# Chesapeake Quarterly

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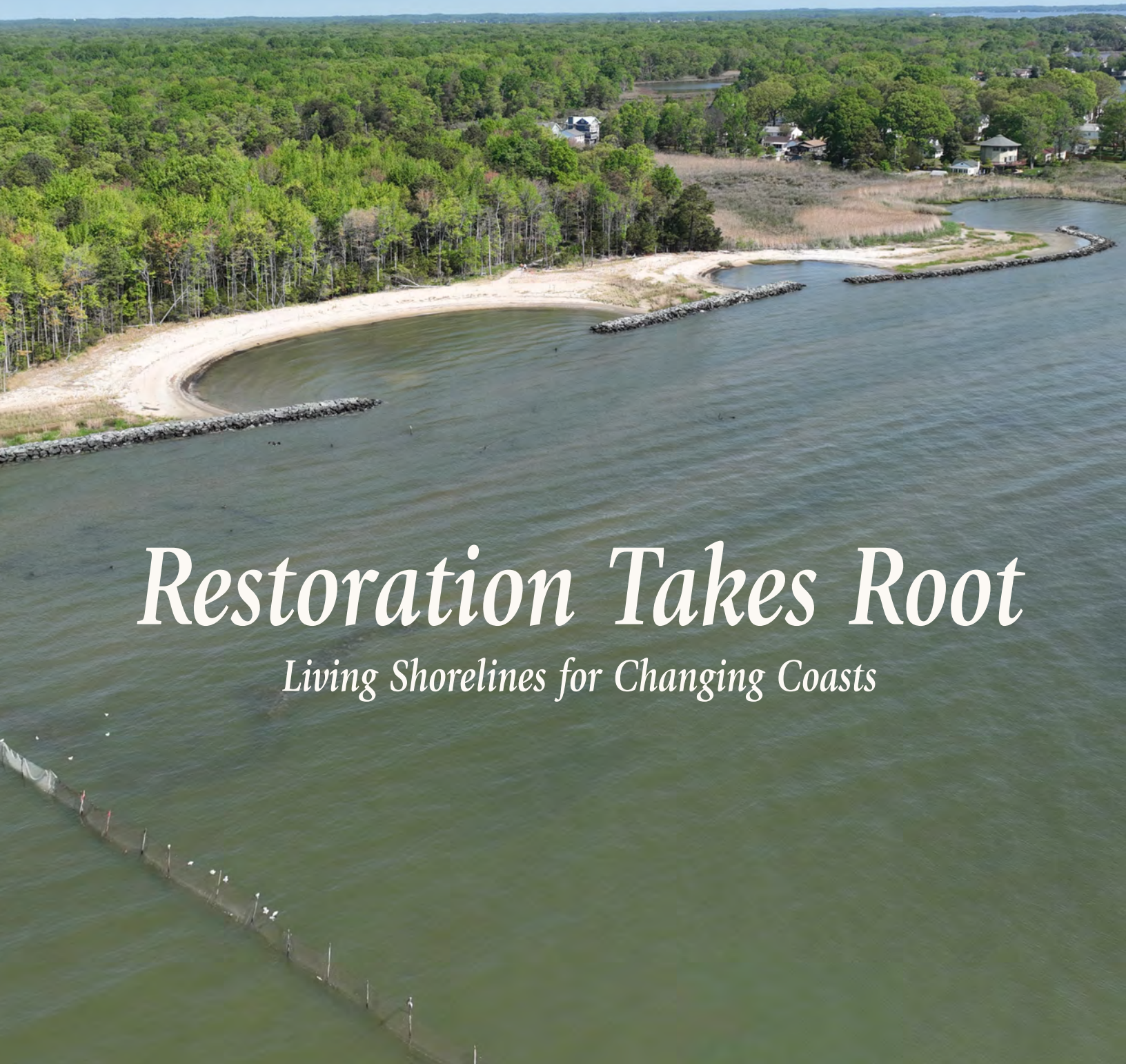

# *Restoration Takes Root*

## *Living Shorelines for Changing Coasts*

# in this issue

*Volume 24, Number 1*

Living shorelines protect coastal areas from erosion using natural materials. In this issue, learn about how science steers shoreline restoration projects around the Chesapeake Bay.

