

## Drinking Water and Wastewater Infrastructure Challenges in West Virginia

Access to safe and reliable drinking water and wastewater infrastructure are critical needs across West Virginia. The recent “West Virginia Infrastructure Survey” led by West Virginia University (WVU) researchers Emily Garner (Wadsworth Department of Civil Engineering) and Jamie Shinn (Department of Geology and Geography) asked West Virginia water sector



Figure 1: Students collecting water samples at a rural wastewater treatment plant.

professionals to assess water infrastructure challenges that can be addressed through policy actions. In light of the recent Infrastructure Investment and Jobs Act, it is critical to understand key challenges in the state that hinder the ability of water utilities to provide safe drinking water and adequate wastewater treatment to residents across the state.

## Highlights

The results of the survey demonstrate that several key issues present widespread challenges to the operation and maintenance of drinking water and wastewater infrastructure across the state:

- Succession Planning and Staff Recruitment / Retention
- Maintenance of Aging Infrastructure
- Maintaining an Adequate Base of Ratepayers to Sustain Operations
- Asset Management and Planning for Capital Improvement

## Results

Participants completing the survey were professionals working in areas related to water infrastructure at local and county levels, and were identified through resources like online lists of floodplain managers and public service commission annual reports. A total of 536 professionals were contacted via email with a link to the survey and 92 people answered most or all questions (17% response rate). There were 44 of 55 West Virginia counties represented in the responses (80%). Respondents ranked a variety of water utility operations as either a strength or a challenge. Key challenges to drinking water infrastructure and utility operation are presented in Figure 3, with key challenges for wastewater infrastructure in Figure 4.

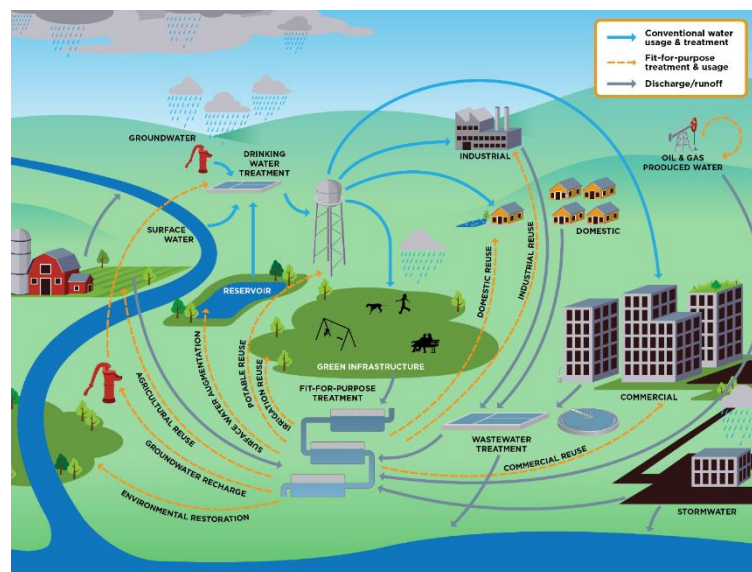


Figure 2: The urban water cycle demonstrates how drinking water and wastewater treatment are critical for many aspects of community well-being. Source: [U.S. Environmental Protection Agency](https://www.epa.gov/urbanwater)

