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As Sewers Fill, Waste Poisons Waterways

By CHARLES DUHIGG

It was drizzling lightly in late October when the midnight shift started at the Owls Head Water Pollution Control Plant, where much of Brooklyn's sewage is treated.

A few miles away, people were walking home without umbrellas from late dinners. But at Owls Head, a swimming pool's worth of sewage and wastewater was soon rushing in every second. Warning horns began to blare. A little after 1 a.m., with a harder rain falling, Owls Head reached its capacity and workers started shutting the intake gates.

That caused a rising tide throughout Brooklyn's sewers, and untreated feces and industrial waste started spilling from emergency relief valves into the Upper New York Bay and Gowanus Canal.

"It happens anytime you get a hard rainfall," said Bob Connaughton, one the plant's engineers. "Sometimes all it takes is 20 minutes of rain, and you've got overflows across Brooklyn."

One goal of the Clean Water Act of 1972 was to upgrade the nation's sewer systems, many of them built more than a century ago, to handle growing populations and increasing runoff of rainwater and waste. During the 1970s and 1980s, Congress distributed more than $60 billion to cities to make sure that what goes into toilets, industrial drains and street grates would not endanger human health.

But despite those upgrades, many sewer systems are still frequently overwhelmed, according to a New York Times analysis of environmental data. As a result, sewage is spilling into waterways.

In the last three years alone, more than 9,400 of the nation's 25,000 sewage systems — including those in major cities — have reported violating the law by dumping untreated or partly treated human waste, chemicals

and other hazardous materials into rivers and lakes and elsewhere, according to data from state environmental agencies and the Environmental Protection Agency.

But fewer than one in five sewage systems that broke the law were ever fined or otherwise sanctioned by state or federal regulators, the Times analysis shows.

It is not clear whether the sewage systems that have not reported such dumping are doing any better, because data on overflows and spillage are often incomplete.

As cities have grown rapidly across the nation, many have neglected infrastructure projects and paved over green spaces that once absorbed rainwater. That has contributed to sewage backups into more than 400,000 basements and spills into thousands of streets, according to data collected by state and federal officials. Sometimes, waste has overflowed just upstream from drinking water intake points or near public beaches.

There is no national record-keeping of how many illnesses are caused by sewage spills. But academic research suggests that as many as 20 million people each year become ill from drinking water containing bacteria and other pathogens that are often spread by untreated waste.

A 2007 study published in the journal Pediatrics, focusing on one Milwaukee hospital, indicated that the number of children suffering from serious diarrhea rose whenever local sewers overflowed. Another study, published in 2008 in the Archives of Environmental and Occupational Health, estimated that as many as four million people become sick each year in California from swimming in waters containing the kind of pollution often linked to untreated sewage.

Around New York City, samples collected at dozens of beaches or piers have detected the types of bacteria and other pollutants tied to sewage overflows. Though the city's drinking water comes from upstate reservoirs, environmentalists say untreated excrement and other waste in the city's waterways pose serious health risks.

A Deluge of Sewage

"After the storm, the sewage flowed down the street faster than we could move out of the way and filled my house with over a foot of muck," said Laura Serrano, whose Bay Shore, N.Y., home was damaged in 2005 by a

sewer overflow.

Ms. Serrano, who says she contracted viral meningitis because of exposure to the sewage, has filed suit against Suffolk County, which operates the sewer system. The county's lawyer disputes responsibility for the damage and injuries.

"I had to move out, and no one will buy my house because the sewage was absorbed into the walls," Ms. Serrano said. "I can still smell it sometimes."

When a sewage system overflows or a treatment plant dumps untreated waste, it is often breaking the law. Today, sewage systems are the nation's most frequent violators of the Clean Water Act. More than a third of all sewer systems — including those in San Diego, Houston, Phoenix, San Antonio, Philadelphia, San Jose and San Francisco — have violated environmental laws since 2006, according to a Times analysis of E.P.A. data.

Thousands of other sewage systems operated by smaller cities, colleges, mobile home parks and companies have also broken the law. But few of the violators are ever punished.

The E.P.A., in a statement, said that officials agreed that overflows posed a "significant environmental and human health problem, and significantly reducing or eliminating such overflows has been a priority for E.P.A. enforcement since the mid-1990s."

In the last year, E.P.A. settlements with sewer systems in Hampton Roads, Va., and the east San Francisco Bay have led to more than $200 million spent on new systems to reduce pollution, the agency said. In October, the E.P.A. administrator, Lisa P. Jackson, said she was overhauling how the Clean Water Act is enforced.

But widespread problems still remain.

"The E.P.A. would rather look the other way than crack down on cities, since punishing municipalities can cause political problems," said Craig Michaels of Riverkeeper, an environmental advocacy group. "But without enforcement and fines, this problem will never end."

Plant operators and regulators, for their part, say that fines would simply divert money from stretched budgets

and that they are doing the best they can with aging systems and overwhelmed pipes.

