

Nature-Based Solutions for the Carolina Beach Community

Northend Flood Mitigation Alliance
July 29, 2025

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North Carolina
Coastal Federation
Working Together for a Healthy Coast

An aerial photograph of a coastal scene. On the left, a long wooden pier extends into the turquoise ocean. The beach is wide and sandy, with many people and colorful umbrellas scattered across it. In the background, a residential area with houses and trees is visible. A dark blue rectangular box is superimposed over the center of the image, containing white text.

***CONGRATULATIONS,
RCCP award
recipients!***

- Collaborate and engage people from all walks of life to protect and restore coastal water quality and habitat throughout the North Carolina coast
- Member supported organization founded in 1982
- 39 staff and 29 board members
- Our work is active in all 20 coastal counties
- Our offices are in Wanchese (Northeast), Ocean (Central), and Wrightsville Beach (Southeast)



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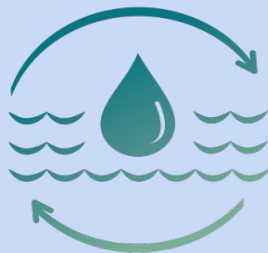
OUR PROGRAMS



Salt Marsh



Oysters



**Water
Quality**



**Marine
Debris**



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Coastal Issues



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Climate Change, Water Quality, Flooding, Polluted Habitats

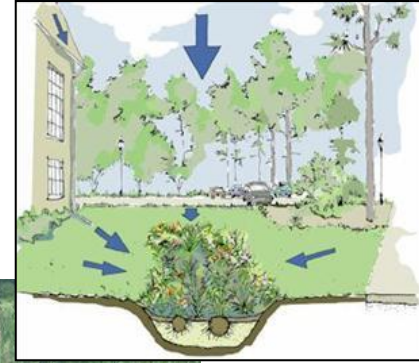
Shoreline Erosion | Stormwater Runoff | Marine Debris



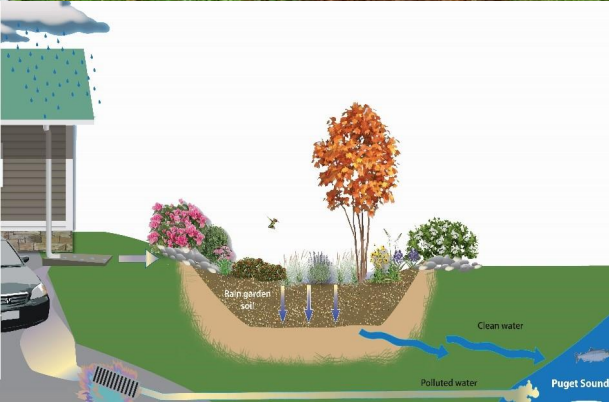
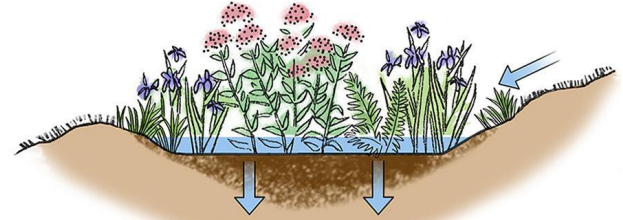
Solutions to Reduce Stormwater Pollution

Smart Yards:

- Rain Gardens
- Reroute Downspouts
- Rain Barrels
- Native Landscaping and Tree Planting
- Backyard Wetlands
- Permeable Paving



Rain Gardens



Rain Gardens:

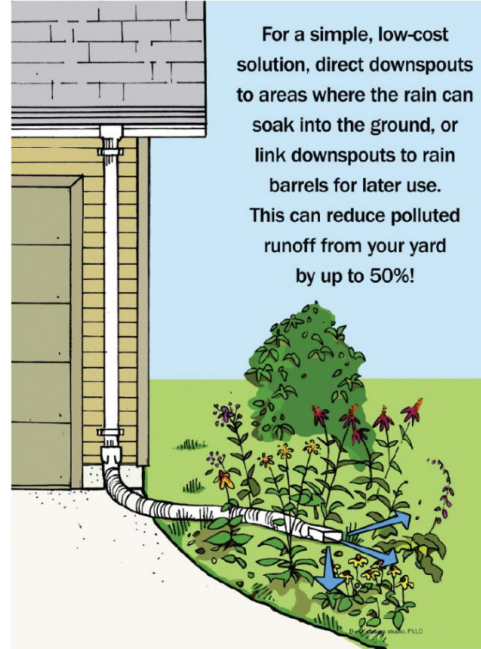
- Shallow, vegetated areas that capture rain during storms.
- Works like a bowl to collect rain from roofs, driveways and parking lots.
- Native plants and soil soak up the rain before it has a chance to become polluted stormwater runoff.

