

The tribe that brought a damaged shoreline back to life

September 19 2019, by Anuradha Varanasi



The Shinnecock Indian Reservation's beach in Long Island, New York. Credit: Anuradha Varanasi

On a sunny Monday afternoon in August, the Shinnecock Indian Reservation's beach in Long Island, New York, resembled one of the

postcard-perfect beaches in the nearby Hamptons. Except, there weren't any sunbathing tourists around. The coastline was quiet and serene with several inlets flowing into a nearby pond, surrounded by lush greenery and a thick forest. Amidst this sprawled a cemetery where tribal members have been buried for centuries. The only visible signs of human activity on the beach were ashes and dried flowers left behind on the soft sand from a recent wedding ceremony.

[Post-Hurricane Sandy](#), this [coastal area](#) was far from being a source of pride or a place to celebrate for the members of the Shinnecock Indian Nation tribe. Sandy's storm surge and destructive winds had left the shoreline completely barren and uneven. The pond had turned into a stagnant body of water for mosquito larvae to thrive in. Over the next two years, the stench from the hurricane-ravaged beach became unbearable. Even during daytime, locals were forced to avoid the beach because of the hordes of mosquitoes that would attack them.

As the seawater kept invading the Shinnecock tribe's land, several trees in the forest by the shoreline started withering away. During high tide, the Native Americans lived with constant fear and anxiety that the Atlantic Ocean would swallow up their ancestors' burial ground that was built right next to the beach.

"It was a stinky muck. Our tree line was fading away as the water levels were four to five feet deep into the outer edges of the forest long after [Hurricane Sandy](#) had subsided," said Viola Cause, natural resource manager at the Shinnecock Nation Environmental Department. Even the town's cedar trees, which are known to be tolerant of saltwater, had started dying.

The Shinnecock tribe is a community of 650 multi-generational families who have historically been known as "people of the stony shore"—whalers, fishermen, hunters, and gatherers. They refused to

helplessly witness the rapid deterioration of their 3,000-foot-long shoreline. So, Shavonne Smith, environmental director of the Shinnecock Indian Nation tribe, and her colleagues decided to revive all of the coastal habitats back to their previous state, which the tribe's elders were ruefully nostalgic about.

As other coastal towns and cities in the US were considering building [expensive sea walls](#) to adapt to [sea-level rise](#), these officials and tribal trustees decided to explore alternative solutions. After attending several conferences and consulting various experts, Smith and her colleagues gradually started coming up with a plan. Their determination to find the right expertise and adequate funds to restore their shoreline and protect their land from the surging Atlantic Ocean paid off after two years.



Post-Hurricane Sandy, the beach turned into a desolate stretch of land. Credit: Shinnecock Environmental Department, Matthew Ballard

In 2014, they collaborated with the United States Geological Survey (USGS) and [marine biologists](#) from Cornell Cooperative Extension of Suffolk County to draft a proposal for a Hurricane Sandy relief grant. A few months later, they were awarded \$3.75 million by the National Fish and Wildlife Foundation.

"We were thrilled. It was the partnership with the USGS and Cornell that helped in putting together a concrete climate change adaptation plan," said Smith.

After working closely with the marine biologists, they came up with a comprehensive plan that involved seven key components to reduce the impact of the relentless waves crashing into the edges of the Shinnecock peninsula. The Coastal Habitat Restoration Project finally kicked off a year later, in 2015, with 12 people from the tribe dedicated to working on the project full-time.

The [first stage](#) involved planting several different kinds of grasses, including Phragmites and Spartina, or cordgrasses that grow in coastal marshlands. These grasses would hold the sand in place, preventing further erosion, and improve the wildlife habitats around the shoreline. To protect the grass seedlings from being trampled, the team installed fences around the beach. The fences were left in place over the next four years, along with signs that warned locals against dirt biking or using any other vehicles on the beach.

"Our community came out to support us and planted every seed and single sprigs of grass manually to bring back what we had lost," said Cause.

The next step was to create more barriers to break wave energy and prevent any further erosion from taking place. That could be made possible by re-opening the tribe's long-closed oyster hatchery.

