



Rural Pennsylvania's Water and Wastewater Infrastructure

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RURAL PENNSYLVANIA'S WATER AND WASTEWATER INFRASTRUCTURE

**A report by
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EXECUTIVE SUMMARY

Citizens sometimes take for granted the running water and efficient wastewater systems that are critical to their communities. Until problems arise, water and wastewater systems may be easy to ignore. Like all communities statewide, Pennsylvania's small, rural communities rely on the continuous health of their water and wastewater systems to maintain the quality of life that their residents have come to expect.

Agricultural and residential waste, industrial discharges, construction runoff, and changing regulatory and financial environments can threaten water and wastewater systems. In some cases, water and wastewater infrastructure needs require immediate repair or replacement due to age, condition, capacity, safety, or permitting. If such needs are ignored, more infrastructure will reach the end of its useful life, and rural communities will ultimately bear the cost of repair or replacement. Infrastructure shortcomings can threaten system viability, hinder development, negatively impact public safety, and adversely affect quality of life.

This study, which was conducted from 2002 to 2004, examined the system capacity of a sample of Pennsylvania's small water and wastewater systems to assess their ability to meet challenges to their systems. System capacity includes the technical, managerial, and financial ability to achieve, maintain, and plan for compliance with applicable standards, given the available resources and characteristics of a system's service population.

Results from the study offer much needed baseline data that may help lay a foundation for actions needed to meet funding challenges and to enhance the infrastructure needs of rural water and wastewater systems over the coming decades.

The following considerations were developed from the study's findings:

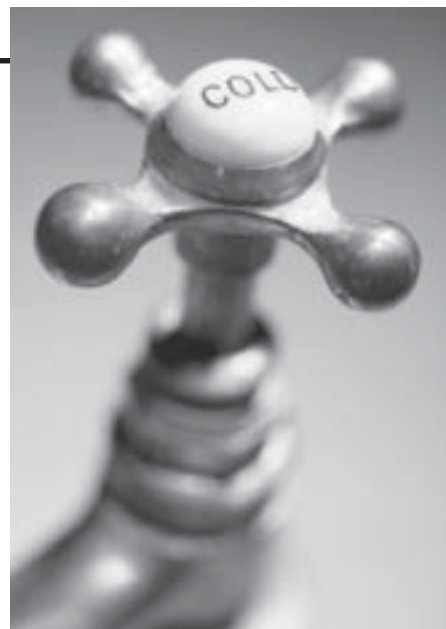
- Enhance water and wastewater operators' managerial, technical and financial skills to reduce the need for infrastructure funding.
- Encourage further cooperation in planning for future needs among local governments, state and federal regulatory agencies, funding agencies and legislators.
- Collect systematic information on community infrastructure systems.
- Enhance coordination among agencies for program information, which would include funding access to allow communities to better address future needs.
- Devote more attention to evaluating and possibly integrating technical training opportunities for plant operators.
- Consider alternative strategies for communities of various sizes to develop capacity-building activities, especially financial capacity.
- Provide capital improvement planning assistance to communities of all sizes.
- Encourage citizen participation in water conservation and provide information on the growing needs of water and wastewater systems and the options for reducing costs and financing in water and wastewater to help reduce the demand for infrastructure.

INTRODUCTION

The water and wastewater systems of Pennsylvania's small, rural communities must be healthy to support, and possibly attract, people, industry and jobs.

To learn more about rural Pennsylvania's water and wastewater systems, the researcher conducted the study, from 2002 to 2004, to examine the system capacity of a sample of Pennsylvania's small water systems to assess their ability to meet challenges to their systems. System capacity includes the technical, managerial, and financial ability to achieve, maintain, and plan for compliance with applicable standards, given the available resources and characteristics of a system's service population.

To complete the study, the researcher interviewed by telephone plant operators for rural Pennsylvania's public water and wastewater infrastructure systems to gather a baseline assessment of each system's capacity. Plant operators' perspectives on a number of capacity issues are valuable because they have the most contact with the system and its stakeholders. Because the operators are responsible for adhering to regulations, they have perceptions and ideas about ways to increase the financial, operational, and managerial capacity of their systems. The study's baseline data helps to lay a foundation for public and private actions needed to meet the challenges for funding rural water and wastewater infrastructure in Pennsylvania over the coming decades.



METHODOLOGY

The U. S. Environmental Protection Agency (EPA) classifies water systems according to the number of people they serve, the source of their water, and whether they serve the same customers year-round or on an occasional basis. This research focused on public water systems that provide water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serve an average of at least 25 people for at least 60 days a year. EPA also classifies water systems according to the number of people they serve. This study used three categories of facilities that served relatively small populations, including systems that serve 25 to 500 people, those that serve 501 to 3,300 people and those that serve 3,301 to 10,000 people.

Defining Capacities

Technical capacity refers to the physical infrastructure of a system, such as the adequacy of its source water, infrastructure (source, treatment, storage, and distribution), and the ability of personnel to use the necessary technical information.

Managerial capacity refers to such management characteristics as ownership accountability, staffing and organization, and links to customers and regulatory agencies.

Financial capacity refers to the resources of the system, including revenue sufficiency, credit worthiness and fiscal controls.

The sample contained only publicly owned water systems, not independent or private systems. Municipal authorities, although public, were not included because many contract with the private sector.

