THE CLEAN WATER CALLING

How Innovation and Collaboration Changed the Water Sector's History, and Ensures Its Future

BY PETER GREVATT, PhD CEO, THE WATER RESEARCH FOUNDATION

The US water sector has delivered remarkable public health and environmental benefits to communities of all sizes through the implementation of dramatic innovations in drinking water and wastewater treatment, stormwater management, and water reuse. Dating back to the introduction of chlorination of drinking water supplies early in the 20th century, the sector has contributed to some of the greatest improvements in public health and environmental outcomes in modern history.

As an eight-year-old growing up on the east side of Cleveland, the national ignominy of the Cuyahoga River Fire in June of 1969—where the river was so grievously polluted it caught fire—played out in my own community. The Cuyahoga River and large sections of Lake Erie were lifeless, choked



by pollution released from outfalls and non-point sources on a largely abandoned shoreline. While the Cuyahoga River was perhaps among the most notorious examples of the decay of our waterways, it was far from unique. Across the country, similar scenes were commonplace—some even including Cuyahoga-like flames. A young resident could be forgiven for concluding that this was what urban rivers would always look like in America.

Contrast this with the images of water bodies in these same locations today—families playing on the shoreline, millennials running and cycling on shoreline bike paths, bright new developments bringing economic revitalization back to our cities. While this dramatic turn-around required the collaboration of many, this miracle could not have occurred without the extraordinary leadership,



vision, commitment, and innovation within the water sector.

The passage of the Clean Water Act (CWA) in 1972 and the Safe Drinking Water Act (SDWA) in 1974 established powerful standards and goals, and provided extensive financial resources for the protection and restoration of our nation's waters, as well as the protection of our drinking water supplies. Recent research from the University of California, Berkeley and Iowa State University—the largest analysis of water pollution data since the passage of the CWA—showed a 12% increase in fishable waterbodies and measurable improvements in 25 water quality indicators. Similarly, microbial risks associated with drinking water have been reduced by more than three orders of magnitude, primarily due to water treatment advances such as disinfection and filtration. These advances have occurred even as our nation has experienced continued population growth.

THE MOMENT

As we arrive at the 50th anniversary of the Cuyahoga River fire and approach the 50th anniversaries of the CWA and SDWA, we are again facing a threshold moment for the water sector. While we have achieved extraordinary improvements in public health and environmental protection, significant threats line the road ahead. Rising costs, aging infrastructure, emerging constituents of concern, and excess nutrients are presenting increasing challenges for the sector and the communities we serve.

In addition, we are grappling with a rapidly changing climate and dramatic changes in water resource availability. An analysis of 14 years of data from the NASA GRACE satellite shows that water availability patterns are shifting rapidly and that water security—access to water at a sufficient quantity and quality to support daily life—is more threatened than previously thought.

This moment demands a renewed commitment to innovation and collaboration within our sector. We will need to reach out to a more expansive stakeholder base and embrace a more holistic water resource management approach in order to establish resilient water systems and continue to support thriving communities. We are in an unprecedented time of technological advances and customer awareness and demands. The sector will certainly realize the greatest success by demonstrating a commitment to research and decisions informed by the most credible science, in conjunction with a willingness to embrace innovative approaches to water resource management.

Advances in energy-efficient wastewater treatment have proven the benefits of this science-based, collaborative approach. Energy-neutral wastewater treatment is already occurring, and research has demonstrated the potential to generate energy through wastewater treatment. However, moving beyond energy neutrality to energy-positive wastewater treatment will require a more deliberate approach to resource management at the utility and community levels, necessitating advances in innovative technologies such as hydrothermal liquefaction and co-digestion practices, and partnerships across multiple sectors, including electricity, oil, agriculture, and the food and beverage industry. The Water and Electric Utility Integrated Planning, a project of the Water Research Foundation (WRF), has illustrated how water and electric utilities leverage their interdependence to collaborate on strategic and project-level integrated planning efforts to decrease treatment costs and their carbon footprints while increasing resilience.

The sector will certainly realize the greatest success by demonstrating a commitment to research and decisions informed by the most credible science, in conjunction with a willingness to embrace innovative approaches to water resource management.



the water sector (e.g., to agricultural interests), but also evaluating different methods for controlling nutrients at the watershed level, such as incorporating resource recovery, water reuse, and stormwater best management practices.

Integrated approaches like these are contributing to a cultural shift within the sector. Utilities are working to meaningfully engage diverse community partners, examining legacy governance structures, and leveraging big data to improve decision-making. WRF has a rich portfolio of research focusing on many of these subjects, which include establishing strong relationships, the water workforce, and innovation.

Subsequently, WRF and the Water Environment Federation have partnered to establish the Leaders Innovation Forum for Technology (LIFT). This collaborative program accelerates the use of innovative solutions to address emerging challenges facing the water sector. For example, the LIFT platform enabled an innovative collaboration between the Metropolitan Water Reclamation District of Greater Chicago and Denver's Metro Wastewater Reclamation District to pilot a side-

THE SHIFT

WRF is also applying an integrated water resources management approach to understanding opportunities for improved nutrient management in watersheds, for which WRF has a body of nutrient research that spans more than 30 years and 200 projects. This approach means not only expanding relationships to stakeholders beyond



stream de-ammonification process resulting in cost savings, efficiencies, and knowledge transfer.

WRF is leading the way in addressing the science for all water. It is essential that the sector similarly manage all water in an integrated fashion. It is a time of great excitement and great opportunity. Although future challenges are significant, WRF will continue to lead by providing the robust science and innovative approaches that enable the sector to remain at the forefront of public health and environmental protection. There is no greater mission or calling.

REFERENCES

(1) Keiser, D. A., and J. S. Shapiro. 2019. "Consequences of the Clean Water Act and the Demand for Water Quality." *The Quarterly Journal of Economics*, Volume 134, Issue 1, February 2019, Pages 349–396. https://doi.org/10.1093/qje/qjy019.

(2) Seidel, C., A. Ghosh, G. Tang, S. A. Hubbs, R, Raucher, and D. Crawford-Brown. 2014. *Identifying Meaningful Opportunities for Drinking Water Health Risk Reduction in the United States.* Project 4310. Denver, Colo.: Water Research Foundation. Retrieved from http://www.waterrf.org/Pages/Projects.aspx?PID=4310.

(3) Famiglietti, J. 2019. "A Map of the Future of Water." Accessed May 2, 2019. https:// trend.pewtrusts.org/en/archive/spring-2019/a-map-of-the-future-of-water.

(4) Tarallo, S., and P. Kohl. 2015. A Guide to Net-Zero Energy Solutions for Water Resource Recovery Facilities. Project ENERIC12. Alexandria, Va.: Water Environment Research Foundation. Retrieved from: https://www.werf.org/a/ka/Search/ResearchProfile. aspx?ReportId=ENERIC12.

(5) Conrad, S. A., S. J. Kenway, and M. Jawad. 2017. Water and Electric Utility Integrated Planning. Project 4469. Denver, Colo.: Water Research Foundation. Retrieved from http://www.waterrf.org/Pages/Projects.aspx?PID=4469.