Did You Know?: Rain gardens can reduce stormwater runoff by 90% or more!



Re-route Downspouts:

- Gutter downspouts pointing to driveways, sidewalks or parking lots direct rain from rooftops to the street, where it ends up as polluted runoff in storm drains and coastal waters.
- Instead direct downspouts to rain gardens, where the native plants and soil soak up and filter the rain.



Rain barrels:

- Rain barrels collect and store rainwater from building roofs.
- They help reduce stormwater runoff and provide a free source of water for watering plants and gardens.

Did You Know?:

Just $\frac{1}{4}$ inch of rain produces enough runoff to fill a 50 gallon rain barrel?



Native Landscaping:

- Native landscaping includes the use of hardy native plants that occur naturally in the soils and climate of the southeast coastal region.
- Native plants soak up stormwater and provide habitat for local butterflies, bees and other insects.
- Native plants generally do not require fertilizers, pesticides and irrigation.



Backyard Wetlands:

- Backyard wetlands are depressed wet areas that are enhanced with native wetland plants.
- They are well suited for yard areas that are usually wet for several days following rain.
- Backyard wetlands are generally in locations with high-water tables and soggy soils.



Pervious concrete:

- Pervious concrete allows stormwater to filter into the underlying soil vs. flowing off the site as polluted runoff.
- Unlike traditional concrete, pervious concrete lacks sand in its mixture which allows the rain to fill the tiny holes and seep into the ground.

Did you know?: Permeable concrete is now being used at many commercial, residential and institutional projects across the state.



Shoreline Erosion



Hard Structures bulkheads, seawalls, rip rap



Coastal Resiliency & Solutions

Living Shorelines | Education



What are Living Shorelines?



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Living Shorelines



Escarpment: area of erosion with drastic elevation change, cliff-like

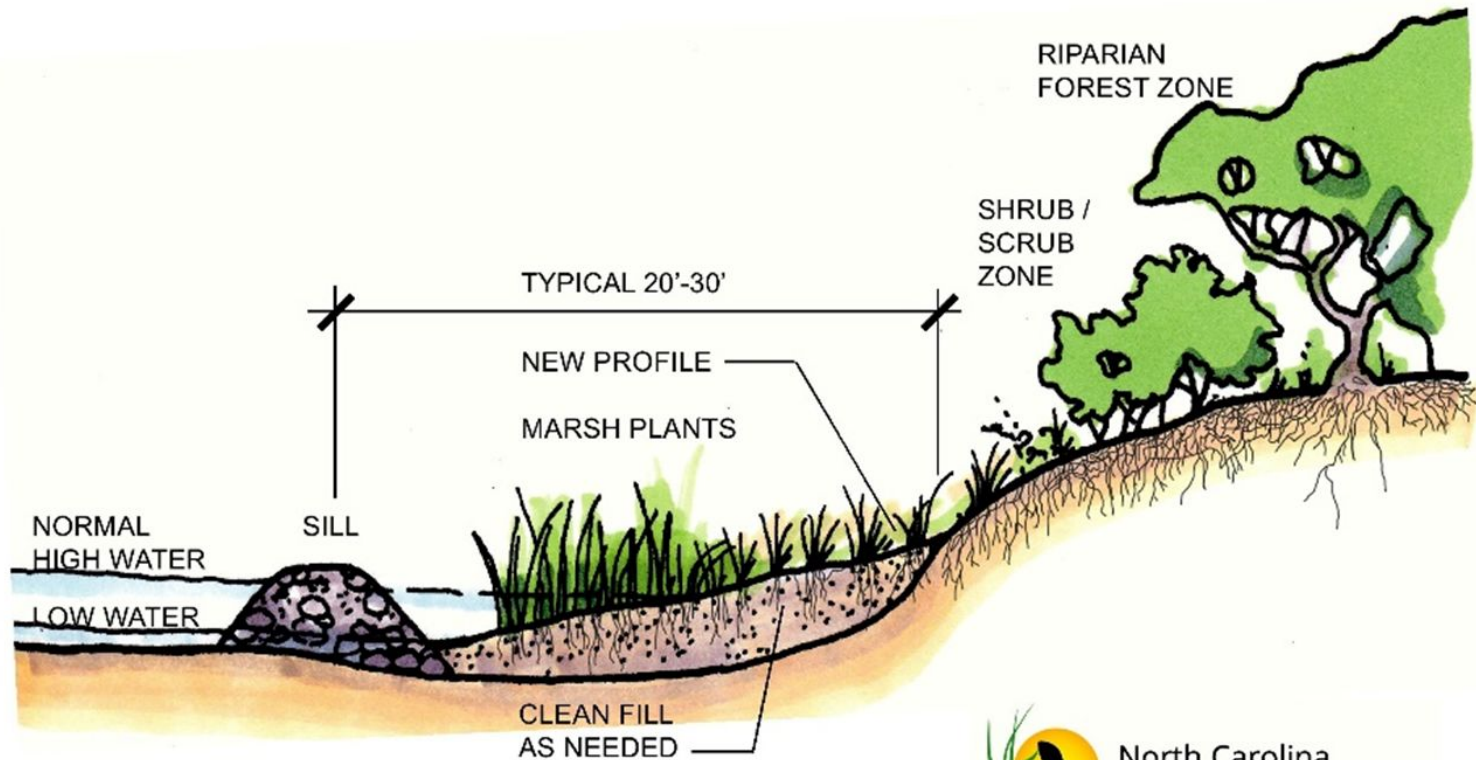
Living Shoreline: stable, coastal edge constructed of natural materials like plants, shell, rock, sand