The researcher examined data collection methodologies used by other states that could help in the design of a test instrument for understanding the technical, managerial, and financial capacity of the communities studied. The examination included information on the state role in rural water/wastewater system financing. Among the studies reviewed were a North Carolina project that had developed more than 150 indicators for

water and sewer systems, including the age of systems, line diameters, construction materials, plant capacities, and the financial situation of system operators; EPA state studies; the Pennsylvania Department of Environmental Protection (DEP) Water Needs Survey, which was completed for the EPA in 1997; and a similar Wastewater Needs Survey completed in 2000.

In addition to conducting a literature review, the researcher formed an advisory committee, comprised of professionals with technical expertise at various levels of government and representatives of local government associations, to help with the project. Members of the advisory board helped with the design of the project and provided information to the project team, such as mailing lists and financial data.

Telephone Survey

The researcher developed a telephone questionnaire, which requested factual information on the existing technical, managerial and financial capabilities of the water and wastewater systems including: the cost of current and future “core” infrastructure and the regulatory costs of the systems; existing state-local financing relationships; and perceptions regarding the above topics, especially those on financing.

To assure the quality of the data collection instrument, build confidence in the project by participating systems, and assess the time needed to obtain standardized data, a draft questionnaire was pre-tested on five small water and five small wastewater system operators in south central Pennsylvania.

Pre-testing made clear that Pennsylvania’s small system operations did not have much of the specific data requested in the questionnaire, so the researcher revised the survey to obtain objective financial data, in aggregate form, for an entire system and not its component parts. The survey was also revised to obtain perceptual data on technical, managerial, and financial capacity.

So that data could be quantified for basic statistical analysis, the researcher used EPA’s definition of system “capacity” for managerial, technical, and financial capacity (see box on Page 5), existing laws, and “how-to” documents produced by EPA and its partners. Data gaps with EPA and DEP information made it impossible to derive other background variables for analysis. The required 2001 infrastructure needs assessments by states were not released during the timeline of this study, and 1997 data were dated, so neither were used. States are now required to develop data on system capacity so that systematic data should be available to researchers in the future. DEP keeps data on permitting but, at the time of this research, did not have baseline data on the systems studied.

Sample Selection

DEP’s Bureau of Water Supply and Wastewater Management database containing contact information for permitted sewage facilities in the state was combined with a database from the EPA’s *Clean Water Needs Survey for 1996*, the latest available at the time of the study, to yield a comprehensive list of municipal wastewater facilities that was used for the study.

DEP’s Bureau of Water Water Supply and Wastewater Management provided a fairly complete database of water systems. Publicly owned water systems were identified. The database was then screened to eliminate mobile home parks, apartment buildings, retirement homes and state parks to yield the study list of public water facilities in the state.

The total statewide number of all types of facilities was 2,918 (738 water and 2,180 wastewater). Each facility was identified as serving a very small, small, medium, or large population.

Figure 1 below summarizes the entire population of water and wastewater facilities. The data available could not identify the size of 61 facilities (listed as unknown).

Figure 1: Public Water and Wastewater Facilities Included in the Study

	Population Size					Total
	Very Small (25-500)	Small (501-3000)	Medium (3001-10,000)	Large (Over 10,000)	Unknown	
Wastewater	82	315	178	109	54	738
Water	1,349	500	180	144	7	2,180
Total	1,431	815	358	253	61	2,918

This study examined only systems that serve very small, small, or medium populations, which included 2,604 facilities.

A stratified random sample of 180 systems was selected with 30 systems in each of the six categories of size and system type. Sixty-five of the 90 water

systems selected (73 percent) and 53 of the 90 wastewater systems selected (59 percent) eventually participated in the study for a 58 percent response rate. This is a relatively high response rate for such small systems, with operators who likely had never participated in a telephone survey.

FINDINGS

Differences between the 65 water and 53 wastewater systems proved to be more important than differences among population categories, contrary to what was expected. As such, the findings are separated for water and wastewater. Only when it is important to the analysis are population differences among systems reported.

Description of Water and Wastewater Systems

The systems in the sample were small both in terms of staffing and finances. Sixty-five percent or 36 of the water systems employed fewer than four employees, with the largest number of employees at any system being 32. Forty-one of the 53 wastewater respondents (79 percent) indicated having a staff of four or fewer employees, with the largest number of employees at any of the systems being 16. Respondents also frequently mentioned the help of volunteers.

Financial Capacity

As seen in Figure 2, 45 percent of the water systems had total assets of less than \$1 million, 32 percent had assets between \$1 million and \$10 million, and just 23 percent had total assets greater than \$10 million. As Figure 3 on Page 8 shows, 21 percent of wastewater systems had total assets of less than \$1 million, 53 percent had assets between \$1 million and \$10 million and 26 percent reported total assets greater than \$10 million.

In terms of budgets, 68 percent of the water systems and 63 percent of the wastewater systems studied had annual budgets of less than \$1 million. Thirty-two percent of the water systems and 37 percent of the wastewater systems had annual budgets between \$1 million and \$10 million and no system in the study had an annual budget greater than \$10 million.

