Conservation: What Can Water Utilities Do?

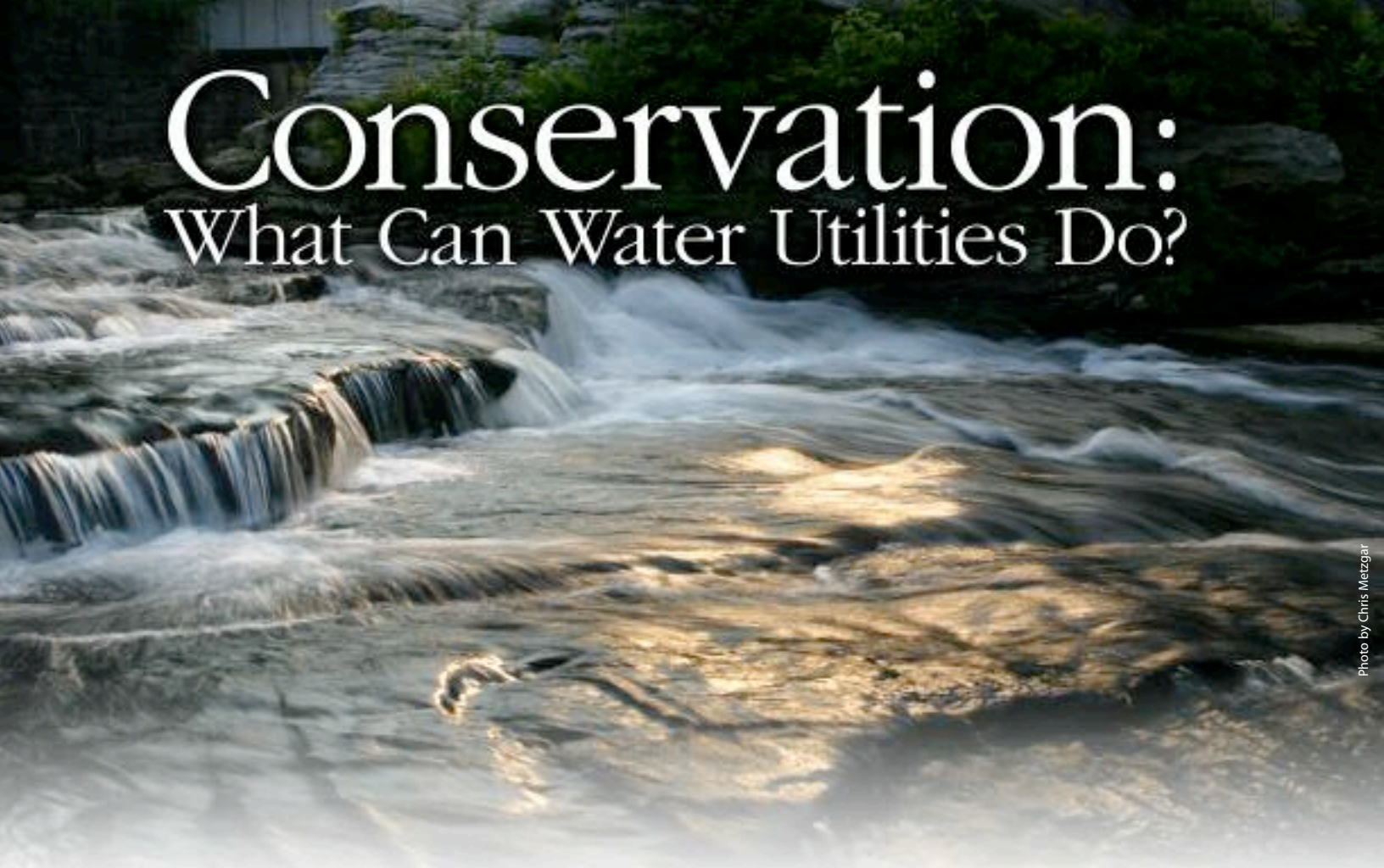


Photo by Chris Metzgar

By Natalie Eddy — NESC Staff Writer

The western U.S. is struggling with a seven-year drought. Although the 1930s Dust Bowl water shortage measures far worse in terms of temperature, rainfall shortages, and a lack of soil moisture, when you look at need—the growing demand for water and the increasing population—many authorities believe today's conditions rival the Dust Bowl.

