IN CONVERSATION WITH
ROHIT T. AGGARWALA

Integration and Collaboration in Stormwater Resilience

Rohit T. "Rit" Aggarwala, Chief Climate Officer of New York City and the Commissioner of the Department of Environmental Protection, talks about what the city is doing to build up stormwater and coastal resilience.

Image: Ed Reed / Mayoral Photography Office

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The Department of Environmental Protection (DEP) is the water and wastewater utility for New York City, providing 1 billion gallons (3.8 billion litres) of water and treating 1.3 billion gallons (4.9 billion litres) of wastewater for nearly 10 million New Yorkers every day. Can you share with us how DEP's mission and operations have evolved as New York City has begun to experience the effects of climate change?

DEP's mandate has evolved over its 180-year history. At first, we only provided drinking water. Then we took on wastewater treatment. After that, we took on consolidated management of the sewer system. A decade ago, we branched out into green infrastructure. With climate change dramatically affecting New York City (NYC), we now need to embrace the role of protecting New Yorkers from flooding.

As a city with 520 miles (837 km) of coastline, building coastal resilience in NYC is a significant challenge. Hurricane Sandy flooded large parts of NYC, including lower Manhattan back in 2012, emphasising the need for physical defences along our waterfront. While NYC has been thinking about climate adaptation since 2006, many New Yorkers did not take it seriously until Hurricane Sandy.

After Hurricane Sandy, the city was given a substantial amount of federal money to do repair and protection work for the parts of the city that had been flooded. A lot of that work is underway, and by 2027, areas such as Staten Island, Lower Manhattan, and parts of Brooklyn will have coastal defences. However, as the policy for federal disaster relief in America is backward-looking, money is only available for formerly devastated places. Thus, the challenge is in figuring out how we can fund coastal defences for our other at-risk neighbourhoods.

Construction of elevated East River Park as part of the ESCR project along the East River in lower Manhattan.
Image: NYC Department of Environmental Protection

How did DEP arrive at its current path of environmental transformation and climate adaptation?

There were two major turning points. The first is what we learned from the East Side Coastal Resiliency (ESCR) project—a nearly US$2 billion project to protect Manhattan's Lower East Side. This project underwent two phases: the first was an architect- and design-led phase that produced some very exciting concepts, and the second was a more pragmatic phase where plans were scaled back by the agencies that had to maintain and operate it. A key lesson from ESCR was that we have to think both ambitiously and pragmatically from the outset to avoid creating false expectations. It also demonstrated what were the creative solutions that the community would value and endorse. This helped to shape the final design, which included seawalls with an elevated park on top.

The other turning point was realising that for the decade since Hurricane Sandy, until a year or so ago, all of our coastal resilience planning had been conducted out of the Mayor's Office, with agencies being pulled in to deliver specific initiatives. Coastal resilience, however, is a multibillion dollar and decades-long effort, and so we had to rehouse it in an agency with the mandate, technical expertise, and capability to do things over a much longer time frame than any given mayoral administration.

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We ultimately concluded that DEP was the right place for two reasons. Firstly, the DEP deals with massive drainage and impacts behind coastal defence, and secondly, as a major capital agency it has all the requisite functionalities.

What are some challenges that DEP faces in enhancing the city's climate resiliency?

There are three main challenges. Foremost, it is building up a team for climate resilience. As we are still in the process of getting funding and hiring people, there is a need to balance between near-term operating mandates and long-term planning.

The second challenge is funding. Relying on the city's general fund is insufficient because it is a limited pot that funds the rest of local government services. So we need to find a dedicated revenue source.

Finally, coordination with other levels of government is challenging. National coastal infrastructure is the domain of the US Army Corps of Engineers. Figuring out exactly what the Army Corps, NYC, and the State of New York should do and how we all work together is essential. Moreover, finding a balance between nature-based solutions and man-made solutions will be critical. There are some New Yorkers who have an unrealistic expectation for how much of our coastal protection can come from nature-based solutions, so navigating that is going to be an important step for us to maintain both efficacy and public support.

What are some of the specific strategies used to tackle the challenges of staffing, fiscal constraints, and inter-agency coordination required to build resilience against other types of flooding in NYC?

