THE CONTROL OF NATURE

CAN *SPONGE CITIES SAVE US* FROM THE COMING FLOODS?

As the planet gets warmer and the rains fall harder, the future of flood control is looking less like a wall and something more like a park.

By Eric Klinenberg

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From Copenhagen to Hoboken, designers have found creative ways to make neighborhoods better on good days, as well as safer on the worst ones. Photo illustration by Javier Jaén

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On October 29, 2025, the Metropolitan Transportation Authority released an update to its Climate Resilience Roadmap. In the previous eighteen months, six floods, six heat waves, and the driest month on record had exposed weaknesses in the transit network. The M.T.A. proposed familiar remedies: $1.5 billion for upgraded flood controls, like high-capacity pumps and elevated station entrances. It also urged the city to modernize its sewage-and-stormwater system, because, when that system is overloaded, the discharge has only one place to go—down.

The next morning, the National Weather Service warned that the city would see a low-pressure system bringing gusty winds and one to two inches of rain. A 6:30 A.M. broadcast from NBC 4's "Today in New York" featured the Climate Resilience Roadmap, and cut to video of water gushing into underground stations during a recent storm. "We've all seen those cascading water streams in the subway," the co-anchor, Michael Gargiulo, said. "Yeah," the meteorologist Maria LaRosa replied. "We don't see that coming together today."

For most of the day, the forecast held. But after 3 P.M. a band of heavy rain drifted over Brooklyn and dropped a downburst of near-Biblical force. Parts of the borough got more than an inch in less than fifteen minutes—far exceeding what meteorologists classify as a "heavy rate."

The novelist Iris Murdoch once described a storm in which "the rain came down, straight and silvery, like a punishment of steel rods." I asked David Radell, a meteorologist at the National Weather Service, if that described what Brooklyn had faced. He demurred, and instead offered, "Big, round drops, just a bit smaller than a dime. Unrelenting. Dense. Filling the air. Bouncing up from the ground. Potentially something folks haven't experienced before."

Sheila Goodwin *had* experienced flash floods before. Blue Doves, a day care that she runs on the first floor of her family's home, sits at the bottom of a hill in East Flatbush, where rainwater can rush in fast enough to breach basements and even ground floors. Goodwin, a tattooed fifty-four-year-old with a doctorate in business philosophy, was minding a roomful of young children when the wind and rain grew more intense. In autumn, leaves and litter clog the storm drains; even a light shower can turn her block into a bathtub. When pipes fill during a big storm, pressure builds and the water comes back up through the plumbing, into homes and storefronts.

This time, the sound of hammering rain told her that trouble was coming. "The kids were doing our afternoon activities," she said, "and they were, like, 'Oh, the water's coming up the door!' " A co-worker called

down: water was rising into Goodwin's car out front. When she opened the door of the day care, she recalled, "the water just rushed in. The kids were screaming and hollering."

She and a colleague lifted the children onto tables. Stormwater, Goodwin pointed out, picks up "everything off the street"—gasoline, heavy metals, raw sewage, rodents. As the foul mix reached knee level, she called 911. Firefighters arrived, and they helped the day-care staff carry the children over a fence and up to a higher floor. Everyone made it out safely.

A few blocks away, at Kingston Avenue and Rutland Road, Aaron Akaberi, thirty-nine, was in a basement apartment with his two dogs when water began surging in. He carried one dog to higher ground and went back for the other. But the flood must have moved faster, and more forcefully, than he expected. Within seconds, Akaberi and his pet were fighting for air. Both drowned. Their bodies were recovered only after the Fire Department's rescue dive team brought in a pump.

A flood sensor at the intersection recorded 22.4 inches of water at street level between 3:01 and 3:26 P.M.; underground spaces took on several additional feet. The downpour surprised almost everyone, yet the day's total rainfall matched the forecast—about two inches. Flooding is less a matter of how much rain falls than of how fast it falls. Two inches over a day is one thing. Two inches in thirty minutes can overwhelm drainage systems and leave deep ponds in lower areas as water races downhill.

"This was, by our computation, about a five-to-ten-year event," Radell told me, using a metric that, because it's built on past patterns, grows less useful as climate change defies those patterns. Events like this have begun to feel ordinary—recurring evidence of the mismatch between aging infrastructure and an emerging ecological reality. That's why a new generation of designers are reimagining flood control, starting with a counterintuitive premise: the safest city is one that can take water in.

