



America's Decaying Water Infrastructure

By Samuel Greengard

TROUBLE

BELOW

Work crews repair a broken water main at 5th Avenue and 19th Street in New York City.

AP PHOTO/LYNSAY ADDARIO

small feat. And even if a consensus can be reached, finding a sustainable approach—one that doesn't depend on the uncertainty of government appropriations—is even more problematic.

Whatever happens, one truth is clear: Decisions made now will have a profound influence on the future. As evidenced by last summer's Minneapolis bridge collapse and the Manhattan steam pipe explosion, potential problems can quickly reach catastrophic heights, especially if left unchecked.

"We're not facing a crisis now, but we could face a crisis if we don't act soon," says Peter Cook, executive director of the National Association of Water Companies (NAWC), a Washington, D.C.-based organization that represents the private water service industry, including drinking water and wastewater utilities. "Every year we delay, the potential for a serious problem grows."

An Age-Old Problem

The problem is that the majority of the water treatment and delivery systems in the United States were built so long ago that an entire generation hasn't had to face building new systems or dealing with expensive upgrades and repairs. It's simply not within their realm of consciousness. As a result, funding has lagged. The federal government has cut back significantly on its investment in local water infrastructure. What was once a flood of federal dollars has, in recent years, turned into a trickle. Funding for the State Revolving Fund (SRF) program, for example, which is the principal federal funding vehicle for wastewater projects, declined from \$1.26 billion in F.Y. 2004 to \$841.5 million in F.Y. 2007 (the most recently enacted level). Thirty-five years after the passage of the Clean Water Act, funding for water projects now amounts to an annual battle on Capitol Hill.

And the fallout from that is felt from coast to coast. A recent engineering industry report rates the overall physical condition of many of the nation's 16,000 wastewater facilities as poor. Many of these

America is facing serious problems related to maintaining aging water systems," says Larry A. Roesner, professor of civil and environmental engineering at Colorado State University (CSU). "The infrastructure is slowly crumbling, and the price tag for fixing things is rising."

In 2003, the U.S. Environmental Protection Agency (EPA) estimated that the gap between spending and needed investment in wastewater treatment infrastructure over the next 20 years will reach \$122 billion. For drinking water treatment, the gap could eclipse \$102 billion. Some estimates run as high as \$500 billion, and

that's not including operating expenses and maintenance costs. Infrastructure, much of it built between 50 and 100 years ago, is now at risk of deteriorating to the point that public safety and health are at risk.

"Repairing and improving the water infrastructure is one of the most significant challenges America faces," says Benjamin Grumbles, assistant administrator for water at the EPA. "It's a top priority. But because there's no single solution, or no one agency that oversees the nation's utilities and facilities, it is a difficult challenge to address."

Indeed, getting elected officials, engineers and other stakeholders to agree on such a breadth of issues, from water treatment to safety to distribution, is no

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NILAKSH KOTHARI
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facilities are nearing the end of their useful lives, and older systems suffer from chronic overflows during major storms. The result: Raw sewage often contaminates U.S. surface waters, including rivers, lakes and oceans. But the problem doesn't end there. Water treatment plants, pipes, control basins, pumping stations and other infrastructure are at risk of failing. More than 200,000 water mains break each year in the United States.

Food & Water Watch, a nonprofit environmental and consumer organization based in Washington, D.C., reports that a majority of states are facing current and projected wastewater infrastructure needs far out of line with available funding. As a proportion of overall wastewater infrastructure spending, federal support, which accounted for 78 percent of funding in 1978, makes up just 3 percent today. Old infrastructure is often unable to handle increased capacity demands, breaking down and releasing untreated sewage. Combined sewer overflows from failing and insufficient infrastructure wreak environmental havoc on a massive scale—23,000 to 75,000 such overflows occur each year, spilling out 1.26 trillion gallons of untreated sewage and incurring \$50.6 billion in cleanup costs.

“The health implications are signifi-

cant,” says Jessica Roach, senior organizer for Food & Water Watch.

Evidence that the infrastructure is crumbling isn't difficult to find. In Boston in late 2006, a series of unexplained water main ruptures flooded city streets, disrupting rush-hour traffic and hurting area businesses. Similar water main breaks, causing flooding and other disruptions, have been reported in places such as Chicago and Arlington, Va. After a water main break in the Florida Keys recently, citizens were ordered to boil their drinking water before consuming it due to risk of contamination.

By 2002, Atlanta's water quality had become so bad that residents in some neighborhoods reported taking baths in water the color of iced tea. The same year, television and radio stations began reporting “boil water” advisories when pathogen levels exceeded health standards. Other cities, including Santa Monica, Calif., and Norman, Okla., have been forced to deal with contaminated wells and groundwater pollution.

Addressing the problem won't be easy. According to the American Water Works Association (AWWA), it costs approximately \$6,300 per household to replace water mains at larger utilities. Factor in water treatment plants, pumps and other systems, and the price tag spikes to just under \$10,000 per household, on average.