Unfortunately for the Shinnecock community, they had lost all of their oyster reefs in the mid-1980s after a massive outbreak of [brown tides](#), or harmful algal blooms, and decades of overharvesting. Following that, their hatchery shut down. The oyster reefs had started to recover from that onslaught only after two long decades.



Viola Cause, natural resource manager at the Shinnecock Nation Environmental Department, and her colleague observe the shoreline from their ancestors' burial ground where photography is strictly prohibited. Credit: Anuradha Varanasi

As the frequency of far more intense storms like Sandy increases due to climate change, experts have found rebuilding oyster reefs in coastal areas protects shorelines from erosion naturally. They act as nature's

speedbumps by absorbing the waves' energy before they hit the coast.

The grant enabled the Shinnecock to re-build a solar-powered hatchery. Here, they carefully raised oyster larvae in tanks, feeding them fresh algae that were grown in the hatchery. Nearby, in a greenhouse, the tribe grew the grass and shrubs that they would continue planting along the edges of the beach, to restore natural habitats and fight against further erosion.

They started creating oyster reefs from scratch using calcified shells. The marine biologists then planted them on the seafloor. Following that, they released oyster larvae onto the reef, where they were expected to grow after attaching themselves to those shells.

While at first things were going as planned, the Coastal Habitat Restoration Project team ran into a huge challenge: The larvae refused to attach to the shells. "During different stages of the project over the last four years, we had to go through a lot of trial and error," said Cause, while pointing out to the spots where the oyster reefs are now flourishing.

"It was only after several trials did we figure out how to get the oyster larvae to attach and grow successfully. We faced similar challenges while planting the grasses and shrubs, but managed to get things right after a few attempts," she added.

Staying true to their ancestors' reputation as the "people of the stony shores," the team from the Shinnecock Environmental Department also placed heavy boulders along the 3,000 feet of shoreline. Members of the tribe joined in over several weeks and helped in placing boulders, and also throwing smaller rocks around the boulders, to add an extra layer of protection from the relentless waves.



The sprigs of grass that were newly planted by the community started growing in 2017. Credit: Shinnecock Environmental Department, Matthew Ballard

Although Cause admits that they could have built a [seawall](#) instead, they were worried it might further accelerate erosion and affect the area's biodiversity. "We wanted to prove that there are effective natural adaptation strategies even though it takes a lot of time and patience," she said.

After successfully putting all these natural mechanisms in place to hold sand in place even during heavy rainfall events, the next stage was to replenish the beach.

The team—including the tribe members, marine biologists, and other experts from the Suffolk County—used 20 huge tubes to dredge sand

from the bottom of a nearby canal. They then pumped around 30,000 cubic yards of sand onto the lifeless beach.

"The biggest challenge in completing this project was the overall scale and complexity of it," said Christopher Pickerell, marine program director at Cornell Cooperative Extension.

Shortly after that, the marine biologists went diving again to plant eelgrass in the water along the entire shoreline, to not only improve the scope of fish nesting but also to add another natural mechanism that is known to reduce the waves' impact.

Today, the tribe is proud to observe the shoreline curving and watch the waves receding to the edges of the beach where they planted the grasses. "Now, we're seeing the marshland moving out into the water, which is incredible because post-Hurricane Sandy, the reverse was happening," explained Cause. "Today, our elders look at the beach and say it reminds them of their childhood when the beach was naturally curved."



An aerial view of the oyster reefs during low-tide. Credit: Shinnecock Environmental Department, Matthew Ballard

Seeing the beach being transformed to its previous glory not only boosted the morale of the tribe but also helped in bringing back their local habitats. Last year, while the officials from the Shinnecock Nation Environmental Department were working on the beach to divert the flow of water into inlets that lead to the pond, they heard a distinct fluttering sound. Curious to see the source, they paused to look up. Much to their awe, the group witnessed a kaleidoscope of monarch butterflies settling on the flowers of the shrubs they had planted several months ago.

A few years after the coastal habitat restoration project first kicked off in 2015, the tribe has noticed more dragonflies and marshland birds visiting the shoreline. Even turkeys have been returning to roost in the forest's trees. Since the oyster reefs started flourishing and the tribe got rid of stagnant water in the pond, there has also been an increase in the population of snapping turtles, who thrive in freshwater and love to feast on oysters.