There's a formula behind the flooding. The Clausius-Clapeyron equation, which was introduced almost two centuries ago, describes the relationship between air temperature and atmospheric pressure. Warmer air holds more water, and the relationship is exponential, so small increases in temperature can yield huge jumps in rainfall intensity. For years, climate scientists have said that warming would bring heavier downpours. Now, it seems, that future has arrived.

In recent years, cities have been living through short storms that turn subway stations into lakes, streets into rivers, cars into boats. Zhengzhou, China, got nearly eight inches of rain in an hour on July 20, 2021. In the Libyan cities of Derna and Bayda, there were no monitors measuring hourly rates on September 10 and 11, 2023, but the totals suggest a storm of terrifying force: more than sixteen inches in twenty-four hours, followed by two dam collapses and more than eleven thousand deaths. The Valencia region of Spain drew global attention on October 29, 2024, when almost seven inches fell in an hour. Elsewhere, record-setting twenty-four-hour totals, including in São Paulo, Dubai, and Milwaukee, have underlined the new reality.

No city was designed for this kind of weather. Modern sewers took shape in the nineteenth century, typically after disasters pushed cities to upgrade their civil infrastructure. Hamburg rebuilt after the fire of 1842, London after summers like the so-called Great Stink of 1858. Engineers replaced streams and marshes with

gravity-fed pipes that carried sewage and stormwater toward rivers and seas. These “combined systems” depended on rain to flush the network, and they were built for ordinary storms. When the skies really opened, they backed up.

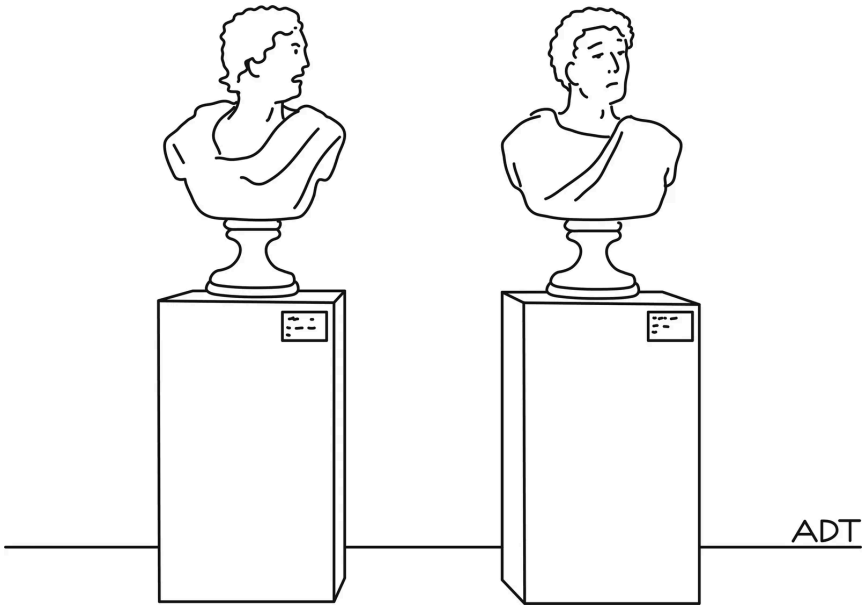
In the nineteen-seventies, New York City standardized flood control for all five boroughs, requiring that new pipes, pumps, and treatment facilities be built to handle 1.75 inches of rain an hour. Until 1991, no storm on record reached that rate. Carolien Mossel, the lead author of a *Scientific Reports* paper on rising rainfall extremes, told me, “It was a perfectly acceptable system, at least for the climate we had then.”

Since the nineties, New York City has experienced eight storms with hourly rainfalls above 1.75 inches, and climate scientists expect that more extreme rain events are coming. New York is built over marshes and creeks and glacial moraines that announce themselves in a storm. Mossel’s data indicate that several of the city’s most intense hourly downpours on record have taken place in the past five years. Radell told me that Hurricane Ida, in 2021, was “the real turning point” for the National Weather Service in New York. It delivered 3.15 inches in an hour in Manhattan, prompted the city’s first flash-flood emergency, and killed thirteen New Yorkers. Four other recent storms have broken hourly and daily records as well, but those were predicted by forecasters. October 30, 2025, was in some ways more concerning—a routine low-pressure system with a water bomb concealed in its clouds.

