

Gotham Gazette - <http://www.gothamgazette.com/article/parks/20110519/14/3530>

Trying to Create a More Permeable New York

by Anne Schwartz

19 May 2011

Photo by New York City Department of Parks and Recreation

The city's Greenstreets program -- offering planting on small bits of land -- is part of its effort to create a greener and less impervious city.

With his 2007 sustainability blueprint, [PlaNYC 2030](#), Mayor Michael Bloomberg brought New York into the vanguard of American cities in acknowledging the importance of green space to the city's long-term viability. The plan set a goal of putting parkland within a 10-minute walk of every resident, transforming streets into public open space and expanding the amount of "green permeable surface."

Although budget constraints have stalled some of the more ambitious park-building plans, the city has [made significant progress](#) toward many of these goals, particularly creating a more permeable city. This represents a sea change in the city's approach to managing stormwater pollution and could well be one of PlaNYC's most lasting effects.

Instead of building more tanks, tunnels and other expensive controls to prevent combined stormwater and sewage from polluting the harbor, the city is investing in green infrastructure. This approach uses advances in urban ecology and state-of-the-art hydrological modeling to create and manage a low-maintenance network of natural lands, plantings and permeable surfaces that can capture rainwater before it enters the sewer system.

The [update to PlaNYC](#) released in April details the steps the city has taken so far, as well as a number of new initiatives. A major component is the city Department of Environmental Protection's [Green Infrastructure Plan](#) released last fall. It proposes to invest \$1.5 billion over the next 20 years in creating and maintaining green infrastructure, and to coordinate it into city road and other construction projects. According to the administration, adopting this approach would reduce overflows from the sewage system by an additional 3.8 billion gallons a year over what traditional controls could accomplish -- at a significantly lower cost.

Following the Green

The articles so far:

[The Missing Public](#) by Alyssa Katz and Eve Baron: PlanNYC offers some outstanding proposals, but unfortunately it didn't involve the public very much in creating them.

[Sustainability Watch: Part 2](#) by Tom Angotti and Melissa Checker: With the mayor renewing his plan for a greener New York, Gotham Gazette and Hunter College launch another series of articles about creating a more environmentally friendly city.

[Counting Heads](#) by Andrew Beveridge: City officials squawked when the 2010 census that found growth here has slowed. New York's pride may be wounded, but the census probably got the numbers right.

[A More Modest Proposal](#) by Gail Robinson: In 2007, Mayor Michael Bloomberg unveiled an environmental plan that called for charging people to drive in Manhattan. This time around, he set forth a new, less-controversial agenda.

[Going for the Green](#) by Courtney Gross: Four years after Mayor Bloomberg announced his plan for a sustainable city, is New York a more environmentally friendly city? A report on PlaNYC's wins and losses.

Unlike the spending on new parks, the investment in sustainable stormwater management -- which is funded by water and sewer fees -- includes the cost of caring for plantings and other green elements, assuring their lasting effectiveness as well as the many other benefits they bring.

The city is under a [consent order](#) negotiated with the state Department of Environmental Conservation to reduce discharges of untreated stormwater and sewage into the harbor. Because the order specifies the construction of specific projects, the state would have to approve any green modifications to the plan. But if the state approves, the new approach could launch a wave of greening that will last long past the Bloomberg administration and make the city a national leader in innovative stormwater management.

The City's Stormwater Problem

Today it is hard to imagine Manhattan as an island of gently rolling hills and forests laced with abundant springs and streams, or to envision bears and wolves roaming Brooklyn, as the Wildlife Conservation Society's [Welikia project](#) has discovered in its quest to understand the city's original landscape and ecology. Except for a swath of forest running through Staten Island, shards of marshland around the harbor and other remnant natural areas, the original landscape of New York City has been largely obliterated.

Buildings and asphalt now cover so much of the land that some 80 percent of the city's surface is impermeable. To replace the natural systems that once absorbed and filtered rainwater, over the decades engineers built a vast infrastructure to collect, store and treat the water that pours off roofs, parking lots, sidewalks and streets. In most parts of the city, this runoff, which picks up pollutants from the streets, goes into the same sewer pipes as the wastewater from toilets, dishwashers, showers and kitchen sinks.