A big challenge that we have had to tackle recently is the stormwater flooding issue in NYC. Since 2021, we have experienced rainfall patterns that are much more tropical in nature. These flooding events really put the issue of stormwater resilience into the public consciousness.

Green roof on Steiner Studios, Brooklyn Navy Yard. Green roofs help infiltrate rainwater, reducing peak flows from the sewer system.
Image: NYC DEP

New Creek Bluebelt Olympia Boulevard portion, taken in July 2024.
Image: NYC DEP

What we should be doing is looking at solutions as an integrated set of tools. Over the past few years, our grey and green planning and engineering teams have started planning together, leveraging the combination of their stormwater management solutions.

A key strategy for us is teamwork and integrated design. Up until a couple of years ago, we would look at a stormwater challenge and decide whether it should have a grey or green solution. What we should be doing, however, is looking at solutions as an integrated set of tools. Over the past few years, our grey and green planning and engineering teams have started planning together, leveraging the combination of their stormwater management solutions. In the process, they have systematically identified more than 80 high flood-risk locations that we will identify solutions for as part of a multi-year plan.

The second strategy is expanding our network of bluebelts, which are a series of engineered wetlands, streams, and ponds that are connected to storm sewers, allowing them to convey and store very large volumes of rainfall. In addition to their stormwater benefits, bluebelts beautify neighbourhoods, support biodiversity, and enhance property values. However, finding space for new bluebelts in a densely populated city is challenging. Furthermore, if we are to expand them citywide, it may require integration into parklands or be part of potential buyout programmes for homes in frequently flooded zones.

The third strategy involves our FloodNet system. These are optical sensors mounted on lamp posts to measure surface flooding. Our plan is to install 500 of them. To date, we have already installed more than 250 sensors. FloodNet provides real-time understanding of where the city is experiencing flooding. This is useful not only for city officials, but also in helping the public make informed travel decisions.

FloodNet sensors.
Image: NYC DEP

Can you share how DEP is working with the community to plan infrastructure and manage climate risks?

We are beginning to train residents to protect their properties from flooding. Because building climate resilience is going to be a 10- to 25-year project, we have started to say that while the DEP works on infrastructure, residents too need to get involved. This includes installing flood alarms in basements and placing inflatable barriers in front of basement doors as interim protection measures. We have started holding community preparedness events where we make educational presentations and give away flood protection products to raise awareness.

Two years ago, the Mayor's office also started an initiative called Climate Strong Communities, which involves going into neighbourhoods to workshop ideas about resilience against multiple climate hazards. Through this process, we have collated a set of project ideas that we are confident the community will support. Such projects are particularly valuable when it comes to federal funding opportunities because climate-related grants often require community endorsement.

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What does DEP plan to do over the next five to ten years to prepare its infrastructure and operations for the future?

A significant portion of our water supply infrastructure is over 100 years old, necessitating extensive reconstruction. We will soon begin crucial dam rehabilitation work as well as complete a third water tunnel to ensure redundancy in our water supply system.

We are also focused on making better use of data and automation to improve our operations.

Two years ago, we started a collaboration with the Partnership for New York City, which is a group of large private sector employers in New York who collaborate with and serve as a resource to NYC's government. They are now in their second year of hosting an Environmental Tech Lab that poses challenges to entrepreneurs to help solve challenges facing DEP. This has helped us systematically identify areas where we can introduce technology, as well as suitable partners and suppliers to support the endeavour.

As an example, we have found partners that use satellite imagery to better understand water quality in our reservoirs. Others use sensors to provide real-time data on wastewater flows, or enhance our capacity to quickly analyse engineering designs. Working with these types of partners could potentially help us to understand our operations through a much more data-driven approach and make our operations more efficient. It can also contribute towards making NYC's built environment more climate-ready and climate-resilient. 🔍

In June 2024, DEP staff connected with community members in Kissena, Queens to discuss the Kissena Cloudburst Hub project. Participants provided feedback for more open spaces, shared their insights on localised flooding, and learned about stormwater management and climate change in NYC.
Image: NYC DEP