As storms that meteorologists once treated as thousand-year events appear more frequently, cities are hunting for workable defenses. One answer is the “modernist” approach: tear up the old tunnels, pipes, and pumps built for a twentieth-century climate and replace them with larger subterranean systems. In practice, some version of this approach remains a staple of urban planning, because certain assets always have to be rebuilt. But in most cities wholesale replacement is logistically impossible. Big metropolitan areas contain hundreds of miles of streets and hundreds of thousands of buildings, all tied into a network that cannot be taken off-line for long. Imagine the time and money that would be required to rip up every block of Beijing, Boston, or Buenos Aires. Most cities cannot excavate their way to safety fast enough. As a result, the ambition is shifting from replacement to redesign.

At the start of this century, a Chinese landscape architect named Kongjian Yu began making the case for a different kind of flood control. Raised in a coastal farming village in Zhejiang Province, Yu came to Harvard’s Graduate School of Design in the nineties after Carl Steinitz, a professor whose lectures Yu had

translated, urged him to apply. What he had seen back in China worried him: new hardscapes—roads, plazas, embankments—were at odds with the region's pattern of powerful rainstorms and periodic droughts.



"Just a reminder: I was significantly taller than you."

Cartoon by Adam Douglas Thompson

The solution, he argued, was to build absorbent softscapes: nature-based infrastructure meant to slow, spread, sink, store, reuse, and release rainwater before it becomes destructive. Reuse was essential because in many contemporary cities, and especially across China, water shortages could be as much of a problem as flooding. In public lectures and research papers, he advocated adopting "a 'monsoon culture' philosophy, where water is revered as a life-giving force rather than an adversary to be conquered," and he cast the modern city as a hydrological system smothered under concrete. For centuries, he said, engineers had tried to turn cities into funnels. By contrast, the "sponge city" concept was, he said, a way of "doing Tai Chi with water."

Yu, who died last year, had forebears. In the eighteen-seventies, Frederick Law Olmsted designed the Emerald Necklace, a chain of parks that managed sewage and flooding in Boston's Back Bay Fens. But the modern case for green infrastructure found particular inspiration in Ian L. McHarg's "Design with Nature" (1969). McHarg, a landscape architect at the University of Pennsylvania, warned that hardened landscapes could produce hazards, and he put his theory into practice in the Woodlands, a residential development outside Houston, where forests, permeable soils, and drainage swales outperformed curbs and gutters in major storms. The lesson, for designers like Yu, was that parks could function like infrastructure—that a low-tech, low-cost method of flood control was surprisingly effective.

The appeal of Yu's sponge-city idea comes less from its originality than from its rhetoric, and from the way it scales up an established design approach from the park or subdivision to the metropolis. But its influence was clear when the Chinese state, the most prolific builder of urban infrastructure in modern history, twice turned Yu's arguments into policy. In 2006, the State Council of China approved his "national land ecological security pattern," grounded in nature-based solutions. Then, in 2013—a year after Beijing experienced a flood that killed seventy-nine people, destroyed more than eight thousand homes, and caused $1.8 billion in damage—President Xi Jinping declared sponge cities a national strategy. China would keep investing in pipes, pumps, and pavement, but "natural accumulation, natural infiltration, and natural purification" would become part of its climate-security plan.

The sponge-city idea was only starting to circulate when, on July 2, 2011, an intense *skybrud*, or cloudburst, dropped more than five inches of rain on Copenhagen in a few hours, including nearly two inches in half an hour. The deluge overwhelmed the city's combined sewer system, along with the six hundred and seventy thousand residents who depend on it. Within minutes, a dark brew of sewage, industrial waste, and stormwater was rising through basements and businesses, hospitals and the central rail station, knocking out power and causing a billion dollars in damage.

Danish policymakers were worrying about climate risk well before the storm. In 2008, Copenhagen put together a project group to assess the city's climate risks. Early in 2010, the group issued a draft laying out weather scenarios, priority areas, and a menu of projects and financing options. Lykke Leonardsen, who runs Copenhagen's Resilient and Sustainable City Solutions program and serves as the city's informal water ambassador, told me that the intent was to hold hearings, win approval in August, and invest gradually. The flood rewrote both the schedule and the agenda.