After investing \$6 billion since 2002 in upgrading its wastewater storage and treatment plants, the city can, for the first time, handle the 1.1 billion gallons of sewage residents generate daily, and raw sewage is no longer routinely discharged into the waterways. As a result, the harbor is cleaner than it has been in more than 100 years.

This traditional stormwater management moves water as quickly as possible off the land and holds it in tunnels and tanks until it can be treated and discharged into waterways.

But when it rains -- and in some areas of the city all it takes is a tenth of an inch -- the volume of wastewater overwhelms the treatment plants. Every year, around 30 billion gallons of sewage mixed with polluted runoff still flow untreated into city waters in what is known as "combined sewer overflows" or CSOs. Some places along the waterways experience such overflows 40 to 50 times a year. Almost a third of the city's 274 public access points to the waterfront are within three city blocks of a sewage outflow pipe. Because of this, the city often must shut beaches following heavy rains.

To help address this problem, many cities in the U.S. and other countries, including [Philadelphia](#), Chicago and Portland, Ore., have pioneered an ecological approach that harnesses or replicates nature's ability to soak up and store rain water.

Greener City, Cleaner Harbor

Even before PlaNYC, New York City was using natural systems to handle stormwater in the 10,000-acre Staten Island [Bluebelt](#). By preserving streams, ponds and wetlands in 16 drainage corridors, all but one in the southern part of the borough, the Bluebelt handles nearly 36 percent of the island's stormwater -- at a savings of tens of millions of dollars compared to the cost of conventional storm sewers.

The task could be more difficult in most other parts of the city. In these densely built areas, capturing stormwater at its source involves hundreds or thousands of small-scale installations. These include green and blue roofs, in which vegetation or flow control devices prevent water from draining off too fast; enhanced tree pits and street plantings that catch and hold runoff underground, allowing it to seep out and water the plants; manmade small wetlands in parks and along roadways; backyard rain barrels; and porous paving that allows water to soak into the earth.

For years, suggestions that the Department of Environmental Protection consider using green infrastructure to address the runoff problem "fell on deaf ears," said Larry Levine, a senior attorney in the [Natural Resources Defense Council's](#) water program. "When the original PlaNYC came along, it was the first point at which the city really started to look seriously at these sustainable stormwater management approaches."

PlaNYC spurred the city to make sustainable stormwater management a priority in capital projects for the first

time. The plan launched an interagency task force to help agencies share best practices and work together to identify upcoming projects in areas that would benefit from green infrastructure and assess which would be most feasible and cost-effective. Many staff had been waiting a long time for this opportunity and the funding. "Immediately there was an interest from within the agencies to add green elements to their projects," said Department of Environmental Protection spokesman Farrell Sklerov.

The Department of Environmental Protection is collaborating with the parks and transportation departments and other city agencies to build dozens of pilot projects, including green roofs, bioswales (narrow vegetated ditches that capture and filter runoff), and enhanced Greenstreets that capture stormwater runoff in addition to rainfall. Researchers are monitoring representative sites in order to make the designs, materials and plantings more effective.

The updated PlaNYC notes that some of the pilot projects have already led to new standard designs for bioswales and enhanced tree pits that can be used in most [Department of Transportation](#) and [Department of Design and Construction](#) road reconstruction projects.

The city also is modifying zoning codes and creating financial incentives for incorporating green infrastructure in private development. Zoning amendments require new commercial parking lots to include interior plantings and sidewalk trees, and new developments to plant street trees and, in lower density areas, sidewalk landscaping.

Photo by New York City Department of Environmental Protection

A green roof covers the underground Paerdegat Basin Combined Sewer Overflow Retention Facility near Jamaica.

A tax abatement implemented in 2009 provides incentives for building owners to install green roofs. While praising the idea, Levine said in a [recent blog post](#) that the tax break could be structured better to promote a technology that a recent study found to be "the most cost-effective of the stormwater interventions" considered in PlaNYC.

As a next step, the city plans to tighten existing requirements for stormwater management on all new development and redevelopment projects, as well as at construction sites. It will look at ways to charge landowners for runoff, using credits as incentives for them to reduce impervious surfaces.

