

Nature Tries to Shift Outer Banks, But Man Keeps Shoveling It Back

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Nature endowed the Outer Banks of North Carolina with great beauty -- long ribbons of sand with Atlantic Ocean waves on one side and marsh-fringed bays and sounds on the other.

But the people who flocked to the Banks have been interfering with this fragile natural landscape for decades, and the infrastructure they have built -- in particular the highway that runs along the islands that make up the Outer Banks and possibly the artificial dune that lines their beaches -- has diminished the islands' natural ability to survive a storm like Hurricane Isabel and recover from its effects, geologists say.

So, as engineers contemplate eroded beaches, a broken highway and a new inlet cutting across Hatteras Island, they are struggling to find a way to restore the Outer Banks tourism infrastructure while respecting the demands of its landscape. In particular, they are looking for a way to maintain State Highway 12, the main road, while allowing the islands to shift, as they would naturally, in response to episodes of heavy weather and long-term rising seas.

That will not be easy. The Outer Banks is really only filaments of sand running across ancient river channels, relics of the last ice age, when sea levels were far lower and the coastline was hundreds of miles farther out than it is today, said William A. Birkemeier, chief of the Army Corps of Engineers Field Research Facility at Duck, N.C., an Outer Banks village about 60 miles north of where the hurricane made landfall.

Monitoring, measuring and other research efforts undertaken before, during and immediately after the storm will eventually provide useful guidance for coastal engineers, Mr. Birkemeier said. But the problems are pressing now.

In this era of rising sea levels, the Outer Banks is trying to migrate inland. Much of this migration is accomplished in storms like the latest one, when sand washes across the island from sea to sound. Marsh plants colonize the sound, the beach ecosystem colonizes the marsh, and the island gradually shifts position. This is the process coastal geologists say has been hindered on much of the Outer Banks.

Though it looks natural, the dune that runs for 50 miles along the Banks was man-made, created out of wood and brush and sand by the Depression-era Civilian Conservation Corps. Some coastal geologists say the dune has functioned as a kind of sea wall, blocking much of the overwash of sand from beach to marsh. Today only a major storm carries much sand across the island, they say.

Without the dune, the beaches of the Outer Banks "would be overwashed constantly," said Orrin H. Pilkey Jr., a Duke University geologist who is famous in North Carolina for his advocacy of letting nature take its course on the coast. Also, he said evidence suggested that the presence of the dune altered wave action such that the slope of the beach in the surf zone steepened, which, in turn, would cause waves to strike it with greater force.

Engineers like Mr. Birkemeier and some coastal geologists are not convinced.

"I don't think the artificial dune has made the island more vulnerable," said Rob Young, an associate professor of geology at Western Carolina University, who studied with Dr. Pilkey and who was out on the Banks as the sun rose on Friday, the day after the storm.

"Primarily what that dune did was provide a false sense of security and put off the inevitable, Dr. Young said. "The real danger is Highway 12."

There is wide agreement that efforts to keep the road in place have harmed the islands of the Outer Banks. When heavy storms bury it in sand, the sand is typically swept up and carried back onto the beach in crude piles. The marsh, deprived of this sand, shrinks as sea levels rise. Because the islands are so flat -- in some places, geologists say, their natural elevation is only about three feet -- even a small rise in water level can make drastic inroads on both marsh and beach. And in places the islands have narrowed sharply, to the point that in some spots the walk from ocean to sound is 100 yards or fewer.

There are parts of the seashore, Dr. Young said, that are where they are "only to keep Highway 12 in place."

"If Highway 12 was not there, these portions would be able to migrate back naturally," he said. "They might not have giant dunes, but they would be functioning ecosystems. Because Highway 12 has to stay where it is, every time Highway 12 is overwashed it is scraped back up into hideous, debris-filled dunes. And they are getting larger and larger, and after this storm they are going to be extremely large."

Overwashed in other storms, Highway 12 actually broke up in spots this time, as it was undermined and collapsed. So engineers must decide how -- and where -- to rebuild. Stretches of the highway, so important to the Banks that its mileposts function as addresses, have been moved inland before, but now the road builders are bumping up against the marshes and duck ponds that line the sound.

But as Dr. Pilkey notes, "they have no way to move back along most of this without getting into the wetlands and the duck ponds."

Michael A. Turchy, a biologist with the North Carolina Department of Transportation, said the department was considering building a causeway that would run behind the islands. But this would be a complicated engineering effort, and its environmental effects might be substantial. Anyway, Mr. Turchy added: "In looking at what happened with Isabel, you have to wonder what's going to happen in the next storm. A future

causeway could be vulnerable to future storms."

Just as pressing is the decision about what to do between the villages of Hatteras and Frisco, where the latest storm cut a substantial inlet through the barrier island. Normally, inlets like this close on their own, but this one is so big -- it was 150 yards wide on Friday, Dr. Young said -- that it may be a permanent feature.

As a result, the village of Hatteras is its own small island now, cut off except for the ferry that runs west to the small island of Ocracoke, where other ferries take more than two hours to reach Cedar Island or Swan Quarter, small towns on the quiet western shore of Pamlico Sound.

Temporarily, Mr. Turchy said, the North Carolina Department of Transportation is considering altering the Hatteras-Ocracoke ferry run to include stops across the new inlet at Frisco. But a dock would have to be built there, he said. "We're not sure how long that would take. It hasn't been done."

Also, it is not clear that this kind of ferry service could accommodate tourism traffic or allow timely evacuation in future storms.

Engineers might also consider filling the inlet. That is what was done after the Ash Wednesday storm of 1962, still the benchmark for bad weather on the Atlantic Coast, when an inlet was cut at Buxton, not far from the new inlet.

"It was very difficult to fill it in," Dr. Pilkey said. "It took several tries. You really have to marshal all your forces and throw it in all at once, otherwise it gets washed out."

The new inlet is the first to form on the Banks since then. There are only two other inlets -- Oregon Inlet and Ocracoke Inlet -- on Pamlico and Albemarle Sounds. "There have been more in the past," Dr. Young said. "We should not be too surprised that the Outer Banks could easily accommodate a third or even a fourth inlet that would remain open."

Dr. Young recalled that an inlet opened on Pawley's Island, S.C., during Hurricane Hugo in 1989.

"That inlet was nothing compared to this," he said. "They closed it, but it wasn't easy. This one is way bigger."

He said engineers might want to bulldoze sand from either side of the inlet to fill it, "but the adjacent portions of the barrier island have lost their sand -- they are just three feet in elevation. There is no sand. It's in the sound, offshore, but not on the beach."

As a result, he said, he feared there would be pressure to bridge the inlet.

"I hope they take a deep breath and don't rush into making a decision," he said. "I am sure there is some panic because Hatteras village is isolated right now. I am worried there is going to be tremendous political and emotional pressure to do something fast like build a bridge right away."

That, he said, would be "another example where the National Seashore will be sacrificed to create infrastructure; because the shoreline does not need a bridge."

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