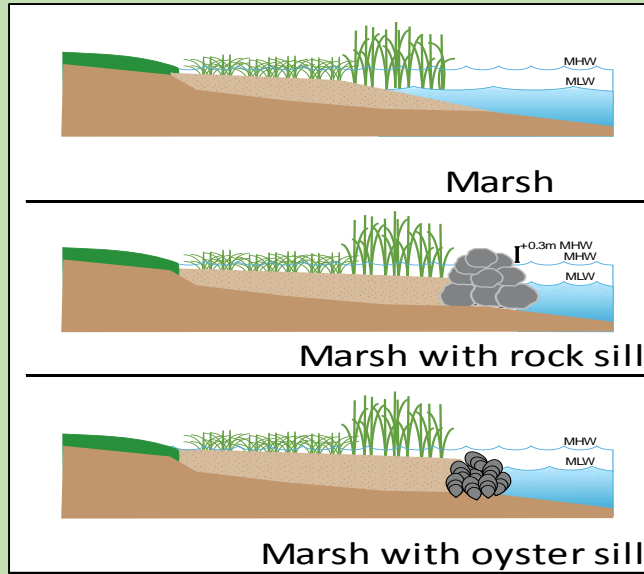
Siting – retreat potential



Retreat potential

- About 70% of VA shorelines may require some shoreline protection (11,000 km)
- A living shoreline is suitable on 86% of those shorelines
- With expected SLR by 2050, **14% of those living shorelines may not be able to retreat.**
 - 2% with impervious surface barriers
 - 2% with agriculture barriers
 - 10% will intersect turf/grass (yards, parks, golf courses)

Allow Dynamic Designs



- Design projects for marsh productivity and sediment retention
- Allow plants to move and settle into the optimal tide elevations – *this will enhance sediment capture (horizontally and vertically)*
- Encourage plant growth – *Tall, dense canopies reduce more wave energy (and capture more sediment)*
- Allow movement landward with rising seas (*don't mow!*)
- Encourage the settlement of marsh mussels on *Spartina* – *enhance sediment capture and marsh stability*



Plan for Maintenance

Some settings are likely to need assistance

- Extreme sea level rise
- Low natural sediment input
- Vegetation stress: exposed to invasive plants or high rates of herbivory

Options include

- Periodic sediment addition, thin-layer spray dredging
- Continued invasive removal
- A maintenance plan with contractors so costs are understood up front



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Enhancing the use and acceptance of living shorelines

Incentives

- tax break
- cost-share programs/low-no interest loans (e.g. VCAP)
- streamlined permit process
- Permit fee waiver
- societal/neighbor appreciation

Education

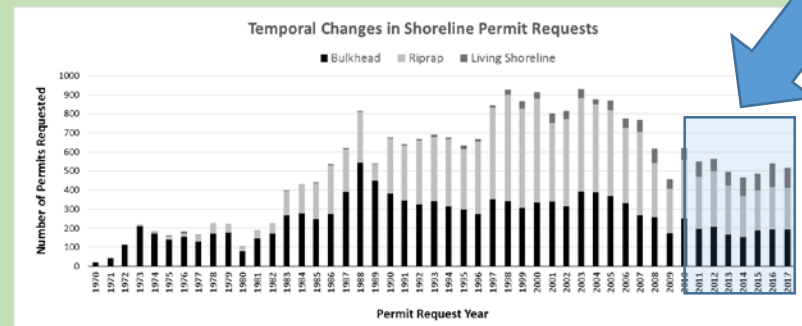
- eliminate misinformation
- consistent messaging about co-benefits
- Training, design assistance
http://www.vims.edu/ccrm/outreach/living_shorelines/resources/index.php
- Shoreline management model – site suitability <http://ccrm.vims.edu/ccrmp>

Co-benefit valuation and crediting

- Economic benefits to locality, community, state (e.g., TMDL credits)
- Community Rating System (CRS) –encourages community floodplain management activities; reduced flood insurance premium rates

State-level promotion

- State regulations to prefer living shorelines (Living shoreline Acts)
- Build into state resiliency plans



Priority next steps

- Identify areas with high long term resilience potential to help prioritize restoration activities (e.g. areas with sediment sources for marsh maintenance, retreat potential)
- Track the effectiveness of incentives and other programs for living shoreline implementation
- Promotion and branding should encourage the acceptance of the dynamic nature of living shorelines for maximum benefits and longevity
- Continued research on project designs in urban and more rural settings that may enhance longevity and minimize maintenance costs.

Questions?

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