In late 2012, the city issued an updated adaptation plan that paired classic civil engineering—"gray" solutions—with nature-based measures that it calls "green" (parks, plantings, swales) and "blue" (ponds, creeks, streams). The gray work meant new pumps and tunnels to move stormwater from the street to the sea. The visible transformation was above ground. Roughly three hundred ecological projects across seven catchment areas would be stitched into the drainage network by "cloudburst boulevards" and "green roads" designed to hold floodwater at street level until the underground system could catch up. Since then, Copenhagen has

done as much as any city to make itself rain-resilient, so that the next *superskybrud* brings disruption rather than disaster.

This winter, Leonardsen, a trained archeologist with cropped blond hair and an amiable punk sensibility, invited me to see some of the work. I arrived, by chance, a few hours before a Category 2 winter storm, with forecasts calling for Arctic winds and as much as twelve inches of ice and snow. After navigating slippery sidewalks, I took the Metro to Havneholmen, one of five stations that opened in 2024. The stations were designed to withstand a two-thousand-year rain event, with entrances raised above street level, retractable barriers, floor-to-ceiling glass platform screens, and drainage grates meant to divert floodwater before it does damage.

Leonardsen lives on the second floor of a concrete-and-glass building along the harbor, which has stunning views of the sea. "You've missed this morning's swim," she told me. I looked out and saw a skin of ice. "I go every morning," she said. "It's a big part of how my water work began."

Copenhagen, Leonardsen told me, was nobody's model city when she first arrived, as a student, in 1981. It was spiralling toward bankruptcy, hit by factory closures and lost shipping traffic. "We had one crane in all of Copenhagen," she said, "and it wasn't for construction—it was for bungee jumping!" Nothing epitomized the city's decline more than the harbor: it was fouled by chemicals and sewage, the end point of a system built around undersized pipes and overflow outlets that, in heavy storms, dumped untreated wastewater straight into the sea.

In the nineties, the Danish government launched an urban-regeneration plan that paired public money with private development and promised new transit and tourist infrastructure. To reduce pollution along Copenhagen's waterfront, the city overhauled its combined sewer system, adding underground reservoirs to hold dirty stormwater and installing a "real-time control" system, managing outflows with a network of sensors and automated valves. Nearly all the outlets that had once discharged sewage into the harbor were capped. By the early two-thousands, Copenhagen was building again: new housing, new bike lanes, a lively bar district, an emerging culinary scene. In 2002, the city opened its first *havnebad*, a public harbor bath, and Leonardsen, along with thousands of her neighbors, took the plunge.

For policymakers, the way the public responded to the harbor's transformation was a revelation. "Saying you're improving water quality doesn't win you a lot of political points," Leonardsen observed. "But telling people that they will be able to swim in the harbor again? That works!" The lesson shaped her office's approach to cloudburst management. Sewers rarely excite anyone, she said, but flood control takes on a different meaning when it arrives as blue-and-green social infrastructure—as pools, parks, and other places to play. The aim is to make the city better on good days, and safer on the worst ones.

To show me what she meant, Leonardsen put on a long olive parka and took me to Enghaveparken, a flood-prone park that, in 2019, Copenhagen turned into a sponge. Built in the late nineteen-twenties, the park sits

on more than eight acres at the foot of the hill where Carlsberg ran its original brewery, and is ringed by apartment blocks, schools, and churches. As we entered, she pointed out its neoclassical bones—a sunken lawn, a symmetrical layout, a long brick pergola—and then gestured to heavy concrete barriers, waist-level, that line the park's central space, with wide gaps for pedestrians.

"Look at the ground here," she said, stopping at one of the gaps. "This is a hydraulic floodgate that goes up automatically when the water comes in. The park can hold twenty-two thousand cubic metres"—nearly six million gallons, enough to fill nine Olympic-size pools. The enclosure is designed to store stormwater for up to a day and then to release it, slowly, once the pipes clear. "If we can keep the stormwater out of the sewers," she said, "there's enough room to keep the sewage underground."

We climbed toward a higher tier of the park, past a hockey rink that doubles as a reservoir and a lawn that had been planted over an underground retention chamber. A gust of wind sent tiny pellets of ice into our faces. Leonardsen tightened her scarf and kept moving. The chamber, she explained, allows for the recycling of stormwater, which the city uses to irrigate plantings and clean nearby streets, closing the urban water loop. Much of the system is invisible to the people who visit the park, but it matters for a warming future in which shortages become part of the problem, too. We passed a playground, a grove of new trees, and an old band shell that the renovation had preserved. "There's a lot of history here," she said. "And we didn't want to come in and destroy everything. The question was how we meet our needs while making sure the people who live here have a place they enjoy."