This print edition of *Chesapeake Quarterly* includes the issue's feature story, "Roots at the Water's Edge." Read more articles in our complete online issue by visiting chesapeakequarterly.net or scanning this QR code:

CHESAPEAKE QUARTERLY

*June 2025*

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*Chesapeake Quarterly* editorial team:
*Director:* Fredrika Moser
*Assistant Director for Communications:* Annalise Kenney
*Writer:* Ashley Goetz
*Writer:* Madeleine Jepsen
*Graphic Designer:* Jill Gallagher

**Maryland Sea Grant**
5825 University Research Court, Suite 1350
University System of Maryland
College Park, Maryland 20740

Email: communications@mdsg.umd.edu

www.mdsg.umd.edu
www.chesapeakequarterly.net

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**Cover:** *Living shoreline at Franklin Point beach in Anne Arundel County, Maryland.*

*PHOTO, LOGAN BILBROUGH/UNIVERSITY OF MARYLAND SEA GRANT EXTENSION*

# Roots

On the banks of Grace Creek in Talbot County, Maryland, sits a picturesque farm with forests and fields, wetlands, and blue-green waters. The 164-acre estate once belonged to Russell Train, second administrator of the US Environmental Protection Agency and a founding director of World Wildlife Fund. In 1998, the Trains placed their farm in a conservation easement with the Eastern Shore Land Conservancy, permanently protecting it from development.

The property was sold to new owners in 2021. Though the legal protections remain intact, the same can't be said for the shoreline, which has been slowly crumbling into the creek. Felled trees lie across scraps of sandy beach and exposed roots tangle beneath muddy, undercut banks. "Over the last 10 years, I've seen approximately 15 to 25 feet of shoreline erode," says Grace Creek Farm caretaker Chris Wood.

As Wood observed these changes, a similar scene was unfolding about 13 miles away, as the crow flies, on the Chesapeake Bay's western shore.

## The Gem of the Bay

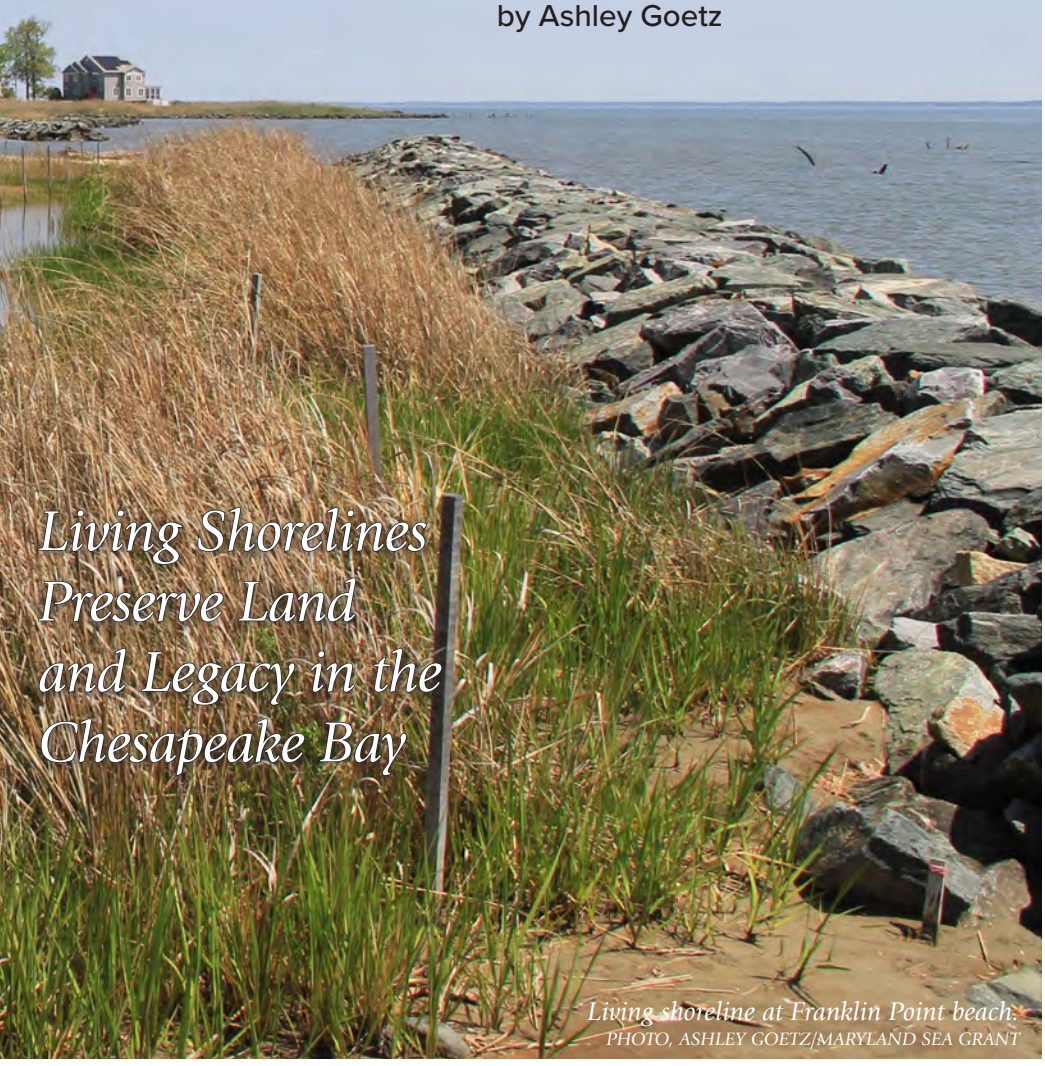
In 1940, a group of Black families purchased about 88 acres of land near Shady Side, Maryland, in southern Anne Arundel County. They divided the land and sold the lots to Black professionals in Baltimore and Washington, DC. Thus, Columbia Beach became a summer waterfront retreat for Black families during a time when most US beaches and resorts were segregated. The community is nestled on the Deale-Shady Side peninsula between the Chesapeake Bay and the West River.


