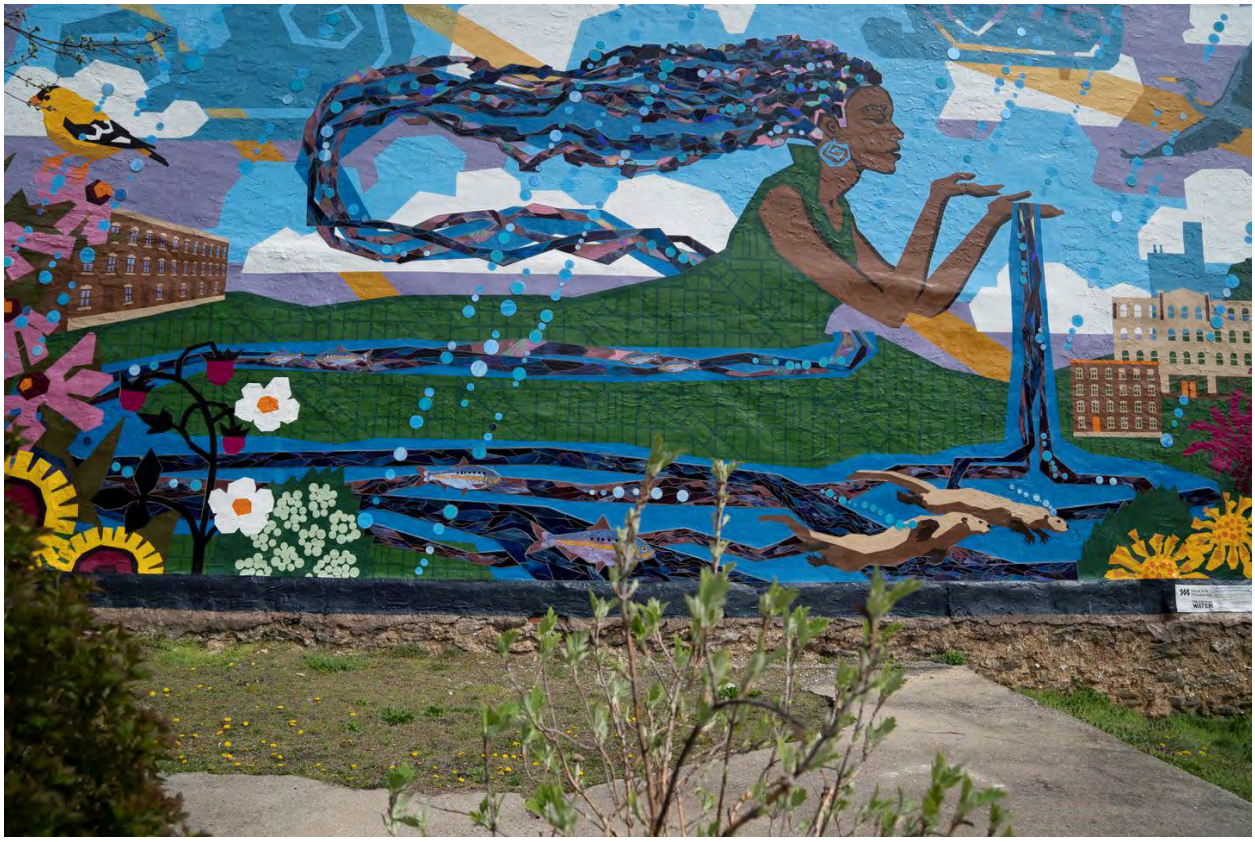
A green solution to an aging stormwater system

Climate change means more floods, which overwhelm urban sewers and send raw sewage into rivers and streams. Philadelphia is aiming to capture rainwater before it flows into city drains.

https://www.washingtonpost.com/climate-solutions/2020/04/09/philadelphia-sewage-climate-change/?arc404=true



The Philadelphia Water Department helped with the makeover of this neighborhood park, which now includes a rain garden and a water related mural. (Photo by Jessica Kourkounis for The Washington Post)

By Frances Stead Sellers

APRIL 9, 2020

PHILADELPHIA — Julie Slavet leaned over the concrete culvert where Rock Run meets Tacony Creek and sniffed.

“At least it doesn’t smell today,” she said, crediting the chilly air.