The next morning, the snow was still coming down, reducing the colors of Copenhagen to white and gray. A warm fire burned invitingly in my hotel's lobby, but I was in the city to see how it handles extreme precipitation, so I laced up my boots and trudged across slushy streets to a nature-based design studio called SLA. The elevator was out, which meant taking the stairs.

Near the studio's entrance, open shelves held labelled glass jars of sand from the firm's sites—a small archive of textures and hues. Around a coffee table, two designers were figuring out how to excavate a buried creek. In a conference room lined with awards, I sat down with Mette Skjold, the firm's C.E.O., a fifty-two-year-old architect who has led some of SLA's most prominent cloudburst work in Copenhagen. We had planned to visit two of the firm's most celebrated blue-and-green projects. Overnight, the storm had turned both of them white. That morning, she had messaged to confirm: "The weather is demanding slow drive, but is awestriking. Do you need boots or socks?"

Skjold wore a navy cardigan, gray jeans, and black boots. She walked me through the workspace, introducing one of the firm's biologists, who was sorting insects collected from a project in Abu Dhabi and from a hospital commission in Denmark ("because the bugs tell us a lot about the ecosystem"), and the firm's cultural geographer, who asked if I'd heard Mayor Zohran Mamdani talking about New York's "sneckdowns," the piles of snow that form at road edges during blizzards. We went back down to the street. The sky was clearing. The

pavement was not. “This is me,” she said, nodding toward a Mercedes E.V. at a public charger. “Don’t worry,” she added, as she eased out onto the ice. “I’m an excellent driver!”

Our first stop was Grønningen-Bispeparken, a lush five-acre park wedged between two social-housing complexes, one primarily for families, the other primarily for the elderly. A school and a playground stood at the base of a steep slope. “This used to be a great sheet of grass,” Skjold said. “A void. Rain used to flood through the field, pool here, and sink into the school playground.” The design process took more than five years, a negotiation between the city’s strict hydraulic requirements and the neighborhood’s shifting wishes; the result was something no one had pictured in advance.

As we climbed, snow crunching underfoot, the park’s structure emerged. There were a hundred and forty-nine trees, old and newly planted, in twenty-three varieties. People could move around and play in the dry, open spaces between the trees, but, in the Wet Bio Oases, wooden platforms rose above dense plantings where insects and wildlife have right-of-way. Lawns opened onto larger fields for recreation and neighborhood events. Near the top, mounds built over Cold War civil-defense structures offered city views. But the signature feature was a set of eighteen grass-and-stone basins that gather rain and, on calm days, gather people. SLA calls them “social swales.” Scattered through the park, furnished with picnic tables, they can hold about eight hundred thousand gallons during a storm.

As we made our way to the top, three children—two sisters and a brother—came skittering up behind us, giggling, boots slipping in the snow.

“Do you live near here?” I asked.

“Yes,” they said, with the youngest, an eight-year-old boy, as vocal as his sisters.

“How do you like the park?”

“It’s beautiful!” the older sister said.

“When it rains, the water goes down!” the younger sister added, and I saw Skjold smile.

“We reopened at the end of August, 2024,” she recalled. “The mayor was there. There was a band. It was exactly as it was meant to be. And five days later we had an extreme-rain event. Oh, my God, I was so nervous. We had all these new trees and plants, and I didn’t know what would happen.” But the park did what it was designed to do. In fact, it looked even better for it; the basins turned into a scattering of small ponds.

In 2025, an international jury awarded SLA the Rosa Barba Prize, one of landscape architecture’s most coveted honors, despite the project’s modest scale and peripheral address. The prize helped solidify Copenhagen’s reputation for ambitious climate adaptation, as has the $1.8 billion that the city has committed to its cloudburst plan. When I spoke with Leonardsen, though, she tempered the optimism. Copenhagen has

still built only a fraction of its three hundred ecological projects; the unbuilt portion includes the green streets and cloudburst boulevards meant to link them into a functioning network. "For this system to fully work, all the individual projects need to be connected, like pearls on a string," she said. For now, the new infrastructure is less a necklace around the city than a handful of gems.

A country like Denmark, where climate change is treated as a present danger and trust in government remains a civic reflex, might be expected to spend lavishly on social infrastructure. The surprise is that there's an American city that has pursued a similar approach, and the greater surprise is that the city is Hoboken, New Jersey, better known as a post-industrial port and bedroom community across the Hudson River from Manhattan.

