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Resurrecting the Ghost Streams

By Danny Lewis

Eymund Diegle knows his history. Ask him anything about any building along Brooklyn's Gowanus Canal and he can tell you what was originally along its two mile route- whether there was a hill or a creek in that spot, or how toxic that leg of the canal is. He routinely canoes in the canal, taking water samples, testing them for bacteria levels and various industrial toxic chemicals. But it's the little ripples and currents along the shore that he really pays attention to.

Last January, Diegle was walking through the neighborhood with his daughter. Armed with an old map of the Gowanus estuary, they were looking for signs of Denton's Spring, a historic well that provided fresh drinking water to a local mill in the 17th century. He wasn't expecting to find much – maybe a large tree planted where the spring used to be. After all, the neighborhood had been leveled and all the streams filled in or buried almost 200 years ago. But Diegle's daughter heard something, and just a few yards from where the spring used to be she found water trickling out of the corner of a storm drain.

"You can see it, that is the original drinking water that was used by the slaves and millers in 1650," Diegle said. "And if the apocalypse ever comes, just remember that spot because that's where everyone's going to be crowding to get their buckets of water."

Unfortunately for local survivalists, what was left of Denton's spring was blocked off during that summer when the city dug up the street to install a new drain pipe. But Denton's Spring isn't the only historic stream sneaking into the canal. Diegle found another one just a few block north, by the First Street Basin; another creek Diegle calls "Vechte's Brook" travels almost a mile underground from Prospect Park to the Gowanus, where it empties out right next to the Whole Foods on Third Avenue.

Just below New York's streets is an entire network of underground streams. Back in the 1850's, when Brooklyn was still mostly farmland, these streams got in the way

of the prime real estate next to the newly built Gowanus Canal. So engineers buried these creeks and integrated them into the new underground sewer system to make way for big warehouses and factories.

"When people ask me why do we flood, I say you are on a landfilled wetland," Diegle said. "And when people ask me why is my basement always soggy, it's because you built on top of an old farm pond."

But what was once an engineering marvel is now a major weak point in the city's infrastructure. The sewers were built when the best way to keep storm water from flooding the streets was to dump it into the same pipes as raw sewage. Those pipes now lead to wastewater treatment plants, but they can still only handle a limited amount of water. Even just an inch of rain can overwhelm the system, which automatically triggers the pipes to dump everything (sewage and stormwater alike) straight into the harbor. During big storms like Sandy, that water could rise right back up from the harbor and into the streets.

"We know we're going flood, we know the water's got to go somewhere," Diegle said. "The question is where do you want it to go?"

A half-hour train ride north of New York City is Yonkers, a small, formerly industrial city along the Hudson River. A few years ago, the first thing you would have seen upon getting off the Metro-North was a parking lot stretching several blocks west of the train station. A few feet below the parked cars and the concrete rushed the Saw Mill River. When industry began to boom in Yonkers during the mid-nineteenth century and developers wanted more land, the city simply buried the river beneath a foot-thick concrete arch.

"It was a brilliant engineering design," said Ann-Marie Mitroff, program director for Daylight Yonkers, an organization that started advocating for the city to daylight the river back in the early 2000's. "But now, in cities, everyone's afraid of the water."

Like the streams that led to the Gowanus Canal, the Saw Mill River was covered because it had become polluted by nearby factories. But with so much of the

floodplain sealed underneath concrete, the rain had nowhere to go but to flood the city's streets.

"Most urban rivers are very flashy because they don't have as much land around the rivers any more that can naturally spread out flood plains," Mitroff said. "The rain can't get through the pavement, so it goes fast into river and all of a sudden river rises. We blame the river for flooding when we've screwed it up."

In 2004, Yonkers officials were working with the Environmental Protection Agency to come up with ways to beautify the city. The US Army Corps of Engineers had proposed daylighting a section of the river and turning it into a park that would also help manage the problem with flash floods. But Yonkers didn't have a lot of money at the time, and just a few years later the 2008 Financial Crisis rocked the city again. And even though she spent six years fighting to daylight the Saw Mill, Mitroff didn't think it would actually happen. It wasn't until 2010 when she stood at Warburton Avenue and watched construction workers break through the concrete for the first time and getting a glimpse of the river surging under the street that she really believed it was happening.

"It was phenomenal," Mitroff said. "Like, wow! The river really is there. We're really going to do this."

Four years later, the parking lot has been replaced by a park that straddles the end of the Saw Mill River. Ducks and carp have made their homes here among the rocks and small waterfalls, and the river has become a point of pride for the city.

"What's happening now is that we're looking at stormwater as a resource," said Eric Rothstein, an engineer and hydrologist at an environmental engineering firm in New York. Rothstein is part of a team that is designing "green infrastructure" projects to be built at sites around New York City. For him, defending the city from major storms in the future means rethinking how we deal with heavy rains.