Still, the cold did nothing to hide the shimmering brown-green stains on rocks or the toilet paper, condoms and other best-not-identified objects ensnared in overhanging branches where high water had flushed them out of the sewers.

“Kids swim just below here in the summer,” said Slavet, director of the Tookany/Tacony-Frankford Watershed Partnership, which has been collaborating with the city’s efforts to rid this 300-acre Northeast Philadelphia park of the putrid discharge by installing rain gardens, brightly painted trash cans and a giant water storage tank beneath a baseball field.

But that cleanup effort is facing a growing challenge: climate change.

Rising temperatures create more frequent intense downpours that overwhelm urban systems, sending raw sewage into waterways. Many cities, from the District to Chicago and San Francisco, have been scrambling to find ways to slow the flow. Some are building huge storage basins; others are renegotiating their legal obligations to limit pollution; and many are developing green solutions to stanch rainwater runoff before it enters drains.

For those involved in such efforts, Philadelphia has literally been unpaving the way.

“Communities across the country are watching, trying to learn how to do this,” said Nancy Stoner, president of Potomac Riverkeeper Network and an acting assistant administrator for water at the Environmental Protection Agency from 2011 to 2014.

Since entering into an innovative partnership with the EPA almost a decade ago, Philadelphia has become a testing ground for green technologies.

The problems along Tacony Creek — and in countless urban waterways — begin way upstream, Slavet explained as she surveyed the trash-strewn culvert. Rainwater trickles off roofs and roads into drains that join the sewers, mixing the runoff with everything people flush down their toilets or toss into their kitchen disposals.

Graffiti is prominent at one of outfalls in Tacony Creek Park in Philadelphia. (Jessica Kourkounis/For The Washington Post)

Trash and other debris downstream from the city's largest outfall, in Tacony Creek Park. (Jessica Kourkounis for The Washington Post)

It’s the same story across 60 percent of Philadelphia, and in other, older cities where the storm water and sewage systems are combined, and many waterways, like Rock Run, have been enclosed as part of the sewage system.

The destination of this toxic brew? One of Philadelphia’s three giant treatment plants, where contaminants are removed.

But during heavy storms — or about once a week here in Tacony Creek Park — the runoff floods the system.

To prevent backups into people’s basements, Philadelphia has 164 safety valves, like the two giant outlets here in the park that release the diluted sewage directly into creeks.

And from here, it’s all downhill to the Delaware River and the Atlantic Ocean.

Unless, that is, the rainwater can be trapped before going into drains — in residential rain barrels and rain gardens, in roadside tree trenches and bioswales — and then released more slowly or reabsorbed into the atmosphere through evaporation.

That’s the goal of the $4.5 billion, 25-year Green City, Clean Waters program, implemented here in 2011.

Julie Slavet, director of the Tacony-Frankford Watershed Partnership, stands downstream from the Philadelphia’s largest outfall. (Jessica Kourkounis for The Washington Post)

In a typical year, Philadelphia used to release more than 13 billion gallons of effluent into its open waterways. GCCW aims to capture and treat 85 percent of the combined sewer flow, or about 8 billion gallons a year by 2036. So far, it is on track.

In the first five years of the program, the volume was reduced by 1.71 billion gallons, and the water department should exceed its 10-year goal of an annual reduction of more than 2 billion gallons.

