

## Beating Back the Ocean Proves an Enduring Riddle

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OCEAN ISLE BEACH, N.C. -- Lisa Schaeffer spent last Saturday afternoon cleaning up after Tropical Storm Hanna. Her 44-year-old white cottage stood intact -- five yards from the sea.

"There used to be a street in front of our house, and then a row of cottages," Mrs. Schaeffer says. "We're fortunate we're still here."

For years, local residents and the city of Ocean Isle, on the border of South and North Carolina, have worked furiously to hold back the tide, spending millions to pump sand back onto beaches and erect long lines of giant sandbags. But the waves keep pushing closer, wiping away houses and leaving others standing condemned above the rolling surf. Now, Ocean Isle and others are trying to convince the North Carolina legislature to lift a nearly 30-year-old ban on jetties and other hard structures that might stop the erosion.

The proposal has ignited a debate about why the oceans are encroaching on the islands and what to do about it -- and not just here. People around the world are wrestling with how to preserve the beaches they have settled on. In Redington Shores, Fla., engineers constructed a barrier to break the waves farther out. Several Mediterranean towns have replaced their beaches' sand with more-resilient gravel.

Shoreline communities are, to a degree, operating in the dark. Some scientists blame erosion on global warming. Almost all agree that rising sea levels, from whatever cause, exacerbate erosion. But some stress overdevelopment, saying that buildings prevent beaches from retreating evenly in the face of rising seas -- losing a hedge against worse erosion. Others emphasize dredging channels, which disrupt the natural accumulation of sand and the formation of protective dunes.

And many scientists maintain that no matter what towns like Ocean Isle do about erosion, there is no way to stop it.

For decades, such places had relatively few manmade structures on them to obstruct the movement of dunes and beach. Then, in the 1980s, a slew of houses cropped up on Ocean Isle and elsewhere along the Carolina coast, and in recent years baby boomers have retired by the sea.

Today, about 3,800 homes are packed together on the narrow seven-mile long Ocean Isle. At the eastern end, where streets and lots have been steadily disappearing, several homeowners have moved their houses back from the sea, at their own expense. When Hanna hit, the end of Second Street, already damaged from erosion, collapsed after powerful waves rolled over the sandbags.

When Mrs. Schaeffer was a child, the family cottage, inherited from a relative, was at least 100 feet from the oceanfront. Years of erosion have inexorably sucked streets and homes into the ocean. At Ocean Isle's low tide, blocks of concrete, asphalt and other wreckage of lost streets -- and the efforts to preserve them -- are strewn along the beach.

Frustrated by these failures, Ocean Isle leaders joined other local officials on the coast to push for legislation allowing "terminal groins," structures built with stone or steel piling along inlets to block beach erosion. The measure was winding its way through the legislature earlier this year when a group of coastal scientists counterattacked, arguing that the structures can actually cause more erosion by cutting off the supply of new sand in some areas of islands. "There is no debate," they wrote in a letter sent to lawmakers.

But there is a debate. In North Carolina, waves push sand naturally from north to south. Along with wind and ocean currents, they constantly reshape barrier islands, taking sand from one part and depositing it elsewhere. In the late 1970s, the state Coastal Resources Commission began blocking proposed seawalls or jetties because they interrupt the natural flow of sand. The decision has "preserved a large part of this important economic resource, which is the beach itself," says Rob Young, director of West Carolina University's Program for the Study of Developed Shorelines.

While Ocean Isle residents with threatened homes wait for the next legislative session, some are digging into their own pockets to try to save the east end of the island. Michael S. Young (no relation to Rob), who owns a home that was once three blocks from the ocean but is now only one lot away, says homeowners have spent as much as \$30,000 each to place heavy sandbags in front of their homes.

As for permanent solutions, many scientists see only relocation. Orrin Pilkey, a geologist at Duke University, says filling beaches back with sand isn't a long-term solution because there's not enough sand on the continental shelf in parts of North Carolina, and to bring sand from other southern states, where it's abundant, would be costly.

While some individuals relocate, the town continues to build. Development of 192 lots has been mapped out about 300 feet from the sea. As for erosion affecting the development, Ocean Isle Mayor Debbie Smith says, "it's not near the ocean."

That is what Michael Young thought when he purchased his home eight years ago, after looking at satellite photos and a map of Ocean Isle Beach to ensure he wasn't buying a home on fill sand.

"There was a row of houses in front of me, and dunes and a big beach," Mr. Young says as he watches waves crash into sandbag mounds. "Now I'm thinking of putting some pontoons under the house and just floating it."