But the problem is even more complicated than that. “We need to address more than aging infrastructure,” explains Nilaksh Kothari, president of AWWA. “We have to figure out how to deal with expanding populations, growing demand, new regulations and security issues.”

U.S. engineering firms already are rolling up their sleeves to meet these challenges. But more help still is needed. According to industry consulting firm FMI Corp., the water supply and sewage and wastewater construction market will eclipse \$43.6 billion by 2011.

Industry analysis firm ZweigWhite says U.S. water and wastewater treatment facilities will require more than \$1 trillion in upgrades over the next 20 years.

In the Flow

Changing the way America views and values water infrastructure could prove challenging. Finding sustainable solutions for funding will require a willingness to confront the problem and find new and creative ways to address political, social and practical issues. Although the EPA has identified water infrastructure as one of its top priorities, and almost every utility supports the concept, there's little consensus about how to bring water facilities up to 21st-century standards.

Rather than increased funding, the EPA says effective water management is needed, including:

- Improved management of the water and wastewater infrastructure through better system inventories, asset management and capital improvement programs. The EPA reportedly is working with utilities to identify and implement best practices.
- Full-cost pricing that reflects the actual value of water and the real price for infrastructure—rather than government-subsidized pricing. “The lack of full-cost pricing contributes to the neglect and deterioration of infrastructure, Clean Water Act violations and a mindset that doesn't focus on conservation,” says Grumbles.

Replacing and improving the water infrastructure is one of the most significant challenges America faces.

BENJAMIN GRUMBLES
U.S. EPA



- Conservation and efficiency is critical to helping consumers and utilities save water and reduce the funds needed for new and larger facilities. The EPA has modeled its new incentive-based Water Sense program, which supports the use of water-conserving technologies and products, after its highly successful Energy Star program, which was created to promote energy conservation through smart use and education as opposed to increased government regulation.
- Better management of watersheds, including agricultural runoff and storm drain runoff. “These programs can reduce costs for wastewater utilities downstream by preventing pollution upstream,” Grumbles explains. The EPA also supports a credit-trading program that would create economic market-based incentives for utilities and agencies within a watershed area. Grumbles says such a system would accelerate the restoration of watersheds throughout the United States.

Other organizations, such as AWWA, for example, say the answer to the nation's water woes is dependent upon wholesale changes at the local, state and federal levels, including research and development dollars for new technologies, an increased emphasis on education and better state and federal programs that streamline grants, loans and financing. Cutting red tape also is a priority. According to AWWA, the use of alternative procurement methods and a design-build process for infrastructure procurement trims construction costs by 20 percent to 40 percent. The concept has been used successfully in several instances, though procurement laws in many states and localities often impede the design-build process.

CSU's Roesner says policymakers, utilities and consumers also must re-evaluate common assumptions and standard practices. “We must think outside the box and look at how we can reduce the need for expensive centralized water treatment facilities,” he says. This includes the use of gray-water (nonindustrial wastewater) for non-potable uses, such as toilets and irrigation. In new housing developments, he says,

Water Shortage

Droughts and water shortages are nothing new. Indeed, concerns are mounting over the ability to deliver water to large segments of the population. Rapid urban growth, particularly in the arid Southwest, aging infrastructure and global climate change all are contributing to what might one day amount to the perfect drought. “We are seeing a scarcity of water in an increasing number of locations,” says Colorado State University civil and environmental engineering professor Larry Roesner.

Florida is grappling with a scarcity of water and will almost certainly face problems in dealing with its projected population growth. Georgia has experienced a severe drought that threatens the water supply for millions of residents. The Great Lakes are shrinking; Lake Ontario has dropped seven inches in the past year. And, in the western United States, the Rocky Mountains and the Sierra Nevada range—major sources of water for millions—are seeing snow melt earlier and faster every year.

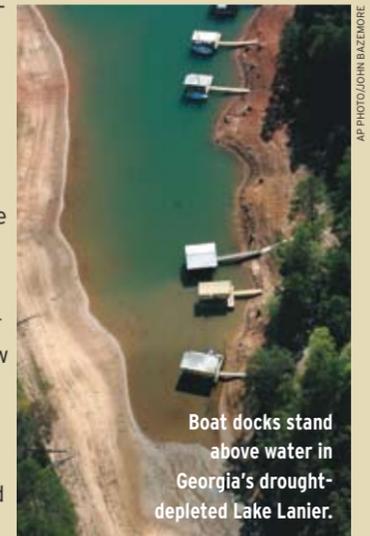
Utilities from coast to coast are employing a number of strategies to head off a crisis. More than 1,000 desalination plants already exist in the United States and more are planned—though operating these facilities is expensive and energy-intensive. Water reuse and reclamation is on the rise. Florida, for example, reuses 240 billion gallons annually—though it's not nearly enough to offset demand. Utilities everywhere are beginning to recognize the need to improve conservation. Says Roesner: “There is enormous waste in both agriculture and urban areas. We need to place a greater emphasis on landscaping that minimizes the need for water.”

