

STORMY

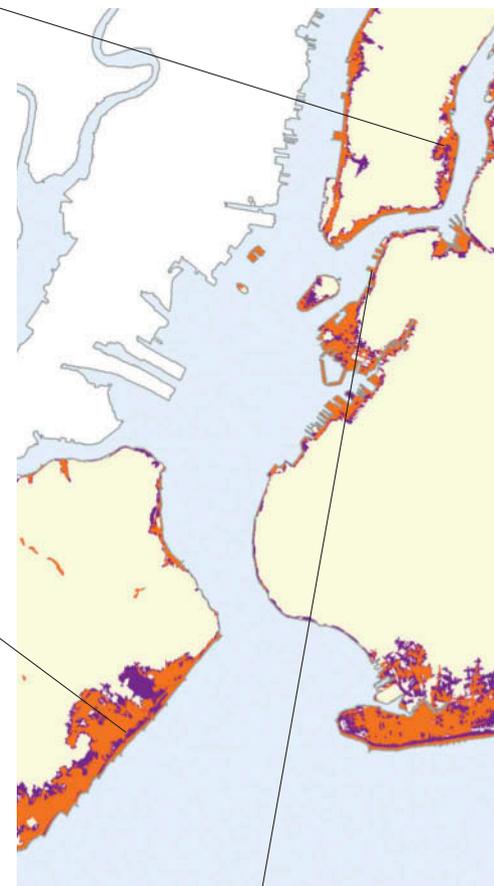
The fight over New York

By Rebecca Elliott

In December 2013, one year after Hurricane Sandy drowned broad stretches of New York City's coastline in up to fourteen feet of water, the Federal Emergency Management Agency released a new set of preliminary flood maps for the region. The agency redrew the boundaries of the city's flood zones, bringing the number of New Yorkers mapped into high-risk areas to 400,000, a nearly twofold increase. (The proposed flood zones are represented by the purple and the orange regions taken together.) FEMA uses these maps to calculate the price of flood insurance policies offered by the National Flood Insurance Program, established by Congress in 1968 to provide coverage that the private market refused to sell at affordable rates. Under current law, anyone with a mortgage in a high-risk zone is required to purchase flood insurance, and the vast majority of policyholders purchase their coverage through the NFIP. Smaller flood zones cost communities less in the short term, but can lead to a false sense of security in the face of rising threats. Larger flood zones, meanwhile, may more accurately reflect risk, but can threaten the long-term stability and affordability of coastal regions.

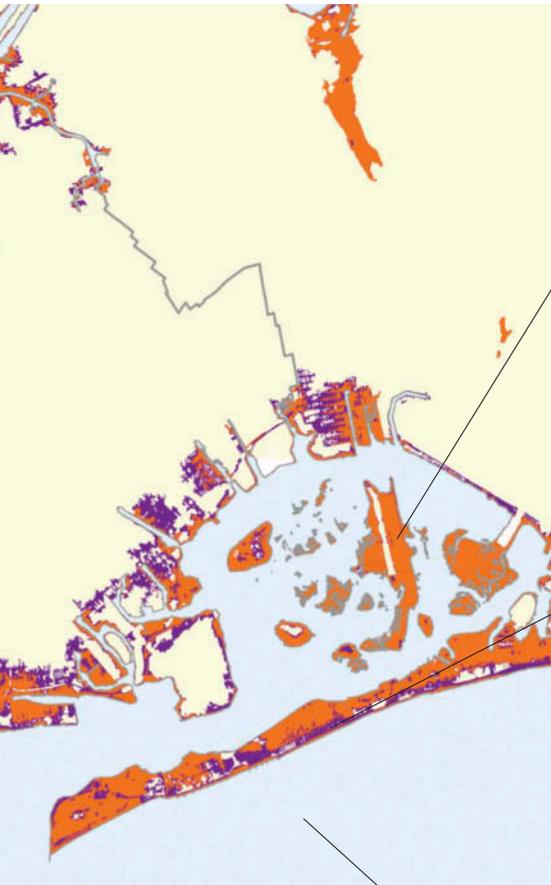
In FEMA's proposed high-risk zones, 61 percent of owner-occupied homes carry mortgages. Many of these low- and middle-income properties were built atop former wetlands—marshes that became dumping grounds as New York grew, and were paved over to meet the demands of the city's ports. Neighborhoods like Breezy Point, in Queens, Red Hook, in Brooklyn, and Oakwood Beach, on Staten Island—some of the areas hit hardest by Sandy—only became year-round communities in the 1960s, providing affordable housing at the city's soggy, polluted, and less desirable fringes. Many residents, such as Franca Costa of Oakwood Beach, already struggle to pay their annual flood insurance premiums. "I am up to nineteen hundred dollars per year and I told myself I would not go past two thousand," she says. Now the prospect of a long-term rise in her premiums, from \$2,000 to \$15,000, might push her out altogether. If the flood zone were to expand as FEMA proposed, many more working-class New Yorkers—the civil servants, educators, transit operators, police officers, and firefighters who live along the city's often inundated edges—would likely find themselves in Costa's shoes.

