INSIGHT

Infrastructure and Rural Water: Solutions for now and planning for tomorrow

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On May 24, 2018, the U.S. Department of Agriculture (USDA) announced its plans to invest $256 million in 81 projects to improve water and wastewater infrastructure in rural areas in America. As USDA Assistant to the Secretary for Rural Development Anne Hazlett stated, “No matter what zip code you live in, infrastructure is a foundation for the quality of life and economic opportunity.” USDA is one of several important funding agencies for rural water systems throughout the U.S., so it is fitting for them to highlight the importance of water infrastructure.

Laying the foundation for water infrastructure

When looking at a rural water system, infrastructure is all the intakes, wells, treatment plants, storage tanks, pumps and pipes that make up the system. These pieces come together to deliver clean, dependable water to people who might otherwise not have access due to their geographic location.

The movement to build rural water system infrastructure and systems began approximately 60 years ago, as the U.S. Federal Government began focusing funding and regulations on water. The Safe Drinking Water Act (SDWA), which was authorized in 1974, directed the U.S.

Environmental Protection Agency (EPA) to set national standards for drinking water. The National Rural Water Association (NRWA) was founded in 1976 in response to the SDWA because many of the original EPA standards were written for and focused on large, metropolitan water utilities. This left smaller utilities and rural communities without the resources to meet those standards. Therefore, the NRWA and state-level associations were formed to help those smaller entities address that gap.

In addition to Rural Development, the Bureau of Reclamation is another federal agency that got involved in rural water projects starting in the mid 1980's. The projects they funded were through specific authorizations based on comprehensive rural water system planning documents. Many of the authorized projects were either specifically for or included native American tribes.

Tribal water treatment plant ground breaking

The current state of water infrastructure

In 2015, the United Nations reported that the world is likely to suffer a 40 percent shortfall in water by 2030 unless countries dramatically change their use of water resources. This highlights the increasing importance of responsible conservation of this natural resource. Yet, as water system infrastructure ages, water loss is a growing problem and leakage recovery has become an increasing priority. In fact, new standards for recovering non-revenue water have been developed and states such as Texas, Georgia and Wisconsin are beginning to require regular, comprehensive validated water audits. While water systems strive to be good stewards of our water resources, leak detection and the maintenance of aging pipe and other infrastructure will become increasingly important as systems plan for future needs.

According to a 2018 American Water Works Association report, renewal and replacement of infrastructure and financing for capital improvements top the list of water industry concerns for the fourth year running. This is an understandable concern as state and federal funding continues to decline.

Yet, despite limited funding, even today rural water systems and their related infrastructure are particularly economically important. For example, in regions that serve as agricultural and livestock bases, large dairies and confinement operations would not be possible without the presence of rural water. These industries are key to the economies of many rural areas. Other rural water districts are essential in meeting the growing demands of suburbia. Large systems such as Washington Co. RWD No. 3, north of Tulsa, OK, serve more than 10,000 residential customers, many in high-density subdivisions. As the population density increases, large commercial customers are attracted and water districts are challenged with meeting municipal-level service, such as 1,000 to 2,000 gpm fire flows. Such demands pose great stresses on existing transmission and storage facilities. The growth also fuels legal complexities related to municipal boundaries and a water district's service obligations if they wish to defend their boundaries.

Given the economic importance of rural water systems, it is importance to maintain a consistent water supply to users. However, that is not necessarily an easy task. These rural water systems own and operate water intakes, well fields, treatment plants, storage facilities, pump stations, transmission mains and service lines. So, a key challenge becomes keeping track of the ongoing maintenance and replacement needs of all that infrastructure.

The role of GIS

One great way to connect field data collection with office operations is to map and plan for ongoing maintenance with a geographic information system (GIS). GIS integrates mapping and databases so that detailed information about facilities can be maintained, while also accurately representing its location. Items such as installation dates, maintenance activities, pipeline breaks, meter readings and product specifications can be recorded and managed on a daily basis. This data can guide managers to exercise valves on at an established frequency, identify failing pipeline and replace meters that lose accuracy with age.