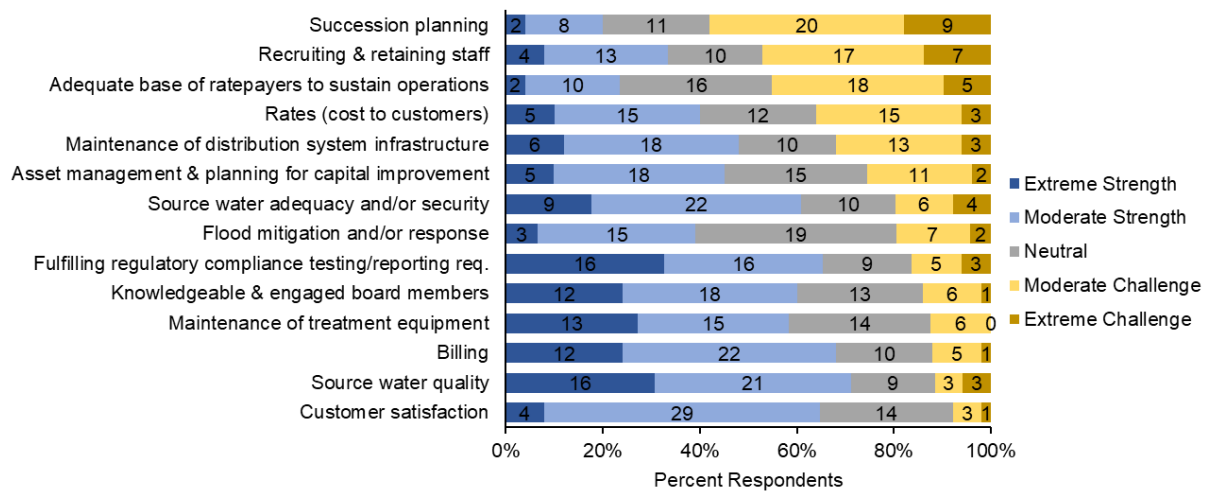


Figure 3: Challenges identified by respondents related to drinking water infrastructure and utility operations

### Succession Planning and Staff Recruitment / Retention

Succession planning, or planning for a retiring workforce, was identified as a key challenge in the water sector in West Virginia, with 58% of respondents ranking this as a challenge for drinking water systems and 50% of respondents identifying the issue as a challenge for wastewater utilities. Recruiting and retaining staff was also identified as a top challenge by 47% and 40% of respondents for drinking water and wastewater, respectively. Building a sustainable water workforce is of imminent importance, given that today's water workforce is widely nearing retirement age. As of 2016, the average age of water sector professionals was 56, with 38% over the age of 60.<sup>2</sup> The impacts of the aging water workforce are likely to affect rural communities operating small systems disproportionately due to the prevalence of systems operated by one or a few water professionals who possess a wealth of institutional knowledge that may not be formally documented. With 60% of operators in West Virginia being over 50 as of 2018,<sup>3</sup> this potential loss of knowledge and experience as those professionals retire could be particularly devastating without a strong pipeline to provide the next generation of trained water sector professionals. Training programs and resources to support transfer of institutional knowledge are needed to safeguard the ability of water utilities to continue serving their communities in the face of the growing shortage of water workers.

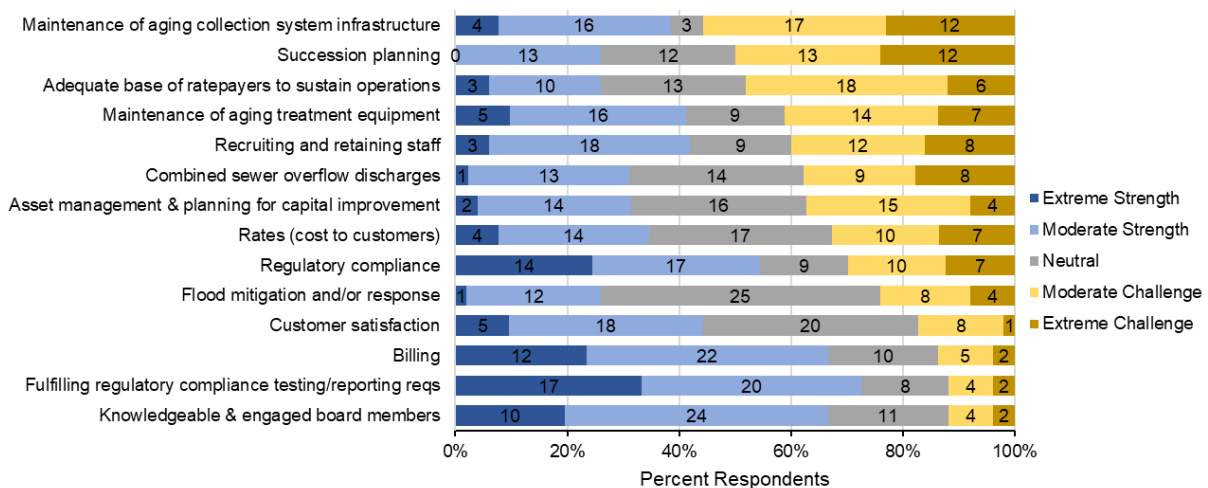


Figure 4: Challenges identified by respondents related to wastewater infrastructure and utility operations