*Grace Creek Farm is located on the Eastern Shore of the Chesapeake Bay in Talbot County. Across the water, the Columbia Beach community is nestled in the southeastern portion of Anne Arundel County.*

*ARCGIS BASEMAP; DATA: VGIN, ESRI, TOMTOM, GARMIN, SAFEGRAPH, FAO, METI/NASA, USGS, EPA, NPS, USFWS*

# *at the* Water's Edge

by Ashley Goetz



## *Living Shorelines Preserve Land and Legacy in the Chesapeake Bay*

*Living shoreline at Franklin Point beach.*
PHOTO, ASHLEY GOETZ/MARYLAND SEA GRANT

"It was a safe haven for children of color. You could go outside. Your parents didn't have to worry about you like they did in the city or other places," says Jameya (Jamie) Way, Columbia Beach resident and president of the Citizens Improvement Association. "You rode your bikes, you went swimming, you went fishing and crabbing. You didn't have to come back home until dinner time…It was a very safe environment."

Way's grandparents joined the Columbia Beach community in the mid-1940s. She recalls summers spent splashing in the water and sitting on a sandy beach with her mother and grandmother. In 1996, Way moved her family to the neighborhood. "I never dreamed that I would have the opportunity to actually buy property and build and live here. I wouldn't change it for anything," she says.

Howard Kea moved to Columbia Beach in the early 2000s. He loves the history and diversity of the community, as well as its proximity to the water. He often walks to the southern end of the peninsula, where a short path through the woods reveals a sandy beach.

This small, secluded retreat is part of Franklin Point State Park. The beach Kea remembers from his early days in Columbia Beach stretched for about 100 yards. But as time progressed, the land was eroding several feet each year. "It was happening fast," says Kea.

Staff at the Maryland Department of Natural Resources' (DNR) Park Service had been keeping an eye on the beach through the 2010s, and their concern was growing. The site was losing as much as 7.5 feet of land a year to erosion due to the peninsula's low elevation and high wave energy. In 2018, DNR's Park Service and Chesapeake and Coastal Service partnered with the Arundel Rivers Federation to restore the Franklin Point beach. They would develop a living shoreline, both for the preservation of the park and for the residents of Columbia Beach.

### Rooted in Resilience

Living shorelines use natural materials—such as native plants, sand, and rocks—to protect the shore from erosion. "They basically mimic the way nature would protect a shoreline," says Cindy Palinkas, an associate professor at the University of Maryland Center for Environmental Science (UMCES).