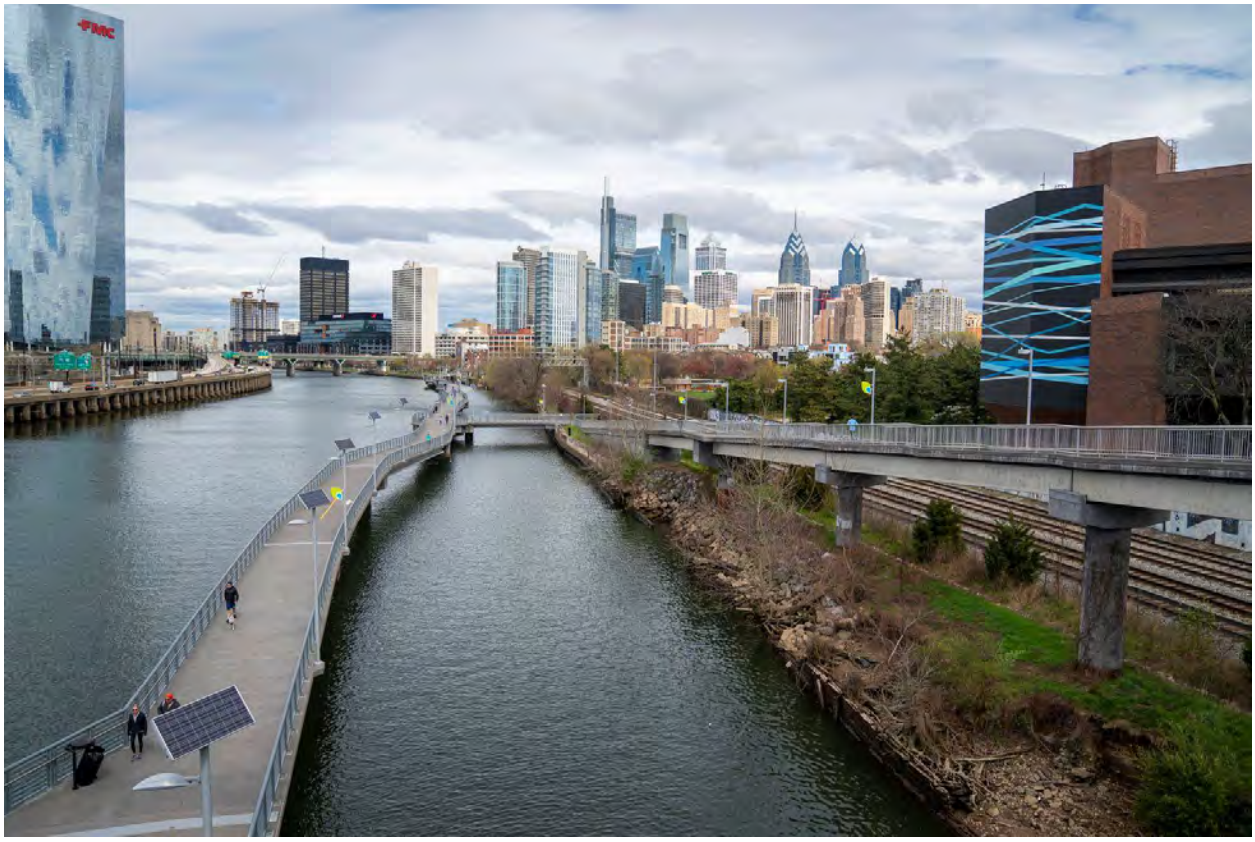
The challenge of reinforcing Philadelphia's 3,000-mile pipe network with green infrastructure, it turns out, lies not so much in re-engineering the existing system as in building the municipal, commercial and residential partnerships necessary to make a new system work.

"When you try to change the character of a neighborhood, it's very difficult," Stoner said.

The program involves creating "greened acres" — expanses of impervious land that are transformed either to absorb the first 1½ inches of rainfall or send it into rain gardens or other local green infrastructure systems. By the end of 2019, the city had created more than 1,500 of a projected 10,000 greened acres.

From the planning stage through the construction and ongoing maintenance, the installations have required coordination among city agencies and with schools, businesses, nonprofit entities, politicians, residents, developers and landowners.

"We had sold people on the concept, but we did not expect the level of complexity that was required, the level of partnership," said Paula Conolly, director of the Green Infrastructure Leadership Exchange, who used to work at the water department. "We had no idea."



Philadelphia is building an extensive network of rain gardens, green roofs, wetlands and other infrastructure to capture storm water before it can overwhelm sewers and pollute waterways. (Jessica Kourkounis/For The Washington Post)

Creating a smoothly functioning green infrastructure network “was really visionary, but it’s much harder than everyone thought,” said Julie Slavet, director of the Tacony-Frankford Watershed Partnership (Jessica Kourkounis for The Washington Post)

For Slavet and others in partnership organizations, the model remains both inspiring and daunting.

“It was really visionary, but it’s much harder than everyone thought,” she said, explaining that the process has convinced her of the need for federal investment in overhauling the nation’s infrastructure, particularly in low-income parts of a cash-strapped city such as Philadelphia. The challenges have mounted with the novel-coronavirus outbreak, as Slavet has moved programs online and encouraged people to get out in nature while observing social-distancing guidelines. Some parks have fliers up, but not this one, and Slavet has been working with a team to make laminated signs.