Hoboken is a dense urban settlement of sixty-five thousand wedged between the river to the east and the three-hundred-foot-tall Palisades to the west. Much of it sits in a shallow bowl, a hardscaped catchment about the size of the West Village. Flooding has always been part of the deal. In the twentieth century, the same storms that made headlines in New York wreaked quieter havoc across the river. In this century, Hoboken's disasters have been vivid enough to make their own news. During Superstorm Sandy, a fourteen-foot surge from the Hudson poured into the city, producing images of National Guardsmen in boats ferrying residents through waist-high water. The water lingered for days and overwhelmed Hoboken's sole operating flood pump. More recently, heavy rain alone has begun to produce the same effect.

On a frigid day not long ago, I met Caleb Stratton in the mayor's office, where he was finishing his term as Hoboken's chief resilience officer. A former college athlete with a sturdy build and a neatly trimmed beard, Stratton, forty, wears a watch on one wrist and an activity monitor on the other. He has the look of someone who can't stop running scenarios.

When Stratton first came to city hall, as an intern, in the summer of 2012, Hoboken had no reason to expect an infrastructure overhaul. Then Sandy hit, and the Obama Administration launched Rebuild by Design, a competition that offered roughly a billion dollars in federal money, with more expected from state and local governments, for the winning proposals. The Dutch firm OMA submitted a plan called "Resist, Delay, Store, Discharge," a hybrid system of walls and gates to block storm surge, absorbent landscapes to handle rain, and pumps to empty the system when the pipes fill. Hoboken won two hundred and thirty million dollars through the competition, later secured hundreds of millions in additional funding from the state and from Biden-era programs, and found itself unexpectedly awash in money and expertise. Stratton's job was to make sure that the city used them well.

In the past decade, Hoboken has installed two more high-capacity pumps in low-lying neighborhoods and begun adding storm gates and floodwalls. The city's "resiliency parks," though, are the system's showpieces, and not only because, as in Copenhagen, they're built to hold water. When OMA architects met with residents and community leaders, Stratton told me, they heard as much about a lack of decent playgrounds and public space as they did about flooding. Hoboken didn't want to limit itself to "black-sky infrastructure," the stuff

you need during emergencies. It also wanted "blue-sky infrastructure," places that would make the city more inviting.

Hoboken's dual-use strategy is on display at ResilienCity Park, a five-acre oasis in a part of town that used to flood whenever it poured. The park has a full-size soccer field, a sunken basketball court that doubles as a reservoir, a long wooden walkway raised above plantings and tall grasses, a community pavilion, a café, and a fifty-thousand-gallon cistern that captures rain for irrigation. There's also a Great Lawn that hosts outdoor movies and neighborhood events, and, beneath it, a million-gallon stormwater tank. The playground would be the envy of children anywhere; Stratton, a father of two, pointed out a water park, a climbing wall, and rope climbing towers.

We warmed ourselves up over lunch at the café. A few young professionals were working remotely, and our table wobbled. Stratton lifted it, carried it off, and replaced it with a steadier one. As we tucked in, he described "the downstream effect" of the upgrade: parks draw people in, property values rise, businesses and jobs follow. "It all ties together," he said. Lower flood risk, he added, should also ease insurance costs. "Our flood map will be redrawn when we complete our projects," he said. "It's conditional. But if we get there—*when* we get there—that will be a very big deal."

"I'm anxious and she's avoidant, so we're committed to raising the baby anxious-avoidant."

Cartoon by Maddie Dai

Before we left, Stratton wanted to show me a facility where, last May, the city installed five new high-capacity pumps that control stormwater discharge from the park and nearby streets. As we approached, we caught a gassy smell. Stratton stopped at a large grate and peered down.

“Can you see the water?” he asked, suddenly alert. “It’s pretty high right now.” He pulled out one of two phones he carries and called the chief sewer engineer for the area. The engineer told him that it was runoff from a commercial corridor a few blocks away, where the city has been raising streets and sidewalks so that stormwater drains toward the park and the pumps. The corridor had just been tied into the new system. What we were smelling was the system working.