"Green infrastructure is about managing stormwater in landscape to mimic the natural hydrology of more intact ecosystems," said Rothstein.. "We have less runoff

in forest system or a grassland ecosystem than in our very pavement heavy, roof heavy urban landscape.”

Instead of dumping rainwater down the drain, it could feed into tree planters, giving the water somewhere to go in a flood and saving the city time and money since it wouldn't have to hire people to water the trees. Or the extra water could be held in tanks below playgrounds and used in sprinklers on hot summer days.

But while green infrastructure projects are promising, there's one problem: it's hard to know how well they will work until the next big storm. In theory, daylight rivers could help prevent flash floods by directing the extra water into soil beds or underground tanks where it will evaporate naturally instead of flooding the street. On the other hand, people have built traditional “grey” infrastructure like levees and sea walls for hundreds of years, and they have a proven track record.

“We know how levees work, we know how to engineer them, we know how to apply them, we know how to maintain them,” said Mark Jaworsky, an environmental engineer. “This use of green infrastructure is still in some instances a big science experiment.”

There are a lot that engineers need to consider when deciding whether or not green infrastructure is a good solution for a particular area: you need to think about currents, tides and natural erosion. According to Jaworsky, it's unlikely that green infrastructure can protect the city on it's own. Even though the Saw Mill River daylighting project may have helped prevent flash floods, it didn't keep riverside buildings from being damaged in the storm surge during Hurricane Sandy. But Jaworsky says the solution could be in combining new green designs with grey infrastructure.

“You could have some kind of living component that enhances the environment, enhances the community and provides some type of benefit to wildlife,” Jaworsky said.

Take the Hunt's Point Peninsula up in the Bronx. It's a relatively small neighborhood jutting out from the mainland where the East and Bronx Rivers meet. While Hunt's Point only takes up about one square mile, this industrial neighborhood is where

much of the food New Yorkers eat enters the city. Separate facilities for produce, meat and fish take in food for inspection and distribution before it is loaded onto trucks and sent out to restaurants and grocery stores across the five boroughs.

“If the tides had come in six hours later, then the markets themselves could have been flooded,” said Richard Roark, a partner at an urban design firm working in Hunt’s Point.

At any given spot, the Hunt’s Point markets are just a few hundred feet from the water. While there wasn’t much damage there during Hurricane Sandy, the storm made landfall at low tide. If it had come during high tide, the storm surge could have travelled all the way up the East River and flooded Hunt’s Point. But Roark and his colleagues didn’t want to rely solely on seawalls and bulkheads. After visiting places like New Orleans that relied mostly on grey infrastructure to mitigate storm surges, Roark thought he had a better idea.

“They looked exactly like interstate highway infrastructure,” Roark said. “They just plowed through communities, and they’re real eyesores. It fails us because we turn our backs on it.”

Roark was worried that traditional infrastructure solutions would perpetuate the problems he saw in New Orleans: local property devalued, levees allowed to fall into disrepair, and disruption to the local community. After meeting with community leaders, city officials and business owners, Roark and his team wanted to find a way to not just protect Hunt’s Point, but to let it thrive.

“You have to design for the everyday,” Roark said. “Most of our infrastructure is coming to the end of its service life, and we have to find a way to be useful and meaningful in several different ways if we’re going to be able to afford it.”

Roark proposed a combination of levees and restored marshland to defend Hunt’s Point. But he envisions the levees integrated with the green space, instead of cutting through it. Roark says that paths could be built along the levees for walking and biking, giving the local community something to enjoy and take pride in while

protecting themselves and the food markets. New parks could be designed to hold extra water in case of heavy rainstorms, preventing floods from damaging nearby businesses and giving local kids a place to play the rest of the time. And new additions to the barrier system could be rolled out over time, as time and money allow.

There is no right solution to the dangers of severe storms. There is no magic bullet that can fully protect against the worst-case scenario. Maybe there is no one big solution, but lots of little ones. While daylight streams and restored marshlands have the potential to usher in a new philosophy of urban design, there's a reason why engineers have favored levees for generations. Planners could combine both grey and green infrastructure, to let their strengths play off of each other and balance out their weaknesses. Instead of massive concrete bulkheads, New York could be defended by small seawalls surrounded by restored marshlands, with storm drains replaced by creeks leading to underground storage tanks, and floodgates surrounded by grassy fields. All small parts adding up to a single unified system protecting the city from future storms, piece by piece. It might seem crazy to imagine streams once again running through the streets of Brooklyn, but so did seeing the Saw Mill River running aboveground once more after over a century.

“By having the crazy talk we can slowly migrate to the sensible talk of how we solve this problem,” Diegle said. “This is what the landscape wants to do. Let's do it once, let's do it right.”