“There’s a lack of information in Spanish,” she said. “I am sure other languages, too.”

A citywide map of the new installations suggests that some lower-income neighborhoods have been slower to accept free rain barrels or make simple adaptations such as putting in planters and the porous paving stones that are recommended by RainCheck, a three-way partnership between the water department, the nonprofit Pennsylvania Horticultural Society, and the Sustainable Business Network, which coordinates with subcontractors.

“The education and advocacy is crucial,” said Zachary Popkin, program manager at PHS, who said almost 8,000 people have taken part in required workshops. “Maintenance is really important.”

The reason becomes obvious as Popkin tours completed projects in West Philadelphia, pointing out an entire block where neighbors have banded together to reduce runoff with below-grade tree plantings, as well as individual houses where owners have installed rain gardens on front lawns, ripped up driveways and replaced them with porous materials, and attached brightly colored 55-gallon barrels to their downspouts.

Philadelphia resident David Krueger stands on the driveway that he laid with porous materials to absorb rain instead of letting it run into nearby sewers. Although he filled in the center of the driveway to address a tripping hazard, the structure still serves its purpose: allowing rainwater to soak into the ground rather than running off into a drain. (Jessica Kourkounis/For The Washington Post)

These systems work only if filters are kept clean and barrels are emptied before a storm so that they can collect as much water as possible when the skies open. David Krueger, who replaced his driveway with porous paving about seven years ago said he decided to fill in some gaps in the new pavers after they proved to be a tripping hazard.

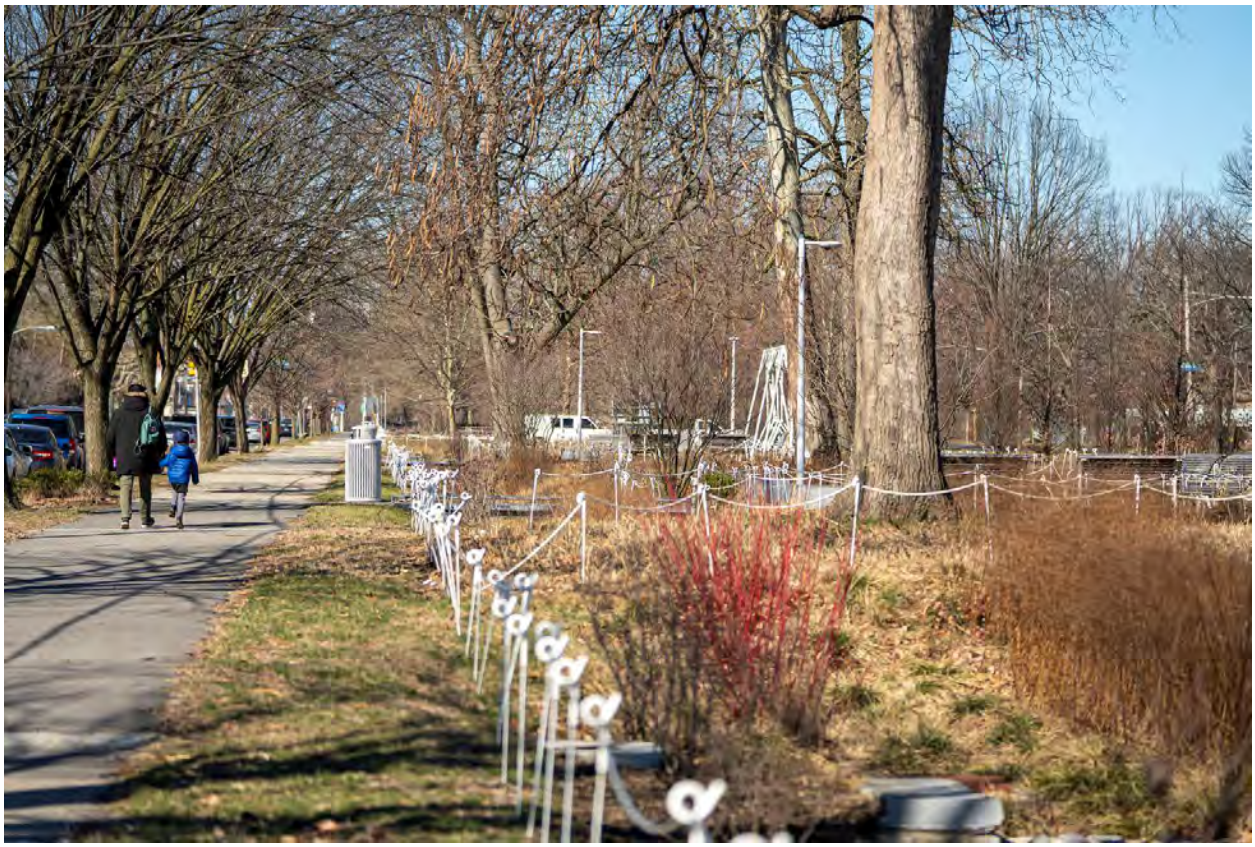
Still, he remains an advocate for the program.