Sill: the elevated structure of the living shoreline

Revetment: barrier applied to the bank

Normal High Water: elevation on shore established by tidal fluctuations

Riparian Zone: banks situated near the river/waterway



SILL WITH PLANTINGS

not to scale



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illus. Lara Berkley, B+O design studio, PLLC



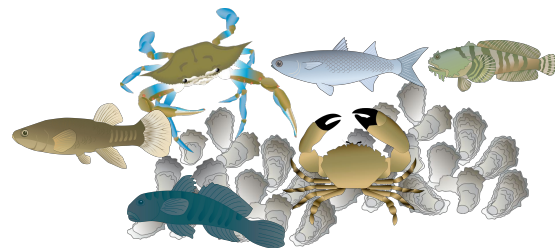
Nitrogen removal
(Onorevole et al. 2018)



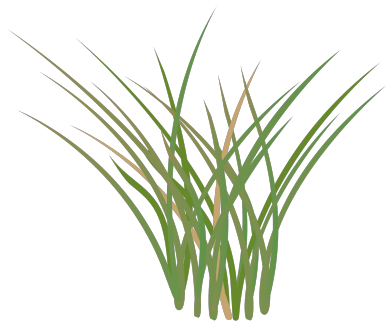
Carbon sequestration
(Davis et al. 2015)



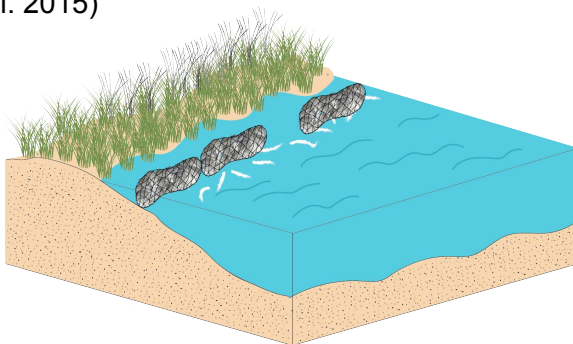
Less expensive to maintain
than hardened shorelines
(Smith et al. 2017)



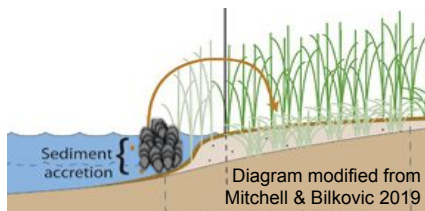
Improved habitat for fish
and crustaceans
(compared to hardened shorelines)
(Gittman et al. 2016, Smith et al. 2021)



Marsh protection
(Polk et al. 2022)



Ecosystem services of living shorelines



Erosion reduction/ sediment accretion
(Currin et al. 2008, Polk et al. 2018 & 2022)



Wave attenuation
(Tso et al. 2023)



More resistant to damage caused
by storms and hurricanes
than hardened shorelines
(Gittman et al. 2014, Smith et al.
2018, Polk et al. 2022)

Bagged Oyster Shell or “Marl”



