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Coastal Federation allocated $2M to install living shorelines

Rising sea levels threaten coastal communities

By Amy Passaretti

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Living shorelines are made of natural materials, including recycled oyster shells, and are a more sustainable solution than bulkheads for protecting the coast from erosion. (Courtesy photo/RS Shorelines)

SOUTHEASTERN N.C. — Sea levels along North Carolina's coast are expected to rise 10 to 14 inches over the next 30 years, the same amount measured over the last century. To mitigate the impact of rising waters, increased flooding and storm surges, the N.C. Coastal Federation has been implementing living shorelines to protect the region from erosion.

The state budget, signed into law in November 2021, appropriated an additional $2 million to the Coastal Federation for its efforts.

While many property owners are familiar with bulkheads and seawalls, which serve similar purposes, living shorelines are a more sustainable, natural alternative, according to Dr. Lexia Weaver, coastal scientist at Coastal Federation.

Living shorelines are typically installed 5 to 30 feet from the edge of land and are made up of oyster shells, granite, limestone and marsh grasses, usually planted in conjunction. The living shorelines serve as hard surfaces for oysters to attach to. They will continue to grow over time, creating a natural habitat and keep pace with the rising sea level.

These structures attract native oysters, which fuse together as they grow, forming rock-like reefs that provide habitat for other marine animals and plants.

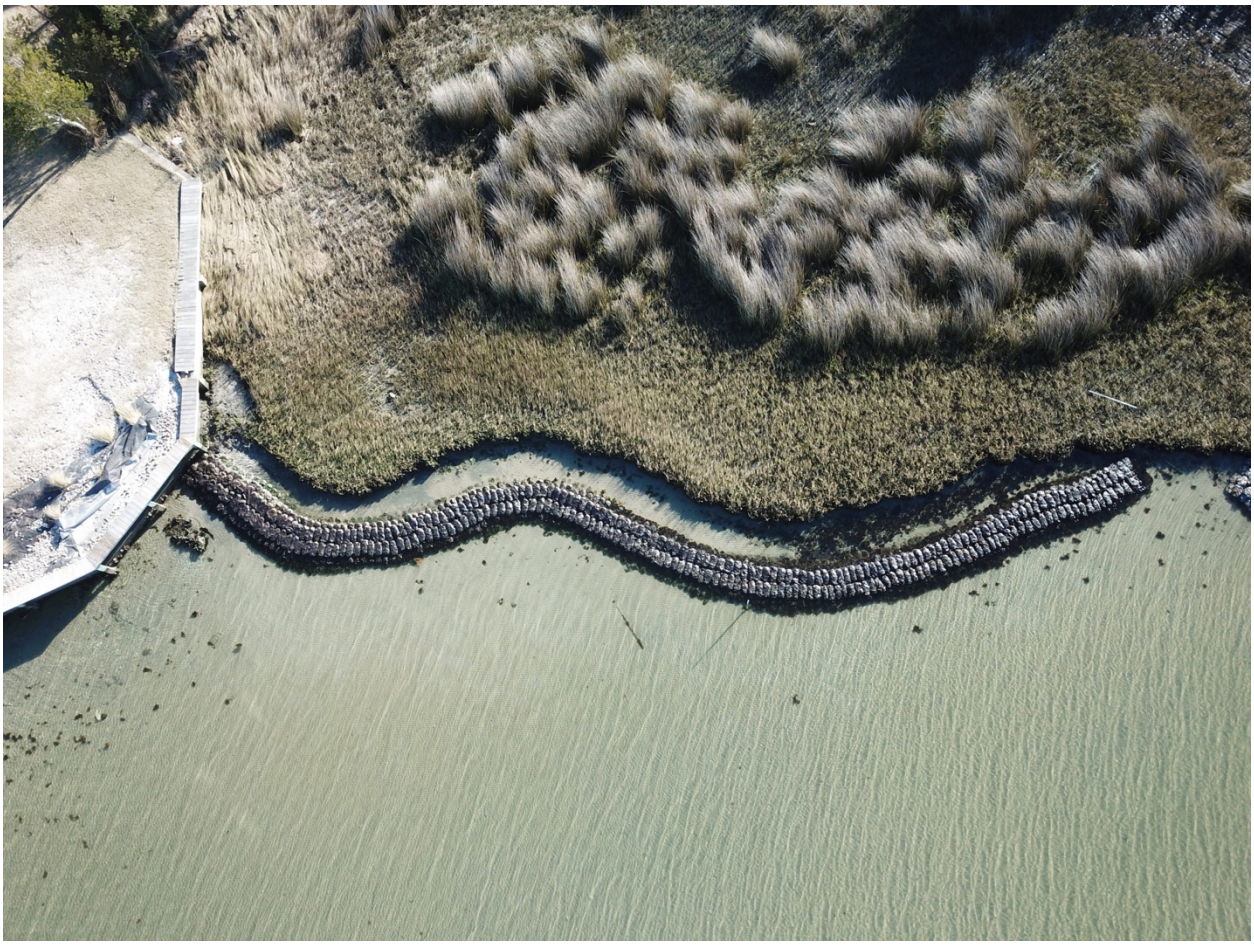
The federation has been installing living shorelines for 20 years, the concept originating from northern states. In 2021, Coastal Federation, with the assistance of volunteers, constructed 4,554 feet, just under 1 mile, of living shoreline at 30 sites. This includes 118 feet of constructed shoreline at Topsail Beach — the first of four living shorelines projects to be installed at Topsail Beach, funded by a portion of a $5 million state grant from 2019.