Taking the use of GIS as an asset management tool a step further, Greater Ramsey Water District and Stutsman Rural Water operations staff in North Dakota are now leveraging the use of Bluetooth-enabled global positioning system (GPS) equipment in conjunction with ArcGIS Online. This switch has improved those system's data collection and infrastructure feature locating. Previously, staff had to use handheld GPS devices with no real-time capability. Information had to be downloaded and processed before use. With this new approach operators, managers and engineers can capture and share real-time information about their water systems. GPS data incorporated into a GIS data base preserves location that previously have often been limited to the memories of employees.

Financial management

Having a clear inventory of a water system's infrastructure assets also allows a system to understand not only the maintenance needs, but also the overall system's value. As the water demands in a system grows, and infrastructure ages, responsible business planning demands that the value be considered when setting rate structures. Rates need to consider not only the current operating budget, but also the future cost of replacing facilities that are nearing the end of their life. Rural water district managers are responsible to the Board of Directors for knowing what the district's assets are worth. Knowing the value of a water system's infrastructure is also particularly important when dealing with wholesale supply contracts, extraordinary large customers and territory boundary negotiations.

Yet, most systems do not know the true value of their assets because there is not a compelling need and because it is often included in audits. However, audits can provide very inaccurate estimates because they are typically based on depreciation of original construction cost. For example, a 6-inch pipeline constructed in 1992 may have originally cost $5 per foot, or roughly $26,500 per mile. If it has depreciated half of its life, it would be valued today at just over $13,000. Yet, if that pipe were to be replaced today, it would cost about $10 per foot, or $53,000 for a mile. Determining the replacement costs of infrastructure therefore must be done independently of any audit to accurately identify the amount of funds that will need to be collected annually to cover the anticipated future costs of replacement based on the expected life cycle of that infrastructure. Managers should work with their engineer to establish a system-wide value using replacement costs. A GIS database makes this a fairly inexpensive effort.

Planning for water infrastructure's future

Evaluating a system's condition and capacity on an ongoing basis helps in planning for the future. Although many rural water systems are still actively growing, many others across the nation have reached maturity, with less needs for sizable new infrastructure construction such as water treatment plants, booster stations or main transmission lines. These systems have completed construction of the features originally envisioned and are in a basic operation and maintenance mode. Yet, it is still important to plan for the ongoing maintenance and growth of a rural water system.

When considering future system needs, a strategic or master plan is an important tool that can be utilized. These plans help set a vision that links daily decision to where an organization wants to be in three to five years, coupled with an understanding of likely infrastructure requirements in 10 to 20 years. The plan can help guide a rural water system financially plan for the future, while prioritizing infrastructure needs. It also can help identify shortcomings and set a path to overcome them. An effective master plan will identify phased improvements, estimate both construction and operation costs associated with the improvements, project future expense

budgets and detail the required rate structure that will be necessary to meet those expenses. With this information, water districts can incrementally adjust rates annually and avoid the sticker shock of large increases.

When developing a strategic plan, outside perspectives are often helpful. This can take the form of seeking input from regulators, accountants and consultants—particularly in using an engineering consultant to model the system's hydraulic performance and lead the development of the plan. These outside influences provide knowledge and fresh perspectives as challenges and potential paths forward are identified and explored.

Ultimately, the value of a strategic plan is that it gives decision makers a solid understanding of key issues, consensus on important assumptions and shared understanding of the facts surrounding the system. In other words, it gets the manager, Board of Directors and engineer on the same page with regards to the future of the district. This acts as a solid foundation for strategic decisions despite the constantly changing funding and regulatory environment.

In these time of tightening budgets, increasing regulations and aging infrastructure, a well-crafted plan of a system's future goals and needs is as important now as ever before.

Source 1 - https://www.usda.gov/media/press-releases/2018/05/23/usda-invests-256-million-water-infrastructure-rural-communities

Source 2 - https://www.awwa.org/publications/connections/connections-story/articleid/4944/2018-state-of-the-water-industry-report-reveals-long-term-trends.aspx