FEMA's preliminary maps would have another impact as well. Any construction on land that is mapped into a high-risk zone must be flood-resilient, which often involves raising structures on pilings, putting key mechanical components on higher floors, and wet-flood-proofing any area below the expected height of floodwaters. This is, of course, a tremendous expense. As Dave Miller, the former head of the NFIP, puts it, "Moving that line just a couple blocks farther out means spending tens, if not hundreds, of millions of dollars." Real estate developers then fold this extra spending into the final retail cost of housing units. After the release of FEMA's maps, the developers of Pierhouse, a condominium complex overlooking Brooklyn Bridge Park, raised the entire complex three feet higher and moved the heating, cooling, and electric systems onto the roof. These adaptive measures are reflected in the building's record-breaking prices—up to \$11 million for the largest apartments. In New York City, where real estate taxes amounted to about \$20 billion last year, or 40 percent of municipal tax revenue, luxury developments like Pierhouse provide one method for funding large-scale, climate-ready resilience. But high prices put new housing even further out of reach for city residents of more modest means, accelerating gentrification in waterfront communities.



WATERS

York City's flood lines and Elizabeth Rush



In November 2014, following outcry from developers and residents, the city hired an independent consulting firm, Arcadis, to generate an alternative assessment of flood risk. (Only the wealthiest floodplain communities can afford to do so.) The city alleged that there were major weaknesses in FEMA's modeling, a technically complex process that leaves plenty of room for reasonable disagreement. Flood risk is determined according to a historical record that includes only a handful of actual storms. Modelers must develop thousands of synthesized data points that describe theoretical storms, which are then run at randomized tidal cycles. The city questioned the number of storms FEMA used, and argued that the agency had incorrectly modeled the tides and overrelied on data from one 1950 northeaster. Seven months later, the city formally appealed FEMA's proposed zones, claiming that the agency had overestimated water levels by more than two feet, unnecessarily mapping 26,000 buildings and 170,000 residents into high-risk zones. Arcadis released its own maps (the orange regions), which slashed the number of people living in FEMA's "special flood hazard areas" in half.

Neither FEMA nor Arcadis managed to include Hurricane Sandy in its model of flood risk. Nor did they factor climate change into their assessments. But as the polar ice caps melt and sea levels and surface temperatures rise, the past will provide a less and less reliable guide. In response, researchers have started to devise new methods for measuring future flood hazards. Last October, Ning Lin, a Princeton University engineering professor, published the first study to fully incorporate both rising sea levels and a future with stronger storms into flood modeling for New York City, and predicted that the likelihood of Sandy-like events would increase dramatically throughout the twenty-first century. According to Lin, Sandy-scale flooding, previously considered a once-every-400-years event, might occur as often as every twenty-three years by century's end. If hurricanes of that magnitude do become more typical, FEMA's expanded flood zones—a near-perfect overlay of Sandy's inundation—make more sense than the city was willing to concede.

In October, FEMA announced that it had reached a compromise with the city. The agency agreed to revise its flood-insurance study in partnership with New York, using the information provided by Arcadis. The bargain also introduced a new kind of flood map, to exist alongside the revised insurance-rate maps. These "future-looking" maps, expected in 2020 for use in planning and construction, will incorporate the expected impacts of climate change into their projections of the city's flood risk. FEMA is considering delivering similar maps to NFIP communities nationwide, giving residents and local officials separate depictions of their current and future risks. But the future of the NFIP is itself uncertain. The program, which is nearly \$25 billion in debt, is up for congressional reauthorization in September. It remains to be seen whether progressive building codes like those outlined in the agreement between FEMA and New York City can withstand the real estate developer in the White House. ■

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