Last year, the federation used 36,753 recycled oyster shells and 50 feet of Biomason units, bricks hardened from microorganisms, to establish protected coasts. Coastal Federation also partners with RS Shorelines, a company with a proprietary living shoreline system, and installed 338 of its QuickReef units last year.

RS Shorelines has constructed more than 3 miles of living shorelines at roughly 60 locations on the state's coast since 2016.

The goal is for living shorelines to become the norm for coastal resiliency, Weaver said. A study from the National Oceanic and Atmospheric Administration reports damaging flooding is expected to occur 10 times as often as it does today by 2050.

"The sea level rise is a more recent reason why we're putting these in," Weaver said. "But also the King Tides we've been having, over-the-top high tides, combined with strong winds create havoc on our shorelines."



Since 2016, RS Shorelines has installed 3 miles of its proprietary living shorelines in more than 60 locations. (Courtesy photo/RS Shorelines)

She said sea level rise has emerged as a more prominent concern in the last five years as research has come out, bringing awareness to the threat. Prior to that, erosion was more often attributed to boat wakes, storms, hurricanes and non-sustainable shoreline protection methods.

Aside from the sustainability and habitat formation living shorelines provide, they are also advantageous compared to bulkheads and seawalls for their ability to absorb wave energy.

“They function as a wave break or speed bump,” Weaver explained. “When a wave hits a structure, the gaps created by living shorelines reduce the wave energy that goes through the structure and will protect the shoreline or restore the marsh that is located landward.”

Bulkheads and seawalls, made primarily of concrete and riprap are not prone to water absorption and can destroy natural habitats over time from the reaction of waves hitting the hard surface, Weaver explained.

The other disadvantage of hard structures, such as bulkheads, is they tend to protect a landowner's property, or what is directly behind them, but can be damaging for nearby land. The wave energy has nowhere else to go when it hits, so it often splashes into neighboring areas, contributing to erosion.

While any size living shorelines will guard the land behind it, RS Shorelines director of coastal restoration Mary-Margaret McKinney recommends at least 45 to 50 feet in length for adequate protection.

"When you get down under 50 feet, you have a hard time tying the structure back to the land," she explained. "You end up with this little piece, which does protect, but the structure itself isn't necessarily stable and it's going to get battered over time."

The N.C. Division of Coastal Management and U.S. Army Corps of Engineers must approve the permitting process for installing living shorelines. McKinney said typically they are permitted to be installed up to 1 foot above the land, or at the normal high-tide level. Often, they are installed submerged, so the high tide easily passes over. This also deposits carried sediment behind the barrier, which gradually allows marsh behind it to grow, strengthening the buffer.

The original living shorelines were built from bagged oyster shells stacked into a pyramid shape, she explained. One example of this is a 610-foot living shoreline constructed in 2016 at Carolina Beach State Park, which restored about .3 acres of shoreline.

Today, other pieces of granite and riprap are incorporated for added stability. Constructing them on a slope is also ideal to ensure water rolls up and over, as opposed to waves making a direct hit.

To incentivize homeowners to install living shorelines, the Coastal Federation has a cost-sharing program, funded in part with state and federal money.

Bulkheads are often more expensive to install, but people still have a preconceived notion they are better, Weaver said.

"It's about changing the mentality," she said. "To the layperson, that wall is a fort to them, but as water rises, no matter what, those seawalls don't stop that damage and eventually they will collapse and need repair."

McKinney said building a living shoreline could cost roughly $150 per linear foot, but the total price depends on how much coverage is needed.

Coastal Federation offers a cost-sharing program, depending on the pot of money it has at the time, to offset some of the expenses. At this time, the program covers about $55 per linear foot, up to a $10,000 maximum, which Weaver said, typically ends up covering about half the cost. The cap for cost-sharing was raised from $5,000 due to the additional money appropriated from the state budget.

To assist with the creation of living shorelines, Weaver said the public should continue to recycle its oyster shells. It's illegal in North Carolina to throw them out, since they are so valuable to forming natural habitats. Coastal Federation also offers a membership program and opportunities to donate financially.

In 2022, the Coastal Federation has a goal to build 3,000 feet of living shorelines on private properties. It will also construct 60 feet of living shoreline at Topsail Beach and begin construction of 5 acres of oyster, living shoreline and salt marsh along Banks Channel. Coastal Federation also plans to enhance its living shorelines at Carolina Beach State Park with 13 acres of tidal creek and marsh.