Like natural marshes, living shorelines help absorb the energy of waves and tides. Their plants play a key role. "When tidal flows and waves interact with the plants, it's like forcing water through a bunch of straws," Palinkas explains. The marsh grasses slow the water down, which reduces erosion.

As the water slows, suspended sediment particles fall and settle onto the marsh surface instead of being washed away, says Lorie Staver, a plant ecologist at UMCES. Over time, that sediment can help raise the surface elevation of the marsh. The plant roots and rhizomes—stems that grow horizontally underground—bind the



*Left to right: Jameya (Jamie) Way spent childhood summers with her grandparents in Columbia Beach. She moved to the neighborhood in 1996; Way's mother and aunts walk through the Columbia Beach neighborhood on their way to the beach in September 1954; Way's grandparents moved to the community in the mid-1940s. Their home, pictured here, was located on Columbia Beach Road.* PHOTO, ASHLEY GOETZ/MARYLAND SEA GRANT; HISTORIC PHOTOS, COURTESY OF JAMEYA WAY

shoreline together. When plants die and decay, they create organic material, building up the marsh even more.

Because of this, a living shoreline has the potential to grow and adapt to rising sea levels—something a hard structure like a bulkhead or riprap cannot do. A hard shoreline structure is fixed in place and height. "It has a finite lifetime," says Staver. The versatility of living shorelines is especially important in a region like the Chesapeake Bay that experiences higher-than-average sea level rise due to a combination of climate change and sinking land. While living shorelines may not be able to keep pace with extreme rates of sea level rise or adapt to every situation, they offer a level of adaptability that hard structures lack.

Hard methods of shoreline stabilization also create a barrier between land and water. When waves encounter a bulkhead, they can bounce off, increasing their energy on the way back out. "That can scour the bottom in front of that bulkhead and make it deeper," says Palinkas. Instead, living shorelines maintain the connection between land and water, allowing plants to dissipate the energy as water rolls onto the shore. "So, it's not having as much of an erosive effect on the shoreline."

Living shorelines have been used in Maryland since the 1970s. Some of the earliest versions of these shorelines were developed on Maryland's Eastern Shore by chemist and environmental nonprofit founder Edgar Garbisch, who demonstrated how stone, sand, and marsh grasses could help restore deteriorating wetlands. In 2008, Maryland passed the Living Shoreline Protection Act. The act requires that property owners use living shorelines for erosion control, except in cases where they can demonstrate it would not be feasible, such as in areas with excessive erosion, heavy tides, and narrow waterways.

Nicole Carlozo, DNR's waterfront and resource planning section chief, says they could have built a revetment—a type of sloped retaining wall—along the Franklin Point beach, but it would have eliminated the community's access to the beach and to the water. They weighed the pros and cons and felt a living shoreline would work.

*Erosion at Franklin Point, pre-restoration (2022).* PHOTO, ARUNDEL RIVERS FEDERATION

## The Nature of Restoration

Columbia Beach is in a low-lying area of Anne Arundel County that is surrounded by water and particularly vulnerable to sea level rise. County hazard planning has highlighted the

peninsula as a high-risk area where flooding threatens the safety of people and property. "We've had a serious problem with flooding," says Way. Residents have been stranded in their homes during heavy storms, which overwhelm drainage systems and create storm surge conditions.

Living shorelines mainly protect coastlines from erosion; they can also offer a small amount of flood relief from coastal storm surge by containing water and absorbing wave energy. More importantly, says Carlozo, is Franklin Point's role as a buffer of land between the Columbia Beach community and the Chesapeake Bay, helping protect the community from the southeast side. If that land were lost, it would make the community even more vulnerable.