Other initiatives focus on creating design guidelines for city agencies to set consistent standards for green infrastructure. The parks department has been incorporating stormwater capture into park and playground design for some time, including a wooded wetland complex in [Canarsie Park](#) and the 2010 reconstruction of [Robert Venable Park](#) in Brooklyn. The department is now developing ways to implement [the best practices](#) for designing and constructing sustainable parks that it developed with the Design Trust for Public Space.

"The pendulum has swung, and it's not going to swing back," said parks commissioner Adrian Benepe. "The people who work for us are now part of a generation that sees sustainable design as being part and parcel of landscape design."

PlaNYC 2.0 also promises an updated version of the Street Design Manual, which includes a chapter on using and maintaining green infrastructure, street trees and other plantings.

The Green Infrastructure Plan

Providing the underpinning for much of this is the Department of Environmental Protection's [NYC Green Infrastructure Plan](#). It calls for a combination of green infrastructure, increased capacity from fully cleaning the existing sewer system and the most cost-effective of the traditional controls specified under the consent order.

In addition to incorporating stormwater capture into public construction projects, the plan looks to community participation. For the last two years, the department has provided grants to private property owners, businesses, and not-for-profit organizations to develop innovative green infrastructure.

Photo by New York City Department of Environmental Protection

Enhanced tree pits, such as this one on Autumn Avenue in Brooklyn, hold runoff underground, allowing it to seep up and water the plants.

The plan aims to stop runoff from 10 percent of the city's impervious surfaces in the 13 watersheds with combined sewer overflows. In addition to saving money and reducing pollution, planting vegetation and adding green space will beautify the city and clean and cool the air. The agency estimates that implementing the Green Infrastructure Plan would provide as much as \$400 million to New Yorkers in reduced energy costs, improved health and increased property values.

"You get a tremendous bang for your buck with investment in these green infrastructure approaches, beyond what you can get from building concrete holding tanks that serve only one function," said Levine.

In turning to green infrastructure, the [Department of Environmental Protection](#) is challenging long-term orthodoxy about stormwater management, said Commissioner Cas Holloway at a March community presentation in Brooklyn. "It required a huge cultural shift at the DEP," he said. "We have a lot of engineers who like building in concrete and steel and are good at it."

Greening After Bloomberg

It is impossible to predict how many of the initiatives in PlaNYC 2.0 will continue past the Bloomberg administration, especially in today's climate of fiscal constraint.

Already, the city has slowed the timeline for creating the eight new flagship parks announced in the original PlaNYC, raising questions of how many will eventually be built.

Protecting the city's remaining wetlands and natural areas so important for water quality, flood protection and wildlife habitat remains a challenge, given constant development pressures and a lack of funding for land conservation. So far, the city has protected just nine of the 89 properties its [Wetlands Transfer Task Force](#) recommended for transfer to the parks department in 2007.

The city has already committed \$187 million over the next four years to begin putting the Green Infrastructure Plan into action. The city is now seeking approval to fully implement the plan under its consent order with the state. This will require a great deal of further analysis and refinement, said Levine. "There are a lot of challenges and a lot of work for the city to fully develop this green infrastructure vision in a way that will take root citywide over the long term."

The plan offers tremendous potential to codify an ecological approach to planning in the city and make it a much greener place. If the plan is approved, said Sklerov, "it will be part of the fabric of the DEP's efforts going forward."

"Green infrastructure is the wave of the future," said Bram Gunther, chief of forestry, horticulture and natural resources group at the parks department. "That's how any city that's interested in sustaining itself and its public health over time has to view its urban planning."

Anne Schwartz, in charge of the parks topic page since its inception in 1999, is a journalist who specializes in environmental issues.



Gotham Gazette is brought to you by [Citizens Union Foundation](#). It is made possible by a grants from the Alfred P. Sloan Foundation, the Altman Foundation, the Fund for the City of New York, the John S. and James L. Knight Foundation, New York Times Foundation, the Charles H. Revson Foundation, the Robert Sterling Clark Foundation, the Rockefeller Brothers Fund and readers like you. Please consider making a [tax-deductible contribution](#).

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