The majority of all systems studied had total liabilities of less than \$1 million (64 percent of the water systems and 53 percent of the wastewater systems). Twenty percent of the water systems and 41 percent of the wastewater systems, however, reported total liabilities between \$1 million and \$10 million. Sixteen percent of water and 6 percent of wastewater systems reported total liabilities greater than \$10 million. A few of each type of

Figure 2: Financial Capacity of Water System Respondents

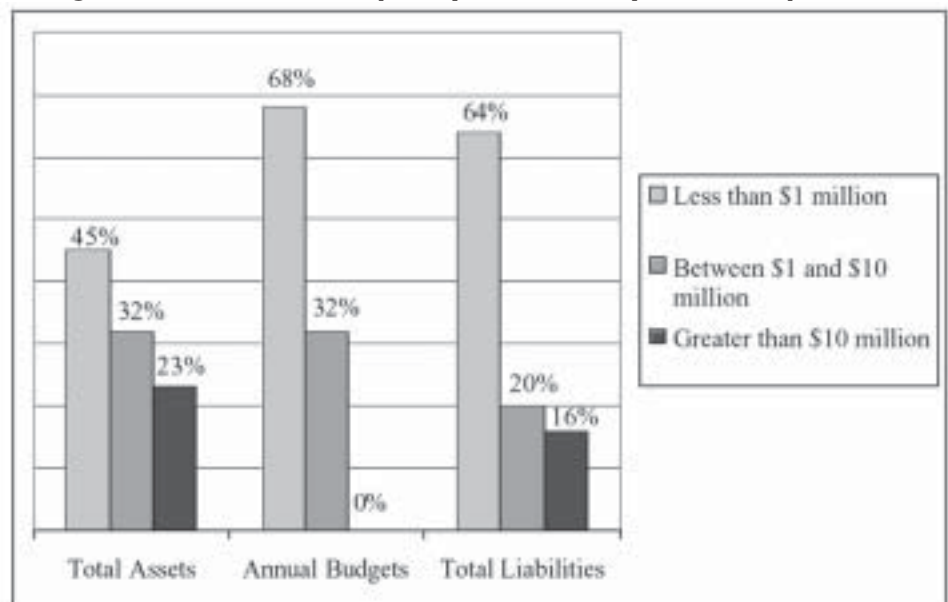
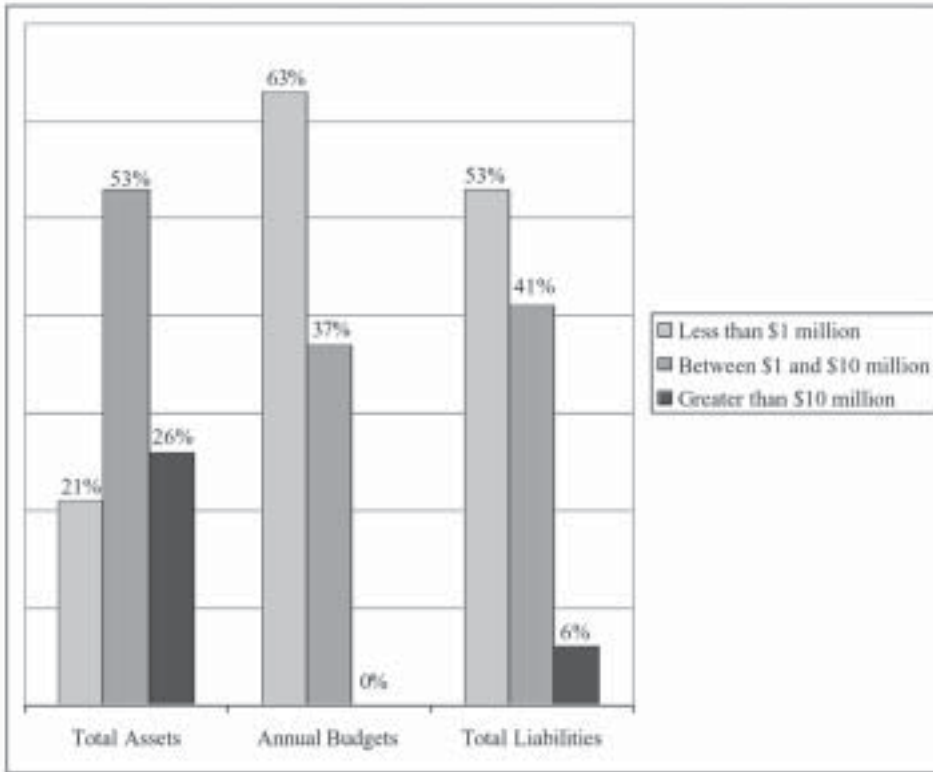