## *Adequate Base of Ratepayers*

Maintaining an adequate base of ratepayers to sustain utility operations was identified as a challenge by 45% and 48% of respondents for drinking water and wastewater systems, respectively. Given that the historic concentration of energy extraction activities in West Virginia has diminished over time, significant loss of jobs and associated population exodus have left small water facilities struggling financially as their customer base shrinks and most of those who remain are strapped by fixed incomes. Correspondingly, setting appropriate rates to allow the utility to sustain operations is also seen as a key challenge for 36% and 33% of respondents for drinking water and wastewater systems, respectively. The dwindling population in the state is also problematic because many federal programs allocated funding for renewal of water infrastructure based on state population.

## *Maintenance of Aging Infrastructure*

Maintenance of aging infrastructure was also identified as a key challenge. Specifically, concerns centred around maintenance of distribution system infrastructure (32%) and maintenance of treatment equipment (13%) for drinking water systems, and maintenance of aging collection system infrastructure (56%) and maintenance of treatment equipment (41%) for wastewater systems. Much of the water infrastructure in the U.S. has exceeded its intended lifespan and the deterioration of distribution and collection system pipes is a critical challenge in protecting public health. The West Virginia Section of the American Society of Civil Engineers rates both the drinking water and wastewater infrastructure in the state with a report card with a rating of D.<sup>4</sup>

In West Virginia alone, water utilities are currently seeking roughly \$302 million to meet their drinking water infrastructure needs.<sup>4</sup> Nationally, over 35% of buried drinking water distribution pipes are at least 35 years old.<sup>5</sup> As a consequence of this degrading infrastructure, over six billion gallons of treated drinking water is lost each day due to leaking pipes.<sup>6</sup> In West Virginia, this problem is particularly extensive, with some systems in the state reporting over half of their treated drinking water being lost during distribution due to leaking pipes.<sup>4</sup> Remediating deteriorating underground infrastructure is challenging, but particularly so in West Virginia. Steep topography, shallow water tables, abundant surface water, and extensive pipe networks consisting of many miles of pipes to serve even small communities due to the low population density characteristic of many parts of the state make locating leaks extremely difficult, so leaks often go undetected and unrepaired. In addition to loss of revenue for water utilities associated with treating water that is never delivered to consumers, aging drinking water infrastructure is problematic because it can compromise drinking water quality. Pipe leaks and loss of pressure in drinking water pipes allow intrusion of soil and potentially harmful bacteria. These potential contamination events present a massive challenge for rural water systems. In 2013, the total coliform rule, a regulation aimed at identifying bacterial contamination in distribution systems, was the leading cause of violations to drinking water regulations for systems serving fewer than 10,000 people (i.e. small water systems), with a total of over 30,000 violations across the U.S.<sup>7</sup> In West Virginia, issues encountered during distribution of drinking water were the leading cause of deficiencies cited during sanitary surveys in small water systems.<sup>8</sup>

In wastewater systems, sewer collection networks in the state have experienced substantial decay over time. The state currently has 59 combined sewer systems which often discharge untreated waste to rivers and streams during conditions of heavy rainfall. These systems are expected to need \$1.2 billion to upgrade this infrastructure consistent with state and federal guidelines.<sup>4</sup> Management of these combined sewer overflow discharges were identified as a challenge by 38% of respondents.

Implementation of asset management is a key resource to facilitate maintenance of aging infrastructure and planning for capital improvement. 26% of respondents identified asset management and capital improvement planning a key challenge for drinking water utilities, and 37% identified this as a challenge for wastewater systems. Creating new resources to facilitate the mapping and management of water infrastructure can improve management of these extensive and aging systems.

## *Limitations*

The needs of each community represented in this survey are likely to be unique. In addition, many respondents identified a need for more instruction on grants and funding assistance. The ability of rural communities to prepare application materials to seek funding from the Infrastructure Investment and Jobs Act is a key concern that could prevent the state from fully benefiting from this legislation. In addition, a large portion of the state is not currently served by centralized drinking water and wastewater infrastructure.

Currently, 63% of the structures in West Virginia are served by public water utilities, while only 47% are served by a public sewer utility.<sup>1</sup> West Virginians who do not live in homes served by these public utilities may experience relevant challenges that are not represented in the results of this survey.

## References:

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