Hoboken’s network, like Copenhagen’s, is a work in progress. It has already started to change what a hard rain means, though. In September, 2023, the remnants of Tropical Storm Ophelia dropped more than two inches in a few hours, the kind of downpour that used to guarantee flooding. This time, the city held. The pumps pulled seventeen million gallons of stormwater off the streets, and the new blue-and-green infrastructure absorbed runoff to alleviate pressure on the pipes. “When the news reporters came to see the damage,” Stratton told me, “we were already open for business.”

Across the Hudson, cloudburst management is a problem of a different order. New York City’s size, density, and patchwork topography make comprehensive protection hard to design and harder to build. Some planners argue for abandoning the low-lying neighborhoods that used to be ponds, creeks, and marshes. The ecologist Eric Sanderson told me that roughly twenty per cent of the city’s land—home to two major airports, nearly a third of the public-housing stock, and about 1.2 million people—sits in what he calls “blue zones,” places that “were wet, are wet, and will be wet in the future.” In his view, New York needs to “restore nature, restore the stream, restore the wetlands.” The housing will have to be replaced by building more densely “someplace else that’s safer, on higher ground.”

Planners call this “managed retreat,” and the idea has begun to shape urban policy. After Sandy, hundreds of homeowners on Staten Island’s shore accepted buyouts through a state program. The city has since explored smaller buyouts in places that flood repeatedly, including the Jewel Streets neighborhood, also known as the Hole, at the Brooklyn-Queens border. But a relocation program for 1.2 million New Yorkers is far too complex and costly for any official to contemplate. For now, the city’s strategy is to build better gray, blue, and green infrastructure in every borough, and to do as much as possible to hold and absorb rain. Eliminating flood risk remains a fantasy. Flattening the curve—making bad floods somewhat less bad—feels achievable.

The climate keeps raising the stakes. Last year, First Street, a Manhattan-based climate-risk group, modelled a “hundred-year” storm—a Category 1 hurricane on a Sandy-like track and rainfall of four inches an hour. In that scenario, Kissena Park, in Queens, could be inundated by more than nineteen feet of stormwater. Yankee Stadium and Bedford-Stuyvesant could get eleven. Ten feet of flooding would cripple highways along Manhattan’s edges and damage vital infrastructure, including transit links to the airports. The estimated property loss, at twenty billion dollars, would be twice that of Sandy. The human toll would be incalculably steep.

There is a danger, in climate planning, of investing in protection against the previous disaster rather than against the next—the engineer’s version of fighting the last war. In the United States, federal policy

encourages the habit, because FEMA recovery money tends to favor rebuilding damaged infrastructure over redesigning it. That was visible after Sandy. The storm, which hit the New York area in October, 2012, unlocked billions of dollars in resilience spending, with hurricanes, rather than heat waves or cloudbursts, as the focus. The East Side Coastal Resiliency project, a 2.4-mile flood barrier that doubles as parkland along Manhattan's Lower East Side, is the city's largest and costliest climate initiative. The original design, led by the firm BIG, imagined a floodable landscape—planted slopes rising from the East River and a grassy berm on the western edge meant to capture storm surge. Engineers judged that version infeasible. The city chose a more muscular solution, raising the park and lifting the river's edge to form a wall intended to hold back sixteen feet of surge. It also added submerged, deployable tide gates that, when closed, turn sewer outfalls into watertight barriers, keeping river water out of the pipes and wastewater out of the river.

In solving one problem, though, elevated walls and hardened gates can create another: rainfall gets trapped on the streets. The city is building a work-around. I recently walked to the Lower East Side to meet Joseph Lione, a Staten Island-raised civil engineer who manages infrastructure and coastal resilience for the city's Department of Design and Construction. We met at a construction site under the Williamsburg Bridge that was painfully loud, even by New York standards. He handed me a hard hat and led me to what is currently the largest open drop-pipe manhole in Manhattan—a vertical shaft twenty-six feet across and forty feet deep. Halfway down was a work platform. At the bottom, a river of raw sewage moved north.

"We call this 'parallel conveyance,' " Lione said. The point is to keep eight low-lying pockets of the Lower East Side from turning into basins once the floodgates close. "The bathtub effect would have been a problem back here," he told me. The system diverts stormwater into a giant tank and then, at Fourteenth Street, pumps it out at up to three hundred and fifty million gallons a day, sending it on to the Newtown Creek wastewater facility. When the full project is finished, he added, with the pride of a new parent, "a hundred and twenty thousand people will no longer be in the flood zone."

