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### Losing Ground

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Losing Ground: When beaches are most at risk, beach dwellers continue the fight to stay by the shore  
By: Alison Kanski

On a brisk November afternoon the beach in New York's Rockaways is quiet. Some surfers in wetsuits bob in the water, waiting for the next good wave and a few people stroll along the newly rebuilt boardwalk. John Cori, an electrician who lives less than a block away, sits on a jetty, playing an old George Carlin stand-up monologue on his phone.

"The planet isn't going anywhere, Carlin's voice booms over the crashing waves. Cori cups his hand around the speaker, ready for the punch line. The comedian--who died in 2008--pauses, then shouts:

"We are!"

Carlin's bit is a withering send-up of "save the earth" environmentalism. He mocks the notion that humans were endangering the planet. Cori, for his part, is no tree hugger. But he is clinging to a fragile landscape that is vulnerable to nature's violent forces: the storms and constant erosion that batter the coastline. He knows what the disappearing shore means for his house, which sits only a few hundred feet from the ocean.

But he's not going anywhere. Cori is 52 and has had his home on the Rockaways his whole life.

"I knew people who left after [2012 hurricane] Sandy," he said. "But I couldn't."

He pulls out his phone again and snaps a photo of the late afternoon sky. He's been taking photos of sunsets from this jetty for 40 years.

He's seen the sand ebb and flow with storms and erosion, only to be forced back by bulldozers. Carlin's joke about the planet's dominance over humans speaks to a looming issue for many beach communities in the era of climate change and sea level rise.

But the U.S. government and loyal residents won't let go of the beaches. Cori is one of the most prominent activists for the peninsula. He's part of a local activist group, Friends of Rockaway Beach, which he co-founded in 2012, shortly after Superstorm Sandy ravaged his home.

The first rally for Friends of Rockaway Beach was called "Demand the Sand." They called for beach nourishment to combat the severe beach erosion after Sandy's storm surge washed across the peninsula.

The Rockaways ended up getting a federal nourishment project in 2014, moving almost three million cubic yards of sand - which is about 800,000 tons - back onto the beach. This same project is done all over the country. According to a Western Carolina University database, there have been more than 2,000 beach nourishment projects across the country since the practice began in 1930.

Cori, determined to withstand Mother Nature's repeated pummeling, has plenty of ideas about how to keep the beach in place.

The jetty he was sitting on was his favorite solution. He said jetties (also called groins) seem to work the best for the beaches of Rockaway and he's trying to get more built. Today, they only span from Beach 60th Street to Beach 90th Street. But Cori thinks they should extend another 50 blocks west.

The area between the groins seems to be staying put better than the beach beyond the 200-foot-long piles of rock. The sand is several feet higher and the waterline is farther out.

Yet, one solution Cori won't entertain is retreat. He fights for his and his neighbor's homes, but it's not just the locals who deserve the beach. Cori also wants to keep it around for the seven million people who escape to the Rockaways each summer, some of whom rent rooms in Cori's boarding-style house.

"Rockaway was purchased for free and open access for people to enjoy the ocean," he said. "It belongs to the people."

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The beach ecosystem is always in flux. Ocean waves, currents and storms eat away at the sand, changing the shoreline every day, shifting sand from one place to another.

That presents an existential challenge for those who live near or along a coastline, particularly for the estimated 123 million people who live in coastal counties in the U.S., including the 130,000 residents of the Rockaways. These people build their homes and business on a tenuous landscape.

That's where the government steps in.

Most beaches along the East Coast are in a continual state of decay, said coastal researcher at Western Carolina University Andrew Coburn. Because there is no new sediment coming from rivers inland to replace the lost sand on the beach, that puts these beaches in a "sand deficit."

Beach nourishment or replenishment is one of the most widely used processes to combat erosion. When sand is eroded from one beach, the federal government often provides money to dredge more sand from offshore and place it back on the beach, turning a skinny, decimated strip back into a wide, sandy beach.

This nourishment also puts more sand between the crashing waves and builds up dunes to protect oceanfront property. But everyone involved knows it's only a temporary, and costly, fix.

"The cost of the fuel and energy needed to complete these projects is increasing, the cost per cubic yard of sand has gone up significantly," said Andrew Coburn, associate director of the Program for Developed Shorelines at Western Carolina University. The government won't be able to foot the bill forever. "At some point a lot of places are not going to be able to afford it," says Coburn.