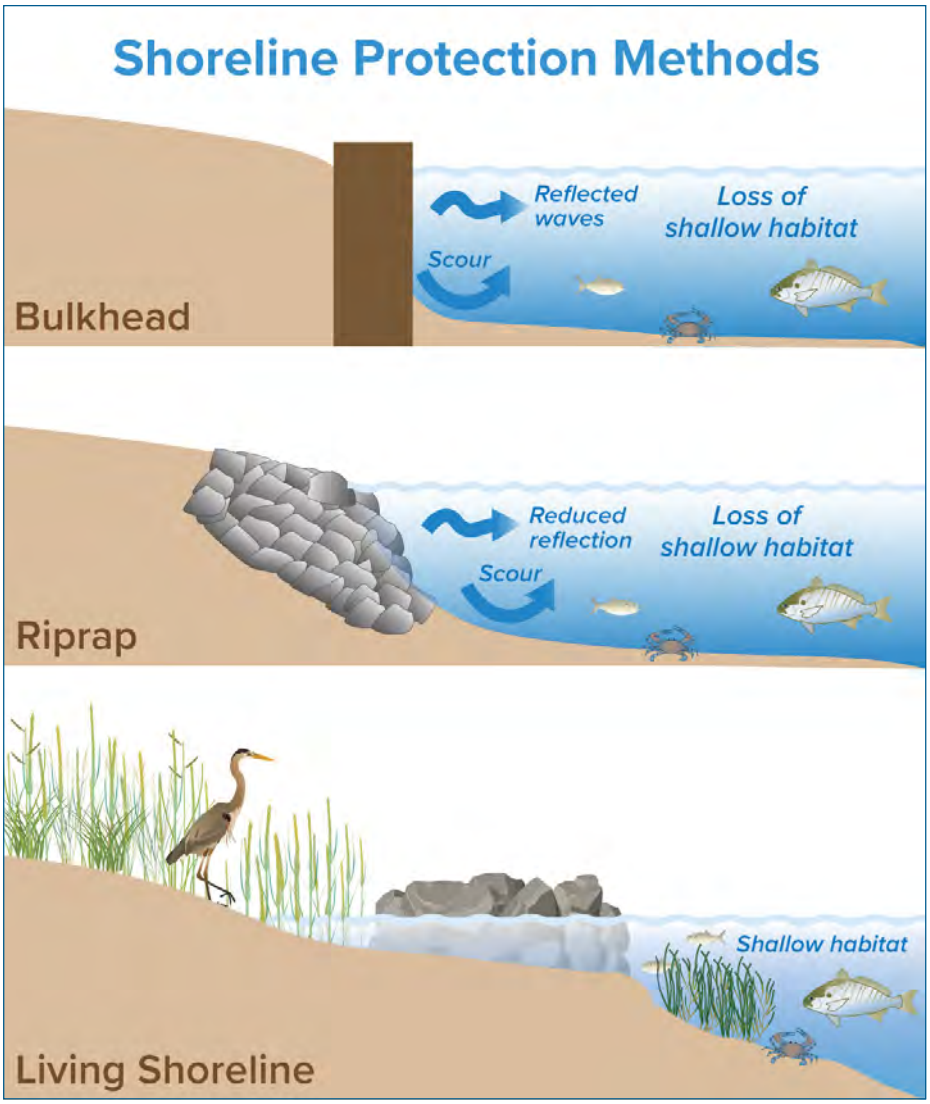
In 2017, DNR launched the Resiliency through Restoration Initiative to support the design, construction, and maintenance of projects that address the impacts of climate change. Franklin Point was selected as a pilot project.

Kea was excited when construction began but says some residents were skeptical. The prevailing attitude seemed to be: let's wait and see how this is going to work. Arundel Rivers Federation organized site walks for residents before, during, and after construction. They also invited community members out to help plant the marsh grasses. The Franklin Point living shoreline was completed in spring 2022, and Way says residents were impressed with the finished product. Franklin Point State Park, like many smaller state parks, does not allow swimming. But people like to walk and ride their bikes to the beach. Kea has added it to his jogging route.

"Now, we can hold the shoreline there, instead of losing all this land and having the tide creep toward people's homes," says Jennifer Carr, director of restoration for Arundel Rivers Federation. The shoreline also protects a portion of mature forest, something Carr says is rare in the county. It was common to see trees collapsing into the water along the eroded bank before the living shoreline was installed. "Anytime you can preserve intact forests, it's a bonus," she says.

While a living shoreline's primary purpose is erosion control, these projects often have environmental "co-benefits," like preserving forest or reducing nutrient pollution in the Bay. Staver says groundwater is often high in nitrogen, but when it passes through or beneath a marsh, some of that nitrogen is taken up by the plants. "That's a potential benefit, because it prevents that nitrogen from getting into the water," she explains.