During a lull in the bridge traffic, I asked which local flood projects had made the biggest difference. "Most Staten Islanders, including myself, love the Bluebelt," he said, referring to a thirty-five-year-old network of streams, ponds, and wetlands that filters, stores, and slowly releases stormwater across sixteen watersheds at the island's southern end. The system spans roughly ten thousand acres—about a third of Staten Island—making it the largest such project in the country, and New York's closest approximation of a landscape-scale intervention.

The Bluebelt takes the rain that falls on it and also accepts runoff piped from street catch basins, routing it through restored topography instead of into the sewers. In storms like Ida, it has proved its value by absorbing hundreds of millions of gallons that otherwise would rush into the combined system and back up into basements and storefronts. The approach has been introduced in other outer boroughs, because with every additional acre the city expands capacity without digging another mile of pipe.

The next day, in Brooklyn, a team from the city's Department of Environmental Protection walked me through some of the newest green-infrastructure work. At Green-Wood Cemetery, an almost five-hundred-acre burial ground in western Brooklyn that rises and falls along an old push moraine, a nonprofit has partnered with the city on interventions meant to keep stormwater out of sixteen nearby sewersheds during heavy rainfall.

A particularly elegant fix is found in Sylvan Water, a pond within the cemetery. Engineers from the Dutch firm Arcadis installed a water monitor and an outlet-control structure. When the National Weather Service forecasts a major storm, operators draw the pond down, sending water into the combined system before the deluge, while there's still capacity. The control system, along with permeable pavers and a large underground tank, is expected to keep roughly fifty-five million gallons of stormwater out of the sewers each year.

In flood-prone Gowanus, where wastewater has a tendency to surface on sidewalks and streets during storms, absorbent ground was installed more than a decade ago in the form of Sponge Park, a rain garden that the landscape architect Susannah Drake created along the canal. Now the neighborhood is changing again. With a hundred and forty-one residential projects in development and twenty thousand new residents projected for the neighborhood by 2035, the city is attempting to reproduce the idea at building scale.

From a bridge over the Gowanus Canal, the D.E.P. team pointed out small sponges quietly softening the neighborhood: planters, gardens, tanks, and densely planted "green roofs." Since 2022, the city's Unified Stormwater Rule has required stormwater controls in every large new development. Each building becomes part of the city's rainfall-capture network. The Dutch go even further, by subsidizing homeowners who add green roofs or pull up pavement so that rain can soak in.

Washington's commitment has been erratic. In April, 2020, FEMA launched the Building Resilient Infrastructure and Communities program, or BRIC, after Congress authorized the agency to reserve up to six per cent of estimated disaster-relief spending for pre-disaster resilience. Under the Biden Administration, FEMA expanded the program and approved more than three hundred and fifty million dollars for nineteen New York City flood-control projects. In April, 2025, FEMA cancelled BRIC, calling it "wasteful" and "ineffective." A federal judge ordered the funding restored that December. In March, 2026, the agency reversed course again, reviving the program and reopening applications.

Meanwhile, New Yorkers have been improvising. A group of residents pushing for better rain infrastructure introduced me to Eric Wiseman, a sixty-one-year-old retired Verizon technician whose home sits where two sloping streets meet in Crown Heights. Wiseman, whose parents bought the house in 1968, has grown so anxious about flooding that, he told me, "I feel like a prisoner in my own home." He pulled out his phone and showed me photographs of his street underwater, then scrolled to an image of himself in a full-body rainsuit, standing ankle-deep. "I do this every time there's a rainstorm," he said. "We know we can't do nothing about the climate here. But we can do something about the infrastructure."

From Wiseman's house, I went to East Flatbush to meet Shayla Hamlin, a former federal worker whose three-story home sits in a shallow depression a few lots down from a polluted commercial strip dotted with auto-repair shops and a junkyard. She took me to the garage, where, on October 30th, a surge of wastewater, rodents, feces, and industrial runoff rose three feet in minutes, leaving a stench, along with a high-water mark that has yet to fade. She has borrowed about a hundred thousand dollars for mitigation, but she is reluctant to invest in further upgrades, she said, "because I know it's going to happen again."

Hamlin grew up in the house. Her family has been there for more than forty-six years. She has a three-year-old daughter and a community. Since the most recent flood, however, she has become jumpy. "I've been talking to my parents about just selling the property," she said. "I feel like it's time to cut our ties." She's ready for a new city, where the weather feels less menacing. The problem is finding one. ♦

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