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As beaches erode, Cape and Islands gamble on sand replenishment

High costs and benefits may be short-lived in the age of climate change.

By **Beth Treffeisen** Globe Correspondent, Updated May 2, 2024, 1:27 p.m.



Ken Cirillo walked the shoreline of Wah Wah Taysee Beach in Harwich, where sand dredged from the nearby channel is being used to replenish the beach. DAVID L. RYAN/GLOBE STAFF

FALMOUTH — The engine roared as a large metal pole, like an egg beater mounted on the tip of a massive dredging machine, scooped up silt at the bottom of Great Pond in Falmouth. This was step one of clearing out a channel used by recreational boaters and fishermen on the brackish pond.

But the project had an important side benefit.

The slurry — filled with sand, water, and occasional debris such as old tires and fishing gear — was then pushed through a large underwater tube, over a rock barrier, and onto a nearby beach along Menauhant Road. As the water was dumped into the nearby ocean, a mountain of sand took shape, the remnants of the slurry.

“Sand is gold,” said Ken Cirillo, dredge director in Barnstable County, overlooking the operation.

Falmouth has big plans for the sand, trucking it to fortify nearby beaches damaged in recent winter storms. It’s a growing trend across the Cape as towns compete to replace sand through dredging projects, as well as from underground pits — located on and off the Cape — or even offshore sand mining, where dredges are sent well into the ocean to mine the sea floor.



A view of a cutter head dredge being used by the entrance of Allen Harbor in Harwich. DAVID L. RYAN/GLOBE STAFF

Coastal beaches have always been dynamic environments, where sand is constantly washed away and replaced in a natural cycle. In places like Florida, sand replenishment has long been common after hurricanes. What’s changed on the Cape and Islands is the increasing volume of sand that’s

now needed as strong storms and rising sea levels — made worse by climate change — batter the area, leading to more extreme coastal erosion.

In years past, Cirillo said, towns would dump sand on their beaches to make them less rocky. Now, it's a way to keep them from disappearing altogether or to protect parking lots from collapsing.

Some beaches on Martha's Vineyard and Nantucket [lose, on average, 2 feet of shoreline a year](#), as water creeps farther onto the land. On the Cape Cod Bay side, Eastham, Orleans, Yarmouth, and Wellfleet are all losing close to 3 feet a year. Large storms or high tides paired with strong winds can sometimes take up to 10 feet of sand or more in one fell swoop.

“I think we're seeing a change happening before everybody's eyes and not realizing it,” said Cirillo.

The costs for towns are steep: hundreds of thousands of dollars depending on the size and scope of the project.

Sand “is almost like a mineral now, like diamonds,” said Kirk Bosma, senior coastal engineer and innovation director at Woods Hole Group.

Sandwich is the only town in the state in recent history to obtain a permit to do offshore sand mining to replenish its beach, a way to supplement sand from dredging projects.

For 15 years, the town has also chased federal dollars to acquire more sand. In October, 325,000 cubic yards of sand will be dumped on Town Neck Beach, the most it's ever received, at a cost of \$12.5 million paid for by federal taxpayers.

“It's not going to be perfect,” said Bosma. “It's not natural, but it's definitely a step in the right direction.”

But, local engineers point out, adding more sand is a quick fix. Once the next big storm barrels in, all that sand, and the dollars that paid for it, can get washed back out to sea. In the North Shore town of Salisbury, a March storm [wiped out half of a \\$600,000 sand restoration project](#) in a single day. And this risk on beaches will continue forever.

“That's what scares me the most,” said George “Bud” Dunham, town manager of Sandwich. “It took decades plus effort to get to this point.”



A fishing boat entered the narrow entrance to Wychmere Harbor, where dredging will be done on the channel to the harbor. DAVID L. RYAN/GLOBE STAFF

Increasingly, people in coastal areas are staring at the prospect of “managed retreat” as sea levels continue to rise with global warming.

The unanswerable question remains — when will communities be beyond saving? Will the current generation of homeowners have to move? Or will it be their grandchildren? Or can the global community come together in time to minimize the impacts?

In the near term, Andrew Gottlieb, executive director of the Association to Preserve Cape Cod, said offshore dredging for sand will become more common as climate change worsens erosion.

It’s not just a question of how to pay for the sand or where to get it. Offshore sand dredging comes with its own problems, such as potential loss of breeding areas for fish and habitat loss for shellfish.

It’s also difficult to get an offshore sand mining permit, especially with alternatives available, such as dredging channels or buying sand from a pit.

“There’s going to be increased pressure [for more sand],” said Gottlieb. “People have become increasingly desperate to protect their communities, individual homes, and public infrastructure.

That pressure is even higher along expensive coastlines such as those on Nantucket.

Unlike the Cape, Nantucket has few navigational dredging projects to support sand replenishment. Instead, the town has had to rely on two sand pits, which are pretty much exhausted, said Carl Jelleme, president and CEO of the Toscana Corp.

“It comes down to how much the property is worth, and if it’s worth putting that kind of money in front of you and watching it go away each time,” said Jelleme.

On Martha’s Vineyard, two storms that hit the island’s south side in January wiped away part of Edgartown’s beach and caused significant erosion along the shoreline.

“We still have roads closed down,” said James Hagerty, the town administrator, in early April.

Edgartown, which is the only island town with a municipal dredge, spent \$1.1 million on sand replacement after the storms. The island declared a local state of emergency on Jan. 17 and plans to apply to FEMA for reimbursement.

Hagerty said that if the town were to bring in sand from off-island, it would cost 10 times as much, easily.

“In some respects, it’s like a closed loop system: put [sand] on the beach, the ocean washes it off the beach back into the channel, and rinse and repeat,” said Gottlieb. “You do it year over year over year.”

For most of the Cape, towns rely on the Barnstable County dredge, through a program started in 1997 when finding contractors became difficult and costly. The county has two huge dredges: the “Sand Shifter” and the “Cod Fish II,” which traverse the Cape, scooping up sand.

Chatham paid to dredge more than 11,000 cubic yards at Stage Harbor, enough to cover 0.2 miles at nearby Harding’s Beach at a cost of a little under \$300,000. (The sand will also get naturally redistributed to nourish adjacent beaches.) The cost includes moving the sand to the beach and spreading it out, an expense the town needs to account for each year.

Still, the rates are about 50 percent cheaper than turning to the private sector.

“So, still a hell of a good deal,” said Cirillo.

Replenishing the beach is also a secondary benefit of dredging — the first and main purpose is to make sure the channels remain navigable and maintain their minimum depth to allow safe passage of boats.

But there are simply not enough dredging days in the year to do what the county needs to do, said Cirillo. Plus, bad weather, mechanical problems, and restrictions make it challenging to determine when they can dredge.

If the county weren't doing the projects, Cirillo said, many of the Cape's beaches would be long gone. But, he said, getting more sand to replace what was recently lost isn't a forever solution.

”Because all we're doing now is putting a Band-Aid on,” said Cirillo.