Figure 3: Financial Capacity of Wastewater System Respondents



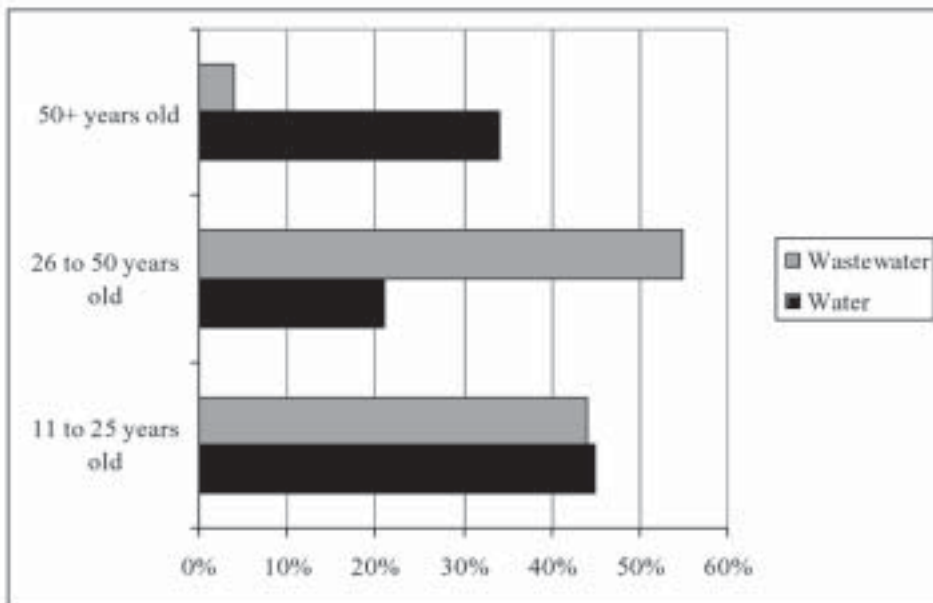
diseconomies of scale that are characteristic of small systems. The population served often determines key operating ratios and the capacity-to-daily production ratio for most of the systems studied was well below full capacity. While this is not unusual for systems of any size, an inverse relationship between the ratios of peak daily water production to average daily production means that small systems experience higher fluctuations in water production during different times of day than do large systems. The smallest water systems lack significant storage facilities for their treated water, so they meet any increases in demand by increasing the amount of water treated at that time.

the smaller systems, primarily the water systems, already had problems with debt service cost. In general, the smaller the system, the less likely its ability to service additional debt.

The system operators generally could not provide detailed cost information on their systems; however, some offered examples that helped to illustrate the

Small system operators explained that the length of distribution and transmission pipes per connection generally increases as system size decreases. The median pipe length per connection for the very small systems in the study (those serving 25 to 500 people) may be as much as double that for the systems serving closer to 10,000 people. Operators explained that, because of this, smaller systems spend more per connection on installation, maintenance and repair of transmission and distribution pipes.

Figure 4: The Age of Water and Wastewater Systems



Managerial Capacity

At the time of the study, 25 percent of the water systems had no employee with a valid state certification, and 71 percent of the non-certified employees had received no formal training.

State certification of employees was somewhat more prevalent for wastewater facilities than for water facilities. Ninety-six percent of wastewater facilities had at

least one certified employee on staff, and 51 percent indicated that among non-certified employees, one or more had received training.

Board members in 83 percent of the water systems had not received training during their typical four-year term, which is the average term for board members in 45 percent of the water systems. Of the wastewater system board members, 87 percent had not received training during the typical five-year board term, which is the average length of service for board members in 58 percent of the wastewater systems. Given the definition of capacity as involving technical, managerial and financial capacity, it appears that training for board members needs attention.

Technical Capacity

The age of the water facilities in the study ranged from one to 203 years. Fifty-five percent were at least 25 years old or older and 34 percent were 50 years old or older. Only 22 percent of the facilities were 10 years or younger. (See Figure 4 on Page 8.) The capacities for the water facilities ranged from 5,000 to 5.2 million gallons per day, with 81 percent indicating a capacity of less than 1 million gallons per day.

The wastewater facilities in the study tended to be younger. The two oldest wastewater facilities were at least 50 years old. Twenty-three of the wastewater facilities were 25 years old or less and 29 were between 26 and 50 years old. Capacities for the wastewater facilities ranged from 23,000 to 4.2 million gallons per day. Sixty-five percent of respondents to the question on capacity indicated a system with less than 1 million gallons per day.

Less than one third (31 percent) of the respondents expected their water facility to require expanded capacity in the future. Just one system indicated the need to update now. Three percent indicated a need to reduce capacity in the future. The typical timeline for an anticipated expansion was within 10 years.

In contrast, the relatively younger wastewater systems anticipated the need for more expansion sooner. Specifically, 73 percent of the wastewater systems anticipated needing expanded capacity within five years.

Respondents suggested that the largest investments in expansion would be for the installation and repair of transmission and distribution pipes because of deteriorated or significantly undersized pipes. Respondents frequently gave examples of the need for water storage capacity. Respondents' views on capital needs may have been underestimated. Most of the plant operators could not or did not identify a wide array of needs and

did not provide documentation. National studies of capital needs suggest underestimates, especially by small systems.

Sources of Information for Capacity Development

The surveys included a series of questions on information sources used to develop technical, managerial and financial capacity. Multiple responses were permitted. In general, respondents use a small array of information sources.

Both water and wastewater system personnel were most likely to turn to engineering firms, professional associations, and state agencies for information. National agencies and universities were not mentioned by any water system operator, despite the numerous high-quality materials produced by the EPA and the technical assistance provided by EPA and DEP through university affiliates. Wastewater system operators, on the other hand, mentioned national agencies and universities, although infrequently.

Planning and Management Capacity

A series of questions were asked about the major components of the planning process, the allocation of maintenance resources, priority setting for capital improvement projects, stakeholder relations, and customer outreach.

Water systems were most likely to rely on "previous experience" (32 percent) to guide their planning than on a variety of planning techniques. As Figure 5 below shows, continuous preventive maintenance (14 percent), mandate compliance (12 percent), customer surveys (9 percent), strategic meetings (9 percent), and using Census data (3 percent) were not widely used as components of the planning process.