"One of the components of the work that was most fulfilling to me was the fact that we were able to greatly reduce the mosquito breeding issue that was present before the project started," said Pickerell. "By opening up and enhancing flushing to one of the tidal ponds, we were also able to bring in more fish to feed on the mosquitoes' larvae."

While the tribe successfully created a buffer between the sea and the Shinnecock Indian Reservation to protect their ancestors' burial grounds, Pickerell warns that the Shinnecock community will continue to face

threats from [sea-level rise](#) in the future.

"Regardless of how wide the beach is, it will never be high enough to prevent flooding during storms and other significant events. Water will find its way into the reservation from all sides. It's going to be a long-term challenge for them," added Pickerell.

Relocation is More Than a New Address



An aerial view of the coastline and surrounding habitats that took years to recover after the Coastal Habitat Restoration Project first kicked off in 2015. Credit: Shinnecock Environmental Department, Matthew Ballard

For Smith, the project has been a success and is effectively protecting their peninsula for now, mainly because of the relentless hard work and

effort the tribal community committed to for four years. "Our project was all about bringing scientific and traditional knowledge together," she said.

Other tribes living along coastlines may not be so fortunate. In most of these communities, the conversation isn't focused on how to rebuild and adapt to rising seas; instead, there is the fear of forced relocation. For [indigenous people living in the U.S.](#), the very idea of being forced to leave their ancestors' land yet again is both scary and immensely painful.

During a [managed retreat conference](#) hosted by the Earth Institute at Columbia University in June, Smith gave a talk entitled, "Relocation is More than a New Address".

"Your location is what your culture is. When you ask tribal people to relocate, you're changing more than an address. You're also changing parts of our culture," she said.

According to the National Oceanic and Atmospheric Administration, the impacts of climate change are going to severely affect 567 federally recognized tribes in the U.S. Nearly half of these tribes reside in Alaska Native communities, who are the most vulnerable to melting permafrost, sea ice, and glaciers. Several others living in coastal areas are faced with the daunting reality of being forced to relocate due to [sea-level rise](#).

Take, for instance, the Isle de Jean Charles Biloxi-Chitimacha-Choctaw (IDJC) Tribe in coastal Louisiana. In 2016, the tribe came to be known as the "[first climate refugees](#)" in the U.S., after it was reported they lost 98 percent of their land due to rising sea levels, coastal erosion, and a series of hurricanes. From being an island with 22,400 acres of land in the 1950s, only 320 acres are above water today.

Most of the tribe agreed to work with the state to relocate their

community. Yet in January 2019, the state of Louisiana announced that it had purchased land further inland for the tribe to live on—without approval from the tribe itself. The tribe members were left feeling blindsided; they found out about the state's complete takeover and closing of the purchase only after seeing the press release stating the resettlement project was "spearheaded by the IDJC tribe".

During the managed retreat conference, Albert Naquin, chief of the IDJC [tribe](#), expressed his disappointment and discontentment about losing ownership of their homes that still exist on the Isle de Jean Charles island. Currently, only 34 families still live on the island—a narrow strip of land—that is 80 miles away from New Orleans.

In the U.S., the bulk of funding to deal with sea-level rise goes to voluntary buyout programs, and these funds are mostly awarded to predominantly white communities. Kevin Loughran, a postdoctoral fellow from Rice University, stated that, since 2000, the Federal Emergency Management Agency bought 3,000 homes within the Houston metro area that belonged to white and affluent homeowners. Not surprisingly, these families moved to even more rich and white neighborhoods within Texas.

However, for indigenous communities, that is not an option. During a heated panel discussion at the conference, Reverend Tyrone Edwards, who belongs to a tribal community in coastal Louisiana, asserted that it is important for others to respect the decisions of indigenous communities—even if they decide to remain on lands that are made vulnerable by climate change.

"We can't leave and disconnect from our land that has our families' blood in the soil. We are the first people of this region, and we have a right to our way of life. If we relocate, that can't be replicated," he said. "Indigenous communities can save their land. We just don't have the

resources."

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