What it comes down to in the end, says the Environmental Protection Agency's Benjamin Grumbles, is good decision-making. “Ultimately, we must make smart water choices. We must move toward greater sustainability.”

builders should consider dual-plumbed structures—structures that employ separate water systems for recycled water and potable water—which reportedly can cut the demand for treated water by 50 percent.

Likewise, Roesner says, it's important to rethink and re-examine storm drain management. “We need to find ways to design drainage facilities so that we preserve streams in urbanized watersheds,” he says. In many instances, the cost and problems associated with downstream pollution—as a result of fertilizers, pharmaceuticals and other contaminants in the water supply—add to infrastructure costs, as well as health and public safety concerns. In addition, he says, it's important to manage aquifers and ground water more effectively. “A lot of incremental improvements add up to a significant gain.”

Peter Carlson, a lobbyist for the water industry, says the litany of federal, state and



Boat docks stand above water in Georgia's drought-depleted Lake Lanier.

AP PHOTO/JOHN BAZEMORE

local agencies that oversee different aspects of water distribution and infrastructure makes it tough to spur changes. “The lack of communication between federal agencies makes it difficult to address big-picture infrastructure issues,” he says. “That's why we're now seeing legislation in Congress to create water commissions and infrastructure commissions. There's a recognition that something has to be done.”

In testimony submitted to the House Transportation and Infrastructure Committee late last year, ACEC President Dave Raymond called for a renewed commitment to the nation's water infrastructure.

“The need for increased investment is tremendous and has been well-documented as our nation suffers from rapidly deteriorating water infrastructure systems, and a \$300 billion to \$500 billion shortfall in necessary funding over the next 20 years,” he said.

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LARRY ROESNER

COLORADO STATE UNIVERSITY



“Congress has considered a number of bills in the last several years to alleviate the water infrastructure funding problem,” added Raymond. “While they represented good steps forward, little has been enacted into law. In the meantime, the federal government has increasingly relied upon states, local governments and utilities to finance the funding gap. It is time for the federal government to resume its shared responsibility for clean water by making a significant commitment to help remedy the problems associated with our nation’s water infrastructure.”

ACEC is actively working with Water Infrastructure Now (WIN), a broad industry, environmental, municipal and labor coalition, to advocate for passage of a multi-year bill that reauthorizes the clean water SRF, mandates the use of qualifications-based selection (QBS) and includes language to study the creation of a dedicated water trust fund. ACEC and its WIN coalition partners continue to participate in meetings with key Senate committee staff drafting the Senate version of an ACEC-supported House bill (H.R. 720), which passed the House in March, 2007. ACEC also is conducting outreach and educational meetings about funding needs and QBS with the relevant House and Senate committees, particularly the Senate Environment and Public Works Committee.

Finding Financial Solutions

Funding needed infrastructure improvements is never easy. But there is hope. In November, for example, the U.S. Senate overrode a presidential veto of the Water

Resources Development Act and authorized \$23 billion for 900 water projects, including the rebuilding of facilities along the Gulf Coast that were damaged by Hurricane Katrina, restoration of the Everglades, improvements along the Great Lakes and flood-control projects nationwide. Congress is now weighing several other bills that would fund future projects and create ongoing funding.

Some, like Jessica Roach at Food & Water Watch, would like a trust fund to be established so that dedicated and sustainable funding is available. “A clean water trust fund would take water funding out of that political process and eliminate the annual battle over appropriations,” she says. A fund could be financed through beverage taxes, fees on chemicals that wind up in waterways and other criteria. “The key is to figure out a way to impose a fee on people or companies that degrade our water sources or benefit from them,” she says.

In Washington, the battle over funding has reached its boiling point. Though some organizations, such as Food & Water Watch, favor the conventional approach of funding projects primarily at the federal level, the EPA and several other organiza-

tions, including AWWA and NAWC, subscribe to a different approach.

NAWC’s Cook says, “Society doesn’t subsidize any of our other utilities: electrical, telephone or gas. Customers pay regular rates. So why should water be any different?” He and industry insiders say that unsubsidized rates likely would jump 3 percent to 10 percent, but also would force utilities to be more accountable.

In the end, the battle over water infrastructure remains a murky issue. Although there’s growing recognition that something needs to be done about the nation’s aging infrastructure, the question is whether elected officials, utility operators and the public can move swiftly enough to avoid a catastrophe. “America must make water quality a priority,” says Ken Kirk, executive director of the National Association of Clean Water Agencies. “The American people are going to continue to demand a very high level of water quality. Improvements are going to cost a lot of money, but they are absolutely essential to our way of life.” ■

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