Granite



Concrete



Marsh-toe Revetment



Vertical Sill



Marsh Grass Planting



Environmental Education through Hands-on Restoration



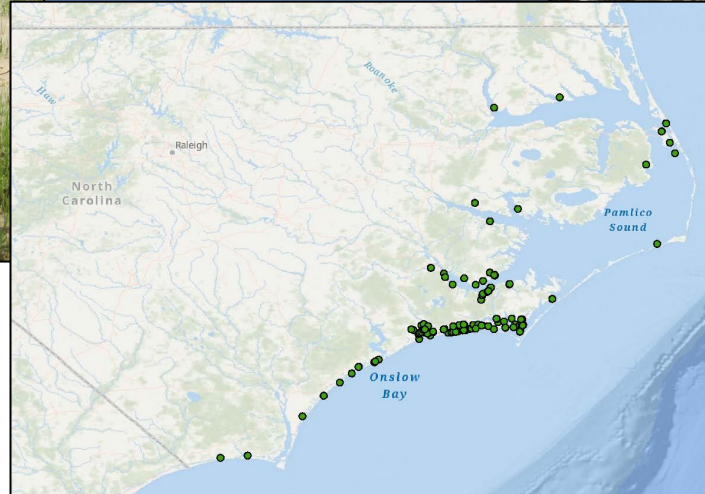
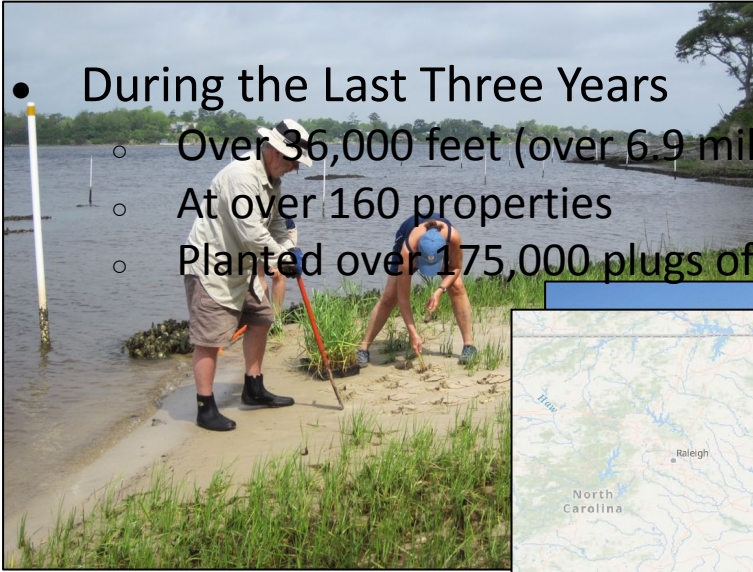
Scaling Up



From a handful of coastal projects...

- During the Last Three Years

- Over 36,000 feet (over 6.9 miles) of living shorelines constructed
- At over 160 properties
- Planted over 175,000 plugs of salt marsh grasses at over 38 sites



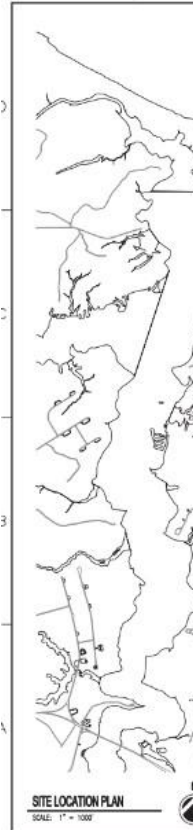
Projects around the coast



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Private, State, and Federal Properties



AS Cherry Point
Cherry Point

Co-Benefits & Project Outcomes



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QuickReef® is made of native coastal materials that rapidly recruit oysters to build a reef quickly.*

QuickReef® also has the ability to effectively disperse wave energy without being reliant on oyster regrowth.

NATIVE
SHORELINES

a DAVEY  company

**where oyster spat is present naturally in the water column*





NATRX
ADAPTIVE INFRASTRUCTURE

STRUCTURE



SANDBAR
OYSTER COMPANY

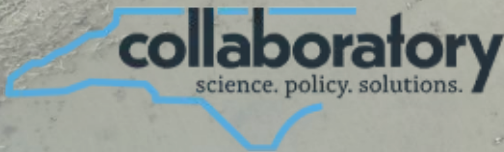
Shellfishly Motivated

Future directions of living shoreline research

Investigating the
impact of living
shorelines on adjacent
habitats and vice
versa

Evaluating
new designs

Understanding
drivers of waterfront
property owner
decisions



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Living Shoreline Cost-Share Program



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[**https://www.nccoast.org/resource/smart-yards/**](https://www.nccoast.org/resource/smart-yards/)

[**https://www.nccoast.org/resource/living-shoreline-cost-share-for-homeowners/**](https://www.nccoast.org/resource/living-shoreline-cost-share-for-homeowners/)

THANK YOU!

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Photo: Native Shorelines