Meanwhile, it's business as usual and there are many nourishment projects each year. The Rockaways, in particular, have had the most projects in New York. Since the federal beach replenishment practice began in the 1930s, the Rockaways have seen 36 beach nourishment projects with more than half of them happening in the last 20 years, according to the Program for the Study of Developed Shorelines.

And these 36 projects cost more than \$250 million in 2014 dollars. That averages out to about seven million dollars per project.

Nourishment is generally the more expensive way to preserve a beach. Other methods like sea walls, breakwaters and groins are usually less expensive, but they have their own pitfalls and can cause even more erosion to the marine ecosystem.

Jetties and groins, for example, disrupt the natural flow of sand along beaches, said Coburn. The sand stays in place between the jetties, but the area beyond the structures cannot be replenished as it naturally would and often has worse erosion than if the jetties were not built.

Nourishment has its own impact on the ecosystem.

"You're putting a couple feet of sand on the native beach and everything that can't get away is killed," Coburn said. "So it takes a while for that ecosystem to recover."

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The motive behind beach nourishment often has more to do with protecting shoreline property and the tourism industry from rising seas than allowing beaches to return to their natural state.

"As a short term solution, it's okay, if you're doing this to allow for changes to be made to reduce the infrastructure and to allow the [marine] system to return to quasi-natural state," Norbert Psuty, professor of coastal geomorphology at Rutgers University, said.

Global sea level has risen about eight inches since 1900 as climate change has melted land ice and warmed the ocean, but the rate is projected to increase as temperatures continue to rise. According to the Intergovernmental Panel on Climate Change (IPCC), oceans could rise five feet higher by the end of the 21st century and as much as 20 feet higher in the more distant future.

The highest point in Rockaway is only about 13 feet above sea level, and the majority of the peninsula is less than six feet above sea level.

"Sea level rise of one foot or a foot and a half per century is basically inundating and drowning the shoreline," Psuty said.

A study, published September in the Proceedings of the National Academy of Sciences, suggested that New York is at a very high risk for coastal flooding.

According to the study, the average flood height increased by about four feet in New York when compared to the time before 1800. With continued warming causing larger and more extreme storms and higher sea level, flooding is like to be more frequent and intense in the area.

That should be a warning to coastal residents, said Klaus Jacob, special research scientist at Columbia University's Lamont-Doherty Earth Observatory. "Areas like the Rockaways, Staten Island, are just not sustainable," he said. "They cannot exist in 100 or 150 years as they exist now."

Cori dismisses the large body of science that points to a human role in global warming, but he's willing to be prepared, just in case.

"If the oceans are rising [because of man-made climate change] let's get ready," Cori said. All the more reason, he believes to fight for more federal dollars and more sand to keep his beloved community from being overrun by the sea.

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Cori isn't solely reliant on the government to keep the Rockaways intact. He has spent hundreds of thousands of dollars to raise his house above the flood zone. At this point, he's paid more to protect his house from the sea than what he paid to purchase it. Why does he do it? Because it's home.

His parents were married in the church three blocks away from where he lives, his daughter works in the local coffee shop up the street, and he can't walk down the block without running into someone he knows.

A neighbor, Dan Brown, takes a photo of Cori and with friends at a local holiday event.

"A picture with John [Cori] will get you free dinner anywhere in Rockaway," he laughs.

Even before Sandy hit, Cori fought for better erosion management, like nourishment, and reinforcing the aged boardwalk. Those pleas fell on deaf ears. His home was severely damaged by both the flooding and the boardwalk, which broke apart and floated down the street into his house.

The Sandy recovery program brought 783,000 tons of sand back onto the beach and a brand-new boardwalk with a solid sea wall that sits another six feet above the

beach, extra protection for the homes and businesses on the other side.

It bought more time for Cori and his community.

But the protection they fought for is already washing away. Cori said some of the 2014 nourishment project has been eroded, only a little more than a year after the project was completed. From the jetty, he pointed to where the waves were breaking.

"That's where the edge of the beach was last year," he said. Now, it's nearly 20 feet closer, even at low tide.

But Cori still fights the good fight. He got a new boardwalk and more sand after Sandy, but what he really wants is more groins to hold the sand in place. He's already planning to speak with the local councilman to find a way to build for groins.

"If Rockaway was its own city people would put groins here," he said. "But New York City [government] doesn't listen to us."

At least, they're not listening yet.