New York, for example, was one of the first major cities to build a large sewer system, starting construction in 1849. Many of those pipes — constructed of hand-laid brick and ceramic tiles — are still used. Today, the city's 7,400 miles of sewer pipes operate almost entirely by gravity, unlike in other cities that use large pumps.

New York City's 14 wastewater treatment plants, which handle 1.3 billion gallons of wastewater a day, have been flooded with thousands of pickles (after a factory dumped its stock), vast flows of discarded chicken heads and large pieces of lumber.

When a toilet flushes in the West Village in Manhattan, the waste runs north six miles through gradually descending pipes to a plant at 137th Street, where it is mixed with so-called biological digesters that consume dangerous pathogens. The wastewater is then mixed with chlorine and sent into the Hudson River.

Fragile System

But New York's system — like those in hundreds of others cities — combines rainwater runoff with sewage. Over the last three decades, as thousands of acres of trees, bushes and other vegetation in New York have been paved over, the land's ability to absorb rain has declined significantly. When treatment plants are swamped, the excess spills from 490 overflow pipes throughout the city's five boroughs.

When the sky is clear, Owls Head can handle the sewage from more than 750,000 people. But the balance is so delicate that Mr. Connaughton and his colleagues must be constantly ready for rain.

They choose cable television packages for their homes based on which company offers the best local weather forecasts. They know meteorologists by the sound of their voices. When the leaves begin to fall each autumn, clogging sewer grates and pipes, Mr. Connaughton sometimes has trouble sleeping.

"I went to Hawaii with my wife, and the whole time I was flipping to the Weather Channel, seeing if it was raining in New York," he said.

New York's sewage system overflows essentially every other time it rains.

Reducing such overflows is a priority, city officials say. But eradicating the problem would cost billions.

Officials have spent approximately $35 billion over three decades improving the quality of the waters surrounding the city and have improved systems to capture and store rainwater and sewage, bringing down the frequency and volume of overflows, the city's Department of Environmental Protection wrote in a statement.

"Water quality in New York City has improved dramatically in the last century, and particularly in the last two decades," officials wrote.

Several years ago, city officials estimated that it would cost at least $58 billion to prevent all overflows. "Even an expenditure of that magnitude would not result in every part of a river or bay surrounding the city achieving water quality that is suitable for swimming," the department wrote. "It would, however, increase the average N. Y.C. water and sewer bill by 80 percent."

The E.P.A., concerned about the risks of overflowing sewers, issued a national framework in 1994 to control overflows, including making sure that pipes are designed so they do not easily become plugged by debris and warning the public when overflows occur. In 2000, Congress amended the Clean Water Act to crack down on overflows.

But in hundreds of places, sewer systems remain out of compliance with that framework or the Clean Water Act, which regulates most pollution discharges to waterways. And the burdens on sewer systems are growing as cities become larger and, in some areas, rainstorms become more frequent and fierce.

New York's system, for instance, was designed to accommodate a so-called five-year storm — a rainfall so extreme that it is expected to occur, on average, only twice a decade. But in 2007 alone, the city experienced three 25-year storms, according to city officials — storms so strong they would be expected only four times each century.

"When you get five inches of rain in 30 minutes, it's like Thanksgiving Day traffic on a two-lane bridge in the sewer pipes," said James Roberts, deputy commissioner of the city's Department of Environmental Protection.

Government's Response

To combat these shifts, some cities are encouraging sewer-friendly development. New York, for instance, has instituted zoning laws requiring new parking lots to include landscaped areas to absorb rainwater, established a tax credit for roofs with absorbent vegetation and begun to use millions of dollars for environmentally friendly infrastructure projects.

Philadelphia has announced it will spend $1.6 billion over 20 years to build rain gardens and sidewalks of porous pavement and to plant thousands of trees.

But unless cities require private developers to build in ways that minimize runoff, the volume of rain flowing into sewers is likely to grow, environmentalists say.

The only real solution, say many lawmakers and water advocates, is extensive new spending on sewer systems largely ignored for decades. As much as $400 billion in extra spending is needed over the next decade to fix the nation's sewer infrastructure, according to estimates by the E.P.A. and the Government Accountability Office.

Legislation under consideration on Capitol Hill contains millions in water infrastructure grants, and the stimulus bill passed this year set aside $6 billion to improve sewers and other water systems.

But that money is only a small fraction of what is needed, officials say. And over the last two decades, federal money for such programs has fallen by 70 percent, according to the New York State Department of Environmental Conservation, which estimates that a quarter of the state's sewage and wastewater treatment plants are "using outmoded, inadequate technology."

"The public has no clue how important these sewage plants are," said Mr. Connaughton of the Brooklyn site. "Waterborne disease was the scourge of mankind for centuries. These plants stopped that. We're doing everything we can to clean as much sewage as possible, but sometimes, that isn't enough."