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## How Can New York Prepare For The Next Hurricane Sandy?

Plans call for constructing movable barriers in the ocean to stop the storm surge, but Bloomberg is skeptical. When the next storm comes, will the city be ready?

FASTCOMPANY

By Ariel Schwartz

Plans call for constructing movable barriers in the ocean to stop the storm surge, but Bloomberg is skeptical. When the next storm comes, will the city be ready?

Until Hurricane Irene hit last year and Hurricane Sandy arrived last week, most New Yorkers probably never thought about how well their city was fortified to deal with a monster storm. Now, many wonder if better safeguards--higher sea walls, more storm barriers--could have prevented some of the devastation that took out the subway system for days, left cars swimming in the streets, knocked out power for entire neighborhoods, and even killed a small number of unlucky citizens. The simple answer: Yes, the city could have been much more prepared.

### Editor's Note

Read more of our Sandy coverage:

- \* [A Look Inside New York's Underwater Subways](#)
- \* [What's Really Happening In Blacked-Out Manhattan](#)
- \* Plus, here's [a round-up of all the ways we've covered the storm so far](#).

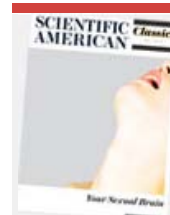
It often takes a big storm to get people thinking about how to protect their city from



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encroaching waters. For the Dutch, that storm happened in 1953, killing almost 2,000 people and flooding much of the country's farmland. Holland had started [planning](#) for a major storm in 1939 after studies revealed there was a danger, but the killer [weather](#) event arrived before those plans came to fruition. That storm spurred the creation of the country's [Deltawerken plan](#)--a series of storm barriers and dams that are sometimes called the "eighth wonder of the world." The Dutch are prepared for the one-in-a-thousand-years storm; New York wasn't even prepared for a one-in-a-hundred-years storm.

New York has known for a long time that it's vulnerable to flooding; one of its sea walls was lauded in a 1901 *New York Times* article, which, as CNN [points out](#), predicted that "It will be many generations, perhaps centuries, before the wall ... will have to be rebuilt or will even require any extensive repair." But the sea walls that surround the city today rise just four to five feet above today's average sea level. That's a concern as the climate changes and sea levels rise, certainly, but the walls aren't even adequate now: When Hurricane Sandy hit, [water](#) topped seawalls, quickly flooding parts of the city.

Scientists saw this coming. In 2002, the [Stony Brook Storm Surge Research Group](#) was formed with help from NOAA's New York Sea Grant program and the New York City Department of Environmental Protection to examine the New York Metropolitan region's vulnerability to coastal flooding.

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"After tropical storm Floyd [in 1999], we realized there was a coastal flooding problem here in New York City and Long Island," says Brian Colle, a SUNY Stony Brook professor and member of the Storm Surge Research Group who specializes in coastal meteorology. The team began combining Colle's numerical atmospheric weather prediction models with team member Malcolm Bowman's ocean models to predict wind, pressure, sea level, and tides during major weather events.

After running test simulations on past events like tropical storm Floyd and the 1992 nor'easter that [flooded](#) New York City, the team confirmed that their system could generate realistic results. So the Stony Brook group began doing some real forecasting, running the model once or twice a day to generate two- to three-sunday forecasts--something that helped predict the impact of Hurricane Sandy, along with models from NOAA and others.



The Stony Brook team's original storm-surge barrier

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proposal.

In 2004, the Stony Brook team [focused its efforts](#) on the value of storm-surge barriers in protecting New York City from high waters. Their idea was to install three moveable barriers that close for a few hours at a time under the Verrazano-Narrows Bridge, the Arthur Kill area on the southwest side of Staten Island, and the East River near the Throgs Neck Bridge, which would prevent the wall of water brought in by a storm from reaching the shores of Manhattan. The cost? An estimated \$10 billion. That's pricey, but not more than the cost of cleaning up a couple of Sandy-like storms in New York City (overall economic costs for the storm are now [estimated](#) to be in the \$50 billion range). Those clean-ups will likely increase in amount and frequency as sea levels rise.

The Stony Brook team has since come up with a revised version of the idea: the East River/Throgs Neck barrier and a single barrier that goes from Sandy Hook New Jersey to the Rockaways--something that would be easier to implement because of the shallow waters involved (20 to 30 feet deep compared to 50 to 100 feet at the Verrazano) and also protects more of Brooklyn's coastline. The team hasn't yet run simulations for that most recent proposal, but even the earlier three-barrier model could have been a saving grace during Sandy. "It would have definitely helped inside the barrier. In the storm [simulations] we did run, the water levels barely changed at all," explains Colle.

There are issues to consider in the Stony Brook proposals. One concern: There would still be rainwater, runoff, and flows from rivers that could cause water levels to rise. But during a simulation of tropical storm Floyd--a huge rainfall event for the region--with the barriers in place, water levels rose just six inches to a foot. The storm surge would have been higher.

In the storm simulations we did run, the water levels barely changed at all with the barrier. Environmental factors are also a concern. "If you have [these areas] plugged up, you have discharge from sewage treatment [plants](#) and industry there, and one concern is that you don't want people wading around in toxic water," explains Colle.

The Stony Brook proposals aren't the only ones on the table for New York City. The city's [Vision 2020 plan](#), released last year, details a 10-year plan for New York's waterfront--"a sustainable framework for more water transport, increased public access to the waterfront, and economic opportunities that will help make the water part of New Yorkers' everyday lives," according to an overview. It also includes a section on climate resilience and protection strategies.

These strategies include building dikes and levees, using constructed or restored wetlands as barriers, and elevating land. Even inside the storm-surge barrier category, there are choices--Colle mentions V-shaped gates that open and close and barriers that rotate up off the sea floor.

New York City has also thrown around the idea of skimping on a larger protection plan and focusing instead on protecting important infrastructure--like subways--with localized walls and dikes. "We've been concerned about that. It feels like it's sort of a Band-Aid approach," says Colle.

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Despite a post-Sandy [statement](#) from Mayor Bloomberg that questioned if "there's any kind of practical ways to build barriers in the oceans, when you have an enormous harbor, like we do, and Long Island Sound," New York is considering its options. One of Vision 2020's climate-related projects is to "develop a better understanding of the city's vulnerability to flooding and storm surge and examine a range of physical strategies to increase the city's resilience."

It feels like it's sort of a Band-Aid approach.

But before any physical strategy (a storm-surge barrier, a series of dikes and levees, etc.) can be implemented, the city needs to conduct feasibility and environmental impact studies. So while it might take just two to three years to construct a series of barriers, Colle estimates that it could take over a decade to go through the whole process.

But Hurricane Sandy was not even the worst-case storm scenario. Colle explains: "I think there can definitely be storms that are stronger. In some sense, we may have gotten a little lucky in this case, because in the last six to 12 hours the storm picked up speed and made landfall quickly. If it had slowed down and parked itself off the coast, the surge would have been likely a few feet higher."

In the end, coastal cities like New York City may have to seriously confront the prospect of moving people and structures out of coastal danger zones. The Vision 2020 plan calls the idea "impractical," which is the understatement of the century. But the danger of flooding will always be present. The [website](#) for the Dutch Deltawerken Plan puts it best: "The general consensus among scientists is that the reinforcement of dikes and the construction of dams and barriers is in no way the final siege in the battle against the sea."

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