In the central and eastern parts of the country, water often is taken for granted, but increasing infrastructure costs stemming from groundwater depletion and water quality issues make water conservation an attractive alternative for everyone.

Conservation information is abundant, particularly for water users. Many homeowners, businesses, and governmental offices have instituted water conservation plans. A quick Google search reveals more than 60 million sites on the subject.

Conservation information, however, may not be as readily available for water utility operators. There is no federal requirement for water conservation except where federal plumbing fixtures apply.

The Safe Drinking Water Act 1996 amendments required the U.S. Environmental Protection Agency (EPA) to publish guidelines for water utilities to use in preparing a water conservation plan. Under the amendment, states may decide whether to require water utilities to file conservation plans.

Most states have some type of water efficiency requirements on the books, whether it's plumbing fixtures or compliance efficiency standards. But in-depth conservation plans are a little harder to find, according to Amy Vickers, engineer and author of *Handbook of Water Use and Conservation*.

She estimates that approximately 15 states have some type of requirement for the development of a water conservation plan.

"There are probably just a handful of states that have an extensive plan, but in my view, that 'plan' often doesn't really mean much," said Vickers. "The reality is that many of these plans are perfunctory and, in practical terms, are not implemented. What really matters is what local

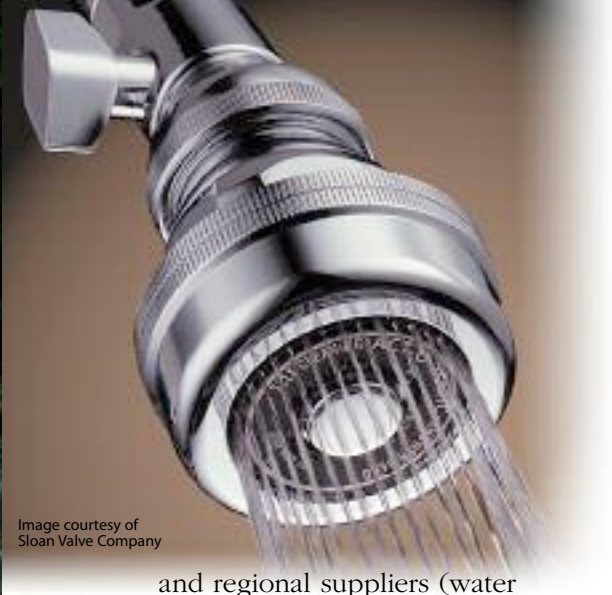


Image courtesy of Sloan Valve Company

and regional suppliers (water operators) do. They are the decision makers."

She added that most water utilities have only begun to initiate water-saving strategies. "That said, the reality is that many of these plans are perfunctory and in practical terms are not implemented," she said.

"The good news is that there are some water systems around the country, small and large, that have water conservation programs. In my experience, the best programs are actually those that are self-generated. They're not doing them because the state is requiring them. They're doing them because they perceive a need, and they value the role of conservation. That is what really drives effective conservation plans from what I see."

Taking That First Step

John Flowers, director of EPA's Water Efficiency Program, said when thinking about adopting a conservation plan, the first step a water utility operator should take is to set a goal. "It's like planning a facility, really. You have to look at the structure of your conservation program, what each component costs, and what benefit it will be to achieving your goal," he said.

From there, a water operator should do cost-effectiveness and cost-benefit analyses. "You have to make sure that by reducing water use, you're not reducing revenues to the point where you affect the operation of the facility," he said, adding that rate planning should be part of the process.

"There have to be enough benefits to outweigh the down sides. In other words, if you need to expand your system, then it may not be cost-effective even with a lot of future growth in the offing. The plan has to be done with a goal in mind," says Flowers.

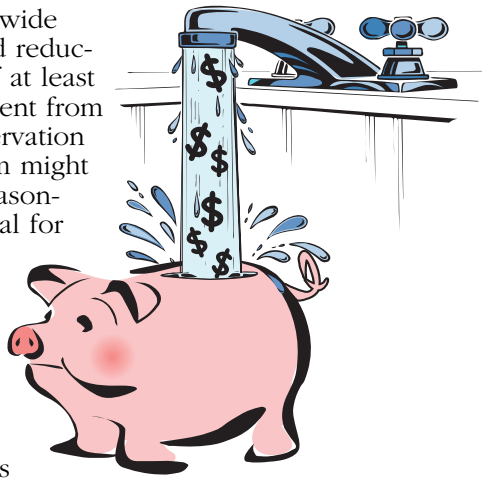
"You have to ask what's to be achieved by the conservation plan. In some cases, if there are not enough benefits, it's not feasible to do a big program. Then, you might just want to do parts of a program. If you're doing it because of a water supply shortage, then there is no question or doubt that you have to do something."