Marshes also have some of the highest rates of carbon sequestration in the world. Like other plants, marsh grasses capture and store carbon dioxide from




*Hard methods of shoreline stabilization, like bulkheads and riprap, create a barrier between land and water. As waves bounce off the structures, they scour the bottom, making it deeper and eliminating shallow-water habitat for plants and animals. Living shorelines are designed to prevent erosion while keeping land and water connected. They use natural materials, like native plants, sand, and rocks, and provide essential habitat for wildlife.*

*Graphic adapted from Prosser, D.J., Jordan, T.E., Nagel, J.L. et al. Impacts of Coastal Land Use and Shoreline Armoring on Estuarine Ecosystems: an Introduction to a Special Issue. Estuaries and Coasts 41 (Suppl 1), 2–18 (2018). https://doi.org/10.1007/s12237-017-0331-1*

GRAPHIC, JILL GALLAGHER/MARYLAND SEA GRANT

the atmosphere as they photosynthesize and grow. "They're a form of blue carbon, which is carbon that's stored in submerged aquatic vegetation, tidal marshes, and mangroves," says Staver. As parts of the plants die and decompose, some of the carbon also gets trapped in the sediment. This natural storage of carbon helps to reduce climate change. In addition to intercepting and storing nutrients, living shorelines provide habitat for turtles, small fish, and other animals that like to forage in the marsh.

On the other side of the Bay, these are the types of benefits Chris Wood hopes a living shoreline will bring to Grace Creek Farm.

## A Farm on the Edge

Wood has worked outdoors for most of his life and has a deep appreciation for this region of the Chesapeake Bay. "I started working at an early age, like most kids on the Eastern Shore," says Wood. At six years old, his father taught him how to grow peppers, cucumbers, and tomatoes. He started leading goose and duck hunting parties in his late teens. Later, he got his captain's license and became a commercial crabber and fisherman. He also worked on farms around Talbot County.

**Living shorelines often share similar elements—like sandy dunes, marsh grasses, and protective stone sills—but each one is tailored to the unique conditions of its site.**

Wood became a property caretaker about 20 years ago and has spent the last decade looking after Grace Creek Farm. In that time, he has witnessed dramatic changes to the property's shoreline, including eroded banks and large trees falling into the water. He worries the sediment entering the river and creek from erosion stresses the Bay's ecosystem. Larisa Prezioso, enhanced stewardship manager at the Eastern Shore Land Conservancy, says landowners and managers have an intimate understanding of how their shorelines change over time. "They feel the differences nostalgically and practically."

Though the property is privately owned, the conservancy is responsible for Grace Creek Farm's conservation easement, which permanently protects the land. It allows the conservancy to limit development and prescribe conservation values, like a water quality buffer and a forest stewardship plan. Thanks to the easement, the changes Wood has observed over time are also documented. "We've been taking pictures of this property for the last 26 years," says Prezioso.

Wood says his work is not only about keeping the property as beautiful as he can for people to enjoy, but also about doing what's best for the environment. The living shoreline planned for the property will support those efforts. The project is split into two phases and aims to restore about 5,000 linear feet—nearly a mile—of shoreline by 2027.

"Our main shoreline stabilization measure is the combination of rock sills and marsh creation," says Cal Novelli, a water resources engineer at Ecotone, Inc, the ecological restoration company designing and constructing the Grace Creek living shoreline. The rock sills, structures of piled rocks placed in the water parallel to the shoreline, will intercept wave energy. "They kind of break up the waves before they hit the bank," explains Novelli. "And they allow for us to place sand and provide sand containment, so we can plant marsh grasses."

Living shorelines often share similar elements—like sandy dunes, marsh grasses, and protective stone sills—but each one is tailored to the unique conditions of its site. At Grace Creek, the shoreline dips, curves, and juts into the water, creating a complex edge where wave energy approaches from multiple directions. That variability shaped Ecotone's design, which had to account for how waters move and wrap around the shoreline's changing contours.