“With climate change, rainfalls are going to get worse, and we wanted to be part of the solution,” Krueger said.

There is no easy way to measure the program's more ambitious goals of improving the triple bottom line — making Philadelphia a better place to live socially, environmentally and financially — by beautifying neighborhoods, reducing summer heat and creating green jobs. Published research and the water department's own surveys suggest "participants overwhelmingly feel that green storm water infrastructure projects are a good investment," said Deputy Water Commissioner Marc Cammarata.

While residents speak with gratitude about the improvements rain gardens bring to communal areas, a few complain that trash collects in them.

"They don't keep it like they should," said Monica Carvajel, waiting for a bus beside one of the most impressive projects — a half-mile stretch of rain gardens at Centennial Park, site of the 1876 Worlds Fair, where the water department partnered with the Fairmount Park Conservancy, Philadelphia Parks and Recreation and others in a $5 million makeover. The new green infrastructure should keep almost 150,000 gallons of runoff from adjacent neighborhoods out of the wastewater system in each storm, while enhancing the setting with benches, swings and plantings that will provide new habitat for wildlife.



Centennial Commons is a half-mile-long rain garden, with seating and swings to make it a pleasant place to relax in Philadelphia's Fairmount Park. (Jessica Kourkounis for The Washington Post)


Swings near the rain garden in Fairmount Park. (Jessica Kourkounis for The Washington Post)

As he sat on one of the benches and scanned his iPhone, Dyland Geraod said the improvements had turned him into a daily visitor. “A lot of people be sitting here, just chilling,” he said.

The renewed pleasure that residents such as Geraod take in their surroundings buoy the program’s advocates even as they are wary about rainfall trends. Philadelphia gets about 42 inches of rain a year, according to the National Weather Service. But the past decade was the wettest on record, and in 2018, the city was drenched by more than 62 inches of rain.

“We design with climate change in mind,” said Howard Neukrug, a former water commissioner who said the partnership deal he helped cut almost a decade ago with the EPA is more malleable than the consent decrees many cities entered into to meet federal pollution standards.

“The reality is that things change; you need to adapt,” he said, sitting in a coffee shop at the University of Pennsylvania, where he has started a water center to study sustainable urban water systems.

The model was cheaper than trying to separate the extensive sewer and storm water systems — a way for the city to work with the EPA on a shared solution that has inspired support from environmental nonprofits including the William Penn Foundation, which gives grants of about $2 million annually to support the greening and provide related job training.

GCCW is now built into the way the city works, with discounts on stormwater fees for non-residential owners who retrofit their properties and requirements for new development to manage its own runoff. Any attempt to defund it, Neukrug said, would be met by a "a much more educated and vocal group of advocates — as well as the EPA."

The long-term project has also brought into relief shifting concerns, including whether the environmental improvements will force up house prices in some neighborhoods and drive out longtime residents.

Ryan Miller, stopped at a bench right above T-14, the biggest of the city's outfalls where the stench wafts up in hot weather.

He's watched the rain gardens being installed along with a new spray pad to provide an alternative to the creek for kids seeing relief from the summer heat. But he worries change isn't coming quickly enough.

"I went down there when I was a kid," Miller said. "It's pretty bad."

The Philadelphia Water Department helped with the creation of this rain garden in a neighborhood park as part of the city's green infrastructure initiative. (Jessica Kourkounis for The Washington Post)