



"It's not a question of if a major hurricane will strike the New York area, but when," former National Hurricane Center director Max Mayfield once told a congressional committee.

Megan Linkin, an atmospheric perils specialist for [Swiss Reinsurance America Corp.](#) in Armonk, NY, reminded me of this ominous projection in a recent conversation, following her presentation at [Climate Week NYC 2010](#).

Linkin who, as a perils specialist at SwissRe, sports one of the most ominous professional titles I've come across, has a PhD in atmospheric and oceanic science. As part of a broader project involving the [New York Academy of Science](#) and in partnership with the city government and a host of regional academic experts, Linkin has recently spent time focusing on the financial perspectives of how climate change could affect America's largest city. Since climate change is expected to intensify the impact of extreme weather events on the city, a major part of her focus is to assess what the cost of major storms could be to New York City.

In the wake of New Orleans' hurricane Katrina disaster, or the leveling of scores of cities in Pakistan due to flooding this past summer, it's not as hard to imagine catastrophic weather events in the Big Apple. Indeed, as we spoke, not far from my Brooklyn apartment, workers were cleaning up the tree fall from the third tornado event in the city's five boroughs in the past few years, unprecedented in recent history. This summer, New York has endured 39 days with temperatures over 90 degrees Fahrenheit, the most in recorded history.

Of course, it's a mistake to associate near-term weather events with long-term shifts in the climate, but extreme weather does steer collective thinking in that direction. And climate change is predicted to significantly alter the area's environment.

According to a forecast by Columbia University Center for Climate Systems Research, the city will see average temperatures rise by as much as 3 to 5 degrees Fahrenheit by the 2050s, and more further out. Sea levels are anticipated to rise by up to a foot by the 2050, and more than twice that if Greenland and Antarctic ice sheets melt quickly. These predictions for average changes bely the destructive potential of outlier events, when heat waves, rainfall, storm surges, or strong winds reach peak power.

New York is uniquely vulnerable in many respects. It is, of course, the most populous conurbation in the United States, with huge swaths of dense building stock merely a few feet above sea level -- not just in Manhattan, but also in the city's most populous boroughs of Brooklyn and Queens as well as Staten Island.

Adding to this list of vulnerabilities are unique sets of infrastructure -- subways, tunnels, and bridges -- which if damaged or destroyed would wreak long-lasting economic havoc by impairing movement of people and goods between the boroughs. And like Amsterdam, LaGuardia Airport is below sea level and requires constant pumping to keep it dry. JFK Airport is at roughly sea level, facing the Atlantic, so it would likely be at least temporarily knocked out by a major storm.

According to estimates compiled by Linkin, the total value of privately insured coastal properties is \$2.4 trillion, including city coastal areas and Long Island, but excluding nearby but similarly vulnerable coastal areas in New Jersey. The city of Hoboken -- which has emerged as a sort of Mini-Me to Wall Street with a clump of office towers housing back office duties for Wall Street's biggest players -- sits directly across the Hudson River from lower Manhattan and would be equally imperiled from a severe storm surge.

Yet even by these measures, New York City ranks second only to Miami in terms of assets exposed to coastal flooding; and in terms of vulnerability to damage from wind, second only to Tokyo.

In the region, the most costly climate event in the past century was the Long Island Express in 1938, when a hurricane made landfall on Long Island, also devastating coastal properties in Connecticut and Rhode Island. New York City avoided the worst of the damage. But given the densification of coastal properties since then, a repeat event would probably lead to around \$70 billion economic losses, according to Linkin.

Direct hits to New York City have been relatively rare. In 1985, Hurricane Gloria in 1985 did some \$885 million in insured damage, adjusted for inflation and property value increases. More recently, the December 1992 nor'easter hit the city with the equivalent of \$715 million in insured damages. Neither of these estimates includes the larger "economic" cost of damage, the long-term loss of business activities, ill health, and or the potential disruption to the national economy if New York's financial hub and transportation capacity were shut down for any period of time.

Getting back to Max Mayfield's worrying forecast, it has been nearly two centuries since a major hurricane bull's-eyed New York City. The worst direct hit in the historical record was in 1821: A hurricane ground up the East Coast before intersecting with the city. That storm raised tides by 13

feet, flooding all of Manhattan south of Canal Street. A Category 3 storm today could produce a surge as high as 25 feet in many parts of the city, potentially flooding 600,000 or so homes.

For more information on the variety of risks facing the city, check out "[Climate Change Adaptation in New York City -- the New York City Panel on Climate Change 2010 Report](#)." City Hall aims to address many of these risks in the upcoming revision to [PlaNYC 2030](#), its groundbreaking sustainability plan for New York.

Related articles about the importance of [financing](#) and [transferring risk](#) in climate adaptation are available at [GreenBiz.com](#). Articles, analyses and resource material about the Climate Week NYC 2010 conference, which ran September 20 through 26, are available at: [www.greenbiz.com/topic/climate-week-nyc-2010](#). For more information, visit [www.climateweeknyc.org](#).

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