*Left to right: Columbia Beach residents participate in a planting event at Franklin Point hosted by Arundel Rivers Federation; Howard Kea stands in the shallow waters at Franklin Point.*

*PHOTOS, COURTESY OF ARUNDEL RIVERS FEDERATION AND HOWARD KEA*

Some of the property's shoreline is armored by riprap—large, loose stone installed years ago to break up waves and prevent erosion. Ecotone plans to repurpose some of that riprap to build new rock sills for the living shoreline. Removing the old riprap will also help to reconnect the upland and tidal habitats. Behind the sills, they will plant a tidal marsh to provide the shore's long-term protection. Gaps in the sills will allow water to flow in and out and give wildlife access to both the marsh and upland areas. Ecotone will also install oyster reef balls—concrete reef structures designed to reduce wave energy and create new habitat for oysters.

Ecotone had to ensure their designs had minimal impact on the farm's existing resources—a riparian buffer of trees and shrubs, farmland, tidal and nontidal wetlands, oyster beds, and some offshore habitat for submerged bay grasses. "It has to really be balanced," says Prezioso. The Maryland Department of the Environment is the main permitting agency for living shorelines, but other state and federal regulatory agencies are involved when it comes to ensuring the resources they manage remain protected. Novelli says it's critical to involve them early, ideally in the design phase.

Living shorelines can have steep price tags. Grace Creek's two design phases cost about $150,000. Phase one construction, which covers about 2,700 linear feet of shoreline, will cost about $1.5 million. The project is funded through a mix of grants, and the landowners have contributed funds every step of the way. Low-interest loans and incentives can also help landowners and organizations pay for living shorelines. "Between the funding and the regulations and the permits, there are so many pieces that come together to make something like this happen," says Prezioso. "It's truly a gigantic team effort."

*Glossy ibises, like those pictured here, visit Grace Creek Farm in spring and summer.*

*PHOTO, US FISH AND WILDLIFE SERVICE*

Wood says his perfect living shoreline would be one "where God's creatures can go and be protected and thrive." Grace Creek Farm is home to white-tailed deer, foxes, opossums, and raccoons. But above all, Wood enjoys watching the birds that use the farm as a resting and feeding area. Glossy ibises and herons visit in the warmer months. "A heron is the best fisherman I've ever seen in my life," he says. He has a particular fondness for ducks but fears that without efforts to save the land, there will be few places left for the wildlife he loves.

"The only way we're going to be able to have anything in the future, for the next generation, for my grandchildren and their grandchildren, is to protect it," says Wood. "We've got to do something." The Grace Creek project team hopes to break ground on phase one of the living shoreline later this year.

Back at Columbia Beach, Kea is thinking about the next generation, too. He's a skipper for Sea Scouts, a Scouting America program focusing on maritime activities. The Annapolis-based scouts plan to sail and kayak to different points on the Bay this year and have added the recently restored Franklin Point to their list. Just a few years ago, they would have seen trees teetering on heavily eroded banks. Now, they can walk along a sandy beach shaded by a forest and held in place by tufts of green grasses.

*—By Ashley Goetz, goetza@mdsg.umd.edu*

*Above: Grace Creek Farm*

*PHOTO, LOGAN BILBROUGH/ UNIVERSITY OF MARYLAND SEA GRANT EXTENSION*

*Left: Property caretaker Chris Wood stands on the farm's shoreline.*

*PHOTO, ASHLEY GOETZ/ MARYLAND SEA GRANT*

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## Designing with Nature

Researchers are on a mission to determine which key components make a living shoreline successful at preventing erosion—but first they must gather crucial data.

*PHOTO, MADELEINE JEPSEN/ MARYLAND SEA GRANT*

## Seeding Shorelines

Living shoreline plants have a tough job: they must hold down the sandy shoreline with their roots and ease waves with their stems, all while surviving salty water.

*PHOTO, MADELEINE JEPSEN/ MARYLAND SEA GRANT*

## Living Rocks for Living Shorelines

Oyster biology is both an obstacle and an opportunity when it comes to living shorelines. Learn how and why oysters are sometimes included in living shoreline projects.

*PHOTO, MADELEINE JEPSEN/ MARYLAND SEA GRANT*

## A Marsh Grows in Brooklyn

A living shoreline is under construction in Baltimore City—part of a sweeping project that aims to restore more than 50 acres of habitat along 11 miles of shoreline.

*PHOTO, ASHLEY GOETZ/ MARYLAND SEA GRANT*

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