In contrast, the wastewater systems used more sophisticated planning processes. Sixty-seven percent mentioned strategic meetings as their key planning

Figure 5: System Planning Processes

	Water	Wastewater
Census data	3%	10%
Continuous preventive maintenance	14%	8%
Customer surveys	9%	4%
Mandate compliance	12%	25%
Previous experience	32%	16%
Strategic meetings	9%	67%

component. Other planning techniques included: compliance with mandates (25 percent), previous experience (16 percent), Census data (10 percent), continuous preventive maintenance (8 percent), and customer surveys (4 percent).

The system operators were asked how maintenance resources were allocated in their systems. Both water and wastewater systems listed cost/need projections as the key consideration (58 percent of the water system and 55 percent of the wastewater system operators), but there was a sharp contrast thereafter. Water systems next allocate maintenance resources based on previous experience (32 percent) and historical records (8 percent). In contrast, the wastewater systems mention “rule of thumb” (57 percent) followed by previous experience (29 percent) and historical records (4 percent). The wastewater system approach does not dovetail well with the claim of using strategic meetings as a key planning component. “Rule of thumb” was explained as making decisions without supportive data.

Fifty-eight percent of water systems reported using cost/need as the basis for prioritizing their capital improvement projects, with 34 percent mentioning previous experience and historical records. This parallels the planning process components most used by the water systems. Fifty-three percent of wastewater systems also relied on cost/need projections for prioritizing capital improvement projects. However, 27 percent of the wastewater system respondents claimed that “rule of thumb” was the second most used prioritization method, with previous experience mentioned by just 6 percent.

Questions on communicating with stakeholders were also asked. Water system operators indicated several ways for promoting stakeholder outreach: inserts in mailings (39 percent), public meetings (20 percent), and school programs (10 percent). The second most mentioned effort, however, was “none” (37 percent). Of those engaging in stakeholder outreach, more than half claimed a lack of success promoting water conservation.

The most typical wastewater system participation methods were public meetings (55 percent), inserts in mailings (15 percent) and school programs (6 percent). (See Figure 6.) Compared to water systems, the wastewater systems were more likely to attempt stakeholder outreach; 12 percent of wastewater systems reported no stakeholder participation efforts. As with the water systems, more than half of respondents (57 percent) reported a lack of success in promoting water conservation.

Specific questions about educating the utilities’ customers were asked. Required consumer confidence reports were mentioned by 47 percent of water operators while 36 percent mentioned mailings. Twenty-seven percent of water operations had no programs whatsoever for educating customers. Thirty-eight percent of wastewater systems used plant tours and 31 percent used mailings. Consumer confidence reports were mentioned by 6 percent wastewater operations, and 27 percent reported no programs in place for educating customers.

In general, both types of systems engage in low levels of activity to educate customers.

Perceptions of Key Issues Faced by Small Systems

System operators were asked about the key issues facing their communities and systems. The issue mentioned by 40 percent of the water systems was physical infrastructure, followed by issues associated with regulatory burdens (25 percent), financial concerns (20 percent), growth and development (8 percent) and regionalization (3 percent).

Forty-five percent of wastewater system operators mentioned infrastructure as the key issue, followed by growth and development (31 percent), financial issues (15 percent), regulatory burdens (12 percent) and regionalization (6 percent).

Some water system operators gave rankings of “high” importance to monitoring and reporting (34 percent), lack of finances (22 percent), and operation and maintenance concerns (19 percent). However, the vast majority of water systems operators frequently ranked each item as “low” in importance.

Very few wastewater system operators gave a high ranking to any issue, but a medium to high ranking on an array of issues was common. A lack of finances was a big concern (68 percent), followed by operations and maintenance (63 percent), monitoring and reporting (57

Figure 6: Stakeholder Outreach Techniques (multiple responses were permitted)

	Water	Wastewater
Inserts in mailings	39%	15%
Public meetings	20%	55%
School programs	10%	6%
None	37%	12%

percent), funding for staff (55 percent), not enough staff (42 percent), and operator certification (36 percent). Compared to the water systems, wastewater systems had a greater number of important system issues perceived to be of medium to high importance. Still, both types of systems were most likely to give relatively low rankings of importance to any issue.

Plant operators were queried about any problems their systems had in applying for loans or grants. Twenty-three percent of the water system operators reported that someone else handled this task. Of those reporting problems in applying for grants or loans, the most frequently cited problem was a lack of staff time (20 percent). For the few wastewater system operators who indicated a problem in applying for grants or loans, the most frequently cited problem was a lack of staff time, mentioned by 8 percent of respondents.

Sixty percent of water system respondents indicated that there had been interest in regionalizing water services. Respondents indicated that regionalization discussions were initiated by a wide variety of stakeholders: plant operators (10 percent), the municipal governing board (8 percent), the system board (8 percent), state agencies (5 percent), professional associations (3 percent), and the municipal manager (2 percent), among others.

Thirty-nine percent of the wastewater system respondents indicate interest in regionalizing wastewater services. A wide variety of stakeholders was engaged in such discussions: wastewater board members (14 percent), plant operators (12 percent), municipal governing boards (8 percent), professional associations (4 percent), a state agency (2 percent), and a municipal manager (2 percent).

