

# Climate change: More intense rains could swamp Chicago's aging sewers



Department of Natural Resources employees Matt O'Hara, left, and Vic Santucci electrofish Wednesday on the North Branch of the Chicago River near drainage pipes at Lawrence Avenue. At left are openings for a combined sewer that spills storm runoff and sewage into the river during heavy rains. (Brian Cassella, Chicago Tribune / April 20, 2011)

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April 21, 2011

In a city built on a swamp, where rainstorms already flood basements and force sewage into Lake Michigan and local streams, climate change could make Chicago's chronic water pollution woes even worse.

Researchers hired by Mayor Richard Daley's office estimate that intense rainfall will happen more frequently in the not-so-distant future because of warming global temperatures, challenging the region's aging sewers and the troubled Deep Tunnel project more than ever.

Rains of greater than 2.5 inches a day, the amount that can trigger sewage dumping into Lake Michigan, are expected to increase by 50 percent between now and 2039, according to a study by scientists from the University of Illinois at Urbana-Champaign and Texas Tech University. By the end of the century, the

number of big storms could jump by a whopping 160 percent.

Another group of researchers studying Milwaukee's sewers recently concluded that heavy rains caused by climate change could lead to a 20 percent increase in the number of sewage overflows, a troubling sign for Chicago, Cleveland, Detroit and other industrial cities throughout the Midwest with similar systems.

"We've already seen an increase in these extreme weather events, especially in the Midwest and Northeast," said Don Wuebbles, a U. of I. climatologist who co-authored the Chicago study. "Chicago has had two 100-year storms in three years. Iowa has had three 100-year floods in less than 20 years. That's telling us something."

As more research points to a changing climate — including bigger rains followed by periods of drought — local officials are grappling with the likelihood that Chicago will need more solutions beyond the \$3 billion Deep Tunnel project, a subterranean network of giant sewer pipes and cavernous reservoirs that now isn't expected to be completed until 2029.

They aren't sure what those solutions are or how much they will cost, but officials at the Metropolitan Water Reclamation District and City Hall are hiring engineers to evaluate how the existing labyrinth of sewer pipes and flood-control reservoirs will handle the projected increase in big storms.

The Tribune reported last month that nearly four decades after taxpayers started paying for the Deep Tunnel, one of the nation's most expensive public works projects, billions of gallons of bacteria-laden sewage and storm runoff still frequently pour into the Chicago River and suburban waterways after storms.

Experts are finding the system can capture rainfall of less than two-thirds of an inch, a typical summer shower. Anything bigger than that forces a mix of stormwater and human and industrial waste out of overflow pipes into waterways and can cause sewage to back up into basements.

If a storm is big enough, officials allow the muck to flow into Lake Michigan, the source of drinking water for 7 million people in the city and suburbs. Long considered the sewage outlet of last resort, the lake has been hit harder during the last four years than it was in the previous two decades combined, records show.

A deluge that hit July 24 highlights what could soon happen more frequently.

In less than 24 hours, one of the most intense downpours in Chicago history swamped expressways, soaked basements and flooded entire neighborhoods. More than 8 inches of rain fell so hard and so fast that the Deep Tunnel couldn't handle the surge of stormwater.

When a noxious mix of runoff and sewage threatened to spill over the banks of the Chicago River and other streams, local sewer officials made a last-ditch attempt to relieve the pressure: They opened locks separating the river from Lake Michigan and dumped more than 6 billion gallons of disease-causing, beach-closing, fish-killing waste into the lake.

"There is no doubt that things are going to get tougher," said Marcelo Garcia, a U. of I. hydrological engineer who is studying the effectiveness of the Deep Tunnel. "I like to think of the entire system as a

giant bathtub. They built a really big bathtub to collect all this water, but it turns out it isn't nearly as big as what they need."

Most mainstream climate scientists agree that rising global temperatures are changing precipitation patterns because of increased evaporation and greater amounts of moisture in the air. There is greater uncertainty about how fast climate change is happening and how human disruption of natural climate cycles will affect day-to-day weather.

While sharp political differences remain among interest groups and elected officials about how critical it is to respond to climate change, or whether to respond at all, local planners around the nation are looking ahead and bracing for the worst.

Chicago, for instance, has developed an "action plan" that envisions capturing rainfall before it washes into sewers through small-scale "green infrastructure" projects. The city also pledged to reduce emissions of greenhouse gases by making buildings more energy efficient, using cleaner sources of energy and expanding mass transit.

"This is an ambitious plan that contains many important ideas that will ensure Chicago continues to distinguish itself as an environmental role model for the rest of the nation," Daley said when he announced the initiative in 2008.

As with many of the city's other green programs, the results have been mixed so far, in part because of funding problems.

The city has repaved 140 alleys with porous pavers or pervious concrete that allows rainwater to seep into the ground rather than drain into sewers. Daley also has pushed for green roofs that help sop up stormwater, including one atop McCormick Place that returns about 50 million gallons to Lake Michigan every year. But the projects remain small compared with the scope of the threat.

"Every time the city tears up a street for improvements, they should be thinking about porous pavement in the parking lanes and street trees and rain gardens," said Thomas Cmar, an attorney in the Chicago office of the Natural Resources Defense Council. "These things don't require a lot of money upfront but can pay huge dividends down the line."

Cmar's group recently commissioned a study of Chicago's sewers by Shaw Environmental, a global consulting firm. The findings echoed research by the Chicago Department of Water Management that found more than 40 percent of the city's sewers fail to handle rainfall greater than two-thirds of an inch, a worrisome problem that leads to flooded basements.

The analysts also concluded that aggressive use of green infrastructure, spread out in neighborhoods across the city, could slow surges of runoff after rainstorms and make it easier for sewers and the Deep Tunnel to work as designed.

Though top officials at the Water Reclamation District once resisted many of the proposed solutions, some are now embracing them.

"Sewer pipes and treatment plants can only do so much," said Debra Shore, a member of the district's

elected board. "The alternative is we just live with flooded basements and polluted waterways, but most people don't want that."