Sticker Shock and the Nation's Drinking Water Infrastructure Challenges

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Over five years have passed since I wrote a 2-part series of articles titled "Pain at the Pipe." Part 1 focused on *why* the US should respond to systemic drinking water infrastructure needs, while Part 2 addressed the *consequences* of failing to address those needs. Since then, drinking water infrastructure-related needs, as well as public health failures like Flint, Michigan, continue to make the news nationally and regionally, and have been highlighted in recent WQ&HC perspectives. In this article, I would like to focus on recent estimates of the magnitude and cost of the problem, and share some ideas regarding the need to establish realistic priorities, keeping in mind the axiom: *If everything is a priority, nothing is a priority.*

Water main break
Photo credit: *EPA.gov*

Size of the Problem

There are over 150,000 active public drinking water systems in the US that collectively deliver treated water through an estimated 1.2 million miles of distribution pipes. But many of those pipes were laid-down in the early to mid-20th century, contributing to an estimated 240,000 water main breaks per year.[1] Considering all sources of system losses, particularly in aging and largely unregulated distribution systems (i.e., "premise plumbing"), **an estimated 6 billion gallons of treated drinking water are lost every day.** And if utility pipe replacement rates continue at a pace of one-half of one percent (0.5%) per year, it will take an estimated 200 years to replace the system—nearly double the effective lifespan (75 to 100 years) of the pipes. Given this bleak assessment, it is not surprising that the American Society of Civil Engineers 2017 Infrastructure Report Card assigned a "D" grade for our drinking water infrastrucutre (and a "D+" for wastewater)—based on the physical condition and investments needed for improvement.

Cost of the Problem

[1] American Society of Civil Engineers. 2017. Infrastructure Report Card: Drinking Water. http://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf.

"As pipes, pumps, and plants reach the end of their expected lifespan, water infrastructure capital needs are growing rapidly, yet investment in water infrastructure is not keeping pace."[2] According to a 2012 American Water Works Association report, an estimated $1 trillion was going to be necessary to maintain service levels to meet a growing population over the next 25 years.[3] For comparison, a 2013 US Environmental Protection Agency report to Congress found that the "nation's drinking water utilities need $384.2 billion in infrastructure investments over the next 20 years for thousands of miles of pipe as well as thousands of treatment plants, storage tanks, and other key assets to ensure the public health, security, and economic well-being of our cities, towns, and communities."[4] When needed infrastructure costs are measured in the hundreds of billions of dollars, prioritization is a given. Unfortunately, there is growing concern that the new administrations's well-publicized call for $1 trillion in infrastructure spending is leaving out water, such as by seeking to eliminate the Department of Agriculture's rural water and waste disposal loan and grant program with an annual budget of almost $500 million.

Priorities and Confronting the Problem

Drinking water is often cited as the 2nd most essential human need exceeded only by the air we breathe. Coupling this with use of water for cleanliness, personal hygiene, food preparation, sanitation, heating/cooling, fire protection, commerce/manufacturing, and myriad other uses, the importance of the community water system infrastructure is patently obvious. The coverage of the United States with municipal and rural water systems and the quality of the water they provide remain one of our country's greatest public health achievements. However, the infrastructure of these essential systems face a growing array of age-related challenges that, if left unaddressed, will only grow worse, become more expensive, and pose increasing risks to public health. Highly publicized episodes such as the aforementioned water quality problems in Flint, Michigan, are harbingers of situations that will increasingly erupt if these challenges are not confronted and resolved in a timely manner.

Federal and state government involvement for the past five decades has been concentrated upon drinking water quality and the provision of *new* water infrastructure in unserved areas—very little has been devoted to upgrading and replacing *existing* physical facilities.

I believe that the time has arrived to review some fundamental water use practices and precepts, including the following:

1. The percentage of treated water that is actually used for human consumption is quite small. The great bulk satisfies other purposes such as lawn watering, fire protection, flushing of toilets, and washing cars—and far too much is lost through pipe leakage and wasteful practices. Does it

[2] Value of Water Campaign. 2017. The Economic Benefits of Investing in Water Infrastructure. http://thevalueofwater.org/sites/default/files/Economic%20Impact%20of%20Investing%20in%20Water%20Infrastructure_VOW_FINAL_pages.pdf.
[3] American Water Works Association. 2012. Buried No Longer: Confronting America's Water Infrastructure Challenge. http://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf.
[4] US Environmental Protection Agency. 2013. Drinking Water Infrastructure Needs Survey and Assessment: Fifth Report to Congress. https://www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf.

make sense that the water used for such purposes be compelled to comply with stringent, consumption-based drinking water quality standards?

2. Should the users of treated water provide the ultimate sole source of the funds needed for construction, operation, maintenance, repair, upgrading, and replacement of the water system infrastructure, or should these needs be subsidized by others? If subsidized, what systems should be subsidized and by whom?
3. Accurate and transparent cost-and risk-benefit analyses should be performed *prior* to making drinking water standards more stringent or inclusive.

Materials, equipment, technology, and skills are already available to resolve this systemic issue, but its resolution must be given the high priority it deserves to enable the mobilization of the funds required.

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