Vickers noted that each community should look at its particular situation before designing a conservation program. "When a water system develops a conservation plan, the operators shouldn't take a cookie-cutter approach and look at what the town next door is doing, because I find that every system is unique," said Vickers. "There are some generalities and commonalities, but just because the town next door is doing one thing doesn't mean that you should too."

Vickers added that a sound water conservation plan is "goal-oriented, cost-effective, and practical in design and implementation."

Ideally, a conservation plan should involve participation from all stakeholders—water managers, planners, engineers, financial administrators, information specialists, the public, businesses, environmental interests, and policymakers. She added that these stakeholders should be involved from the beginning of the process, not just at the end.

Flowers noted that although conservation information abounds, implementing a conservation plan is not an easy thing to achieve. "I don't want to delude anybody into thinking it is," he said. "But whether you want to reduce the cost of future infrastructure or help solve some environmental problem, like keeping more water in the streams and/or reducing impacts on groundwater, conservation programs can be a useful tool."

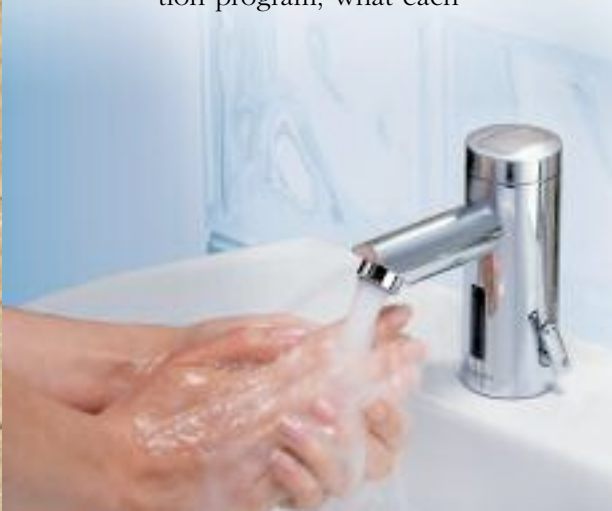


Vickers added that system-wide demand reductions of at least 25 percent from a conservation program might be a reasonable goal for many water utilities.

To help clarify the specifics of conservation, Vickers wrote in her book "A conservation incentive increases customer awareness about the value of reducing water use. A conservation measure is the device or practice that actually reduces demand. A utility conservation program includes a strategic combination of measures and incentives…without a shared understanding of what constitutes a conservation measure, good intentions often go astray and water saving goals aren't reached."

EPA Guidelines

EPA's 1998 "Water Conservation Plan Guidelines" outlines the voluntary steps a water utility might take to initiate a conservation program. EPA conservation guidelines are broken down into three parts: basic, for water systems serving populations of 10,000 or fewer; intermediate, for water systems serving between 10,000 and



100,000 people; and advanced, for those systems with more than 100,000 customers.

The conservation measures are broken down further into three levels:

- Level one for basic systems recommends universal metering, water accounting and loss control, costing and pricing, and information and education;
- Level two for intermediate systems lists water-use audits, retrofits, pressure management, and landscape efficiency; and
- Level three for advanced systems recommends replacements and promotions, reuse and recycling, water-use regulation, and integrated resource management.

"My professional view is that water systems should look at the EPA guidelines because they're good. In addition, they also need to understand their unique water-use scenario–where and how water is used in their system–to set goals and make a plan about the best conservation approach for their particular system," said Vickers.

A number of topics are addressed in the guidelines: integrating water conservation and infrastructure planning, water conservation planning criteria, state roles, and current state programs.

The EPA booklet also discusses a capacity-development approach for very small systems, and there is also an overview to the organization, content, and use of the guidelines.

The EPA conservation guidelines include:

- Specify conservation planning goals—List your goals and their relationship to supply-side planning and describe the community's role in the overall goal-development plan.
- Develop a water system profile—Inventory your facilities, production characteristics and water use and prepare an overview of conditions that might affect your system and plan.
- Prepare a demand forecast—Look at anticipated water