Financial Capacity

To learn more about the financial capacity of the systems, the survey included a series of questions on operating expenses, revenue efficiency, assets and liabilities, outstanding debt, annual budgets, credit rating, rate structures, expansion plans and costs, financing options, design capacity compared to current needs, uncompensated use, planned capital improvements and sources of funding, loan history, and the general financial management of the system.

The fastest growing operating expenses for water systems were staff benefits, mentioned by 23 percent of the operators, and outside analytical services and chemicals, each mentioned by 18 percent of the operators. Seventeen percent mentioned rising costs for wages and 14 percent mentioned rising energy costs.

On the other hand, wastewater system operators reported their fastest growing operating expenses to be energy costs (41 percent) and materials and supplies (24 percent). Relatively few cited the fast rising costs for staff benefits (18 percent) and wages (16 percent). Twelve percent each mentioned chemical and outside analytical services, while 10 percent mentioned outside contractor service costs.

Despite increasing operating costs for some entities, most of the systems report revenue balances (88 percent for each type of system), with 12 percent of the water systems and 10 percent of the wastewater systems reporting losses. A deficit would be a key indicator of poor financial health, so these numbers showed revenue strength.

The basis of the rate structure for water systems was use (55 percent), flat fee (25 percent) and declining block rate (11 percent). Every respondent knew how the rate structure was developed. The basis of the rate structure for wastewater systems was usage (39 percent), flat fee (29 percent), declining block rate (10 percent), or revenue needs (8 percent). Fourteen percent, however, did not know how the rate structure was set. Water systems rely on usage as the basis for setting rate structure more frequently than do the wastewater systems. Similarly, the water system plant operators were more familiar with the rate structure basis than were wastewater system plant operators.

Fifty-four percent of water systems used cost of operation to determine service rates. Other means used were consultants (9 percent), PENNVEST (5 percent), surveys (5 percent) and benchmarking (3 percent). Rates were reviewed annually by 57 percent of the water systems. Significantly, 80 percent of the systems did not currently use any other financing. Loans were mentioned by just 8 percent and set-asides by 2 percent.

Forty-seven percent of the wastewater systems used a consultant to determine service rates, while 31 percent used costs of operation, 12 percent used benchmarking, and 10 percent used surveys. Rates were reviewed annually by 82 percent of the wastewater systems. Loans and grants were each used by 37 percent of the systems, but 25 percent did not use any other financing.

There were again contrasts between the two types of systems. Wastewater systems used consultants much more frequently than did water systems for determining service rates. The wastewater systems were also less likely to rely on usage as the basis of their rates and to know details about their rate structure than were water system operators.

Contrasts between the two systems were also evident on other financial indicators. Twenty-three percent of the water system operators did not know their system's credit rating. None thought that the rating was poor or that it had changed in the last three years. Thirty-two percent of the wastewater plant operators did not know what their system's credit rating was and none claimed that it was poor. Only 4 percent thought that the credit rating had changed in the last three years, but 24 percent did not know.

Fifty-nine percent of the water systems reported some uncompensated usage. Of those, 74 percent mentioned municipal buildings and parks and 76 percent mentioned fire protection. About 33 percent of the wastewater systems reported uncompensated usage, and, of those, 88 percent mentioned municipal buildings and parks, 35 percent mentioned fire protection, 24 percent said hydrant flushing, and 18 percent mentioned leaks, breaks, and failed meters. Uncollected bills were reported by 12 percent of wastewater operators, a category not mentioned by water system operators.

Plant operators from the very smallest systems claimed to have higher water rates than other systems, and they also claimed the need to increase their rates more frequently than larger systems. A number of operators, especially in the smallest communities, said they had few, if any, commercial or industrial customers for whom water expenses were business costs that can be passed on to customers. This supports the logic of diseconomies of scale in that higher rates were needed to serve a smaller population base.

Building Managerial, Financial and Technical Capacity

Respondents had opportunities during several parts of the telephone interview to suggest changes on any aspect of managerial, financial, and technical capacity. All respondents made suggestions and many offered multiple responses. Water system operators offered far fewer suggestions than wastewater operators and the latter made a greater variety of suggestions. Wastewater plant operators were more likely to focus on funding needs than were water system operators. In contrast, water system operators were more likely to dwell on regulatory issues.

In response to a specific question that asked what the respondents would like legislators to know, approximately 33 percent of the water plant operators stressed their concerns with mandates, especially new regulations, and a need for more grant funding, not loans. In

contrast, nearly 60 percent of the wastewater operators cited more funding as their primary concern, with mandates, especially no new regulations, tied for second. Improved state agency performance and more training were also stressed by the wastewater operators, as well as the need for more outreach and assistance, standardized pay scales, and more technical assistance in general. Several respondents wanted legislators to know the complexities of water and wastewater management.

The survey also gathered more general suggestions that might help build managerial, technical, and financial capacity of systems and enhance capacity-building assistance by state agencies. Most suggestions were of a generic nature so comments by both types of plant operators are collapsed into broad categories.

Improving Relations with Agency Personnel

Among all suggestions voiced, respondents most often mentioned relationships with state agencies. There was an array of complaints about "red tape" and agency slowness, but these did not translate to actionable suggestions.

Some valuable ideas were put forth for DEP as follows:

- have more wastewater inspectors with wastewater, not general science, backgrounds;
- provide a single listing of DEP staff by area of expertise, with all appropriate contact information;
- in addition to scores, give the correct responses to questions on certification exams so operators can learn;
- make forms more user-friendly by asking those who must fill them out for suggestions;
- rethink the number of copies needed for required paperwork; and
- provide more grants and not loans.

A circuit rider approach to help small systems with financing and grant writing was suggested. Several respondents mentioned that too much was done to help small systems with bailouts without doing more to make them more responsible on their own. One person mentioned a need to examine what was characterized as "outdated" bid procedures. Several operators thought that state government should either take over some systems or otherwise help them find ways to develop alternative service provisions. One operator was concerned that the system was using funds out of its water budget for work not performed. (The state's

operator certification law now includes a whistleblower provision). Roundtables to reverse the flow of information and provide some operator-to-DEP communication were suggested by one plant operator. Among the dozens of comments about the burdens of mandates, several respondents pointed out a perceived need for more discretion, less paperwork, and tiered regulations based on community size.

Suggestions regarding PENNVEST include: the need to provide better rates than the private market (or make information available that explains that is the case); streamline the application process; eliminate the perceived use of “political” considerations in decision making; give more grants and not loans; build more accountability into financial processes; get DCED more involved; and give more funds for capital improvements, education, and computers.

Training

The key concern was funds for training. In terms of subjects offered, operators from both types of systems wanted more courses on maintenance, even claiming that their systems have reduced repairs in recent years to save money. Several operators stressed the need for training for elected officials and board members. A number wanted courses offered closer to their locations and stressed the usefulness of “hands on,” and not book, learning. One operator suggested that a two-year college degree for plant supervisors be created, along with an accreditation board. Several respondents mentioned that the costs for training vary among training providers and that some providers charge too much. One person wanted the state to help with the costs of association dues if such included training opportunities.

Several plant operators offered that more courses should be offered on pollution prevention and energy efficiency. One thought that systems would benefit if operators knew how to improve media relations. A number felt that their training should include information on where to apply for funding.

Relationships with Consultants

Based on pre-testing of the survey questionnaire, the researcher believed that respondents would voice complaints about engineering services by outside consultants, and that proved to be the case. Several dozen comments were made about lack of cooperation, poor advice, and costly errors. Just a few actionable comments resulted: have DEP give suggestions

before a report is submitted rather than afterward, with a rejection; give systems more guidance in learning how to hire consultants and monitor contracts; and give borough managers vulnerability assessments so that they don’t have to hire a consultant. Several operators said that, with some training, they could save funds by not hiring an engineering firm to write grants and/or to fill out applications for funding.

Suggestions for Other Systems

Several plant operators made suggestions about things that worked for them that might help other systems: meeting with nearby systems to “troubleshoot” and using the Internet as a resource were put forth, but one respondent said that many older operators are reluctant to use a computer. Some operators mentioned sharing equipment with other systems. The dues structure for some associations was perceived to be too high for some systems, especially the ones that need help the most. One individual suggested that the state offer some support to the associations.

Alternative Service Delivery Options

Twenty-one operators initiated conversations about regionalization as an issue that needs to be further explored. Some complained that citizens don’t care about the topic or that elected officials oppose it. Most, however, said that state government should encourage exploration of regionalization and better economies of scale by educating stakeholders in systems. Five operators extended the discussion to broader issues of state-wide planning. The interviewees also made wide-ranging suggestions regarding incentives, circuit riders, selling to larger water companies, buying water from other systems, and even having a foundation buy a system.

Fewer discussed conservation. One said it was a “Catch 22” because conservation reduced revenues. Several others noted that demand didn’t diminish during recent droughts. Two said systems and the general public need more education regarding drought vulnerability. Two talked about security concerns stemming from the tragedy of 9/11. One of these said security funds were going to larger systems but that the state should consider fencing and locks for all systems. The other said that redundancy of systems is good in terms of national security issues.

CONCLUSIONS AND CONSIDERATIONS

The baseline data developed from this research help to lay a foundation for actions needed to meet the challenges for funding and enhancing rural water and wastewater infrastructure over the coming decades. Local solutions, such as increased rates or operating efficiencies can address part of the financing problem as local citizens and private businesses already pay substantially to build, operate and maintain their systems, and rate increases must include considerations of fairness. While utility managers can and should adopt more efficient organizational structures, work practices and new technologies, waters are shared across boundaries and are not solely the responsibility of specific jurisdictions. As costs increase, disproportionate economic hardships may occur in small, rural, especially low-income, communities unless innovative options are devised at all levels of government.

Loans and credit enhancements may be sufficient to help communities with greater economies of scale and wealthier populations, but may not be sufficient for systems in rural areas. Rural systems may also need subsidies, such as grant programs, and greater flexibility in the types of loans and loan subsidies offered. All financing may need to be designed to minimize administrative burdens and collateral requirements. Other financial assistance options, including public-private partnerships and regionalization, may address a portion of the financing problem.

As our water infrastructures are being rethought, the national government's role will have significant impact on state roles. Regardless of any federal changes, the role of Pennsylvania's state government in promoting effective, efficient, and fair solutions must be examined.

The state role includes enhancing the managerial, technical, and financial capacity of the state's water and wastewater systems. Without finding ways to maintain, repair and sustain small water systems, problems will likely worsen and costs increase. Decision-makers, planners, system operators and board members, local governments, and citizens need help in understanding the issues.

The implications of ignoring the full gamut of capacity needs of Pennsylvania's small water and wastewater systems are serious, and may unduly hamper the ability of communities to sustain a high quality of life.

The considerations below provide information that may be used to inform policy makers, community leaders and citizens of the current and future needs of Pennsylvania's small, rural communities for water and wastewater infrastructure.

1) Enhance operator skills: Costs for infrastructure can be reduced through enhancements in managerial, technical and financial skills of those responsible for the operation of water and wastewater systems.

2) Plan for the future: Cooperation among and between local governments, state and federal regulatory agencies, funding agencies, and legislators is needed to address the needs of the state's small water and wastewater systems and to plan for the future. Service providers need to work together to identify opportunities for reducing costs. Strategic planning and other managerial processes are underused by the rural, small water systems, and regional thinking about ways to collaborate is still new. Communities do not fully explore ways to reduce infrastructure needs by assessing planning and design before development occurs and to use existing infrastructure whenever possible.

Reducing water and wastewater facility infrastructure costs requires a holistic approach with considerable cooperation and coordination among multiple actors. Watershed management, pollution prevention, regulatory flexibility, collaboration by infrastructure providers to maximize existing use of infrastructure, and the creation of rate structures with incentives for efficiencies are all targets of opportunity for reducing costs. Innovative designs for development may reduce demand for building some infrastructure as well as for operating and maintaining that new infrastructure.

3) Enhance data collection: The collection of systematic information on community infrastructure systems is of strategic significance; without it, it is difficult to plan for future repairs, upgrades, and replacements.

4) Improve information flow: Adequate funds to meet community needs now and in the future must be obtained. Without external funding assistance, some small communities cannot move into a proactive planning mode to deal with future needs. Small systems expressed the need for a more streamlined funding application process. An option is one-stop shopping, an approach used in California, which seeks to improve

coordination among funding agencies and develop more flexibility in financial assistance practices: the state is strengthening websites and links to include applications and application information as well as eligibility self-assessment tools that communities can use in the pre-application stage. Some states are using electronic newsletters, implementing “road shows” to educate and inform, developing and maintaining funding matrices on a state basis, and sometimes using third parties to promote and inform. Pennsylvania should consider the establishment of a co-funding coordinator and should also examine the possible formalization of the coordination of multi-agency financing of water and wastewater projects.

A centralized location for multi-agency program information of all types, not solely financial, is another way to improve coordination. This could be done by a co-funding coordinator or via the co-funding of a website to provide a centralized location for multi-agency program information.

5) Devote more attention to training: More attention should be devoted to evaluating and possibly integrating technical training opportunities for plant operators. Basic training in the areas of planning, record keeping, and maintenance techniques varied widely among the study communities. Plant operators need to have good management practices because capacity involves more than technical plant operation. Sound managerial techniques can also help reduce costs.

Financial management training for plant operators and board members is needed. This should include instruction on how to set local utility rates at appropriate levels to meet current and future needs, especially rate structures with incentives for sustainable growth and pollution prevention practices. Reviewing rates to determine the adequacy of revenue to properly operate and maintain local wastewater treatment systems is especially pressing. Systems should periodically reassess levels of funding needed to provide a high level of both operation and maintenance.

All system officials need training regarding the education of community residents about the costs of infrastructure. Study respondents claim that very few residents are aware of the true cost of repair, upgrade and replacement of their community’s infrastructure. Enhanced relationships with board members, customers, consultants, and the press also should be incorporated into training programs.

6) Consider alternative strategies for capacity building: Alternative strategies for communities of

various sizes should be considered in the development of capacity-building activities, especially financial capacity. Communities of various sizes often face different challenges. Some often struggle for viability and may lack the human and/or financial resources to operate and maintain public infrastructure. Self-financing infrastructure repair, upgrade or replacement in some communities would result in excessive household utility rates. With declining federal funds, small communities with aging infrastructure may need more state help. Aging infrastructure, development pressure, and administrative burdens may still be addressed with self-financing but the communities need the managerial capacity to address infrastructure maintenance and improvements. Alternative ways to increase the technical and managerial capacity of the smallest communities include better training; information on public-private options and privatization; contract writing and monitoring assistance; and sharing resources among communities.

Permitting and enforcement approaches that weigh the costs of systems and the potential environmental impact, especially for the smallest communities, deserve consideration. Using the same standards for all communities is very costly on a per capita basis for the smallest communities and results in minimal environmental gain. Holding all communities to the same standards is a disincentive for communities to be proactive about their infrastructure.

7) Assist with capital improvement planning: If addressing future infrastructure is a goal, capital improvement planning assistance should be provided to communities of all sizes. With adequate planning, communities could incrementally increase utility rates to build reserves rather than implement large increases when major infrastructure improvements are needed.

8) Encourage conservation: Citizen involvement in reducing demand for infrastructure should be explored. Citizens can help reduce demand for and impacts of infrastructure through conservation and the use of water-quality-friendly fertilizer, the use of native species, habitat enhancements and other environmentally friendly practices. Study respondents claimed that there is little citizen interest in reducing demand for infrastructure through conservation practices. Citizens need information regarding water conservation, the growing needs of water and wastewater systems, and the options for reducing costs and financing. Although multiple methods exist for raising revenue, reducing costs, and distributing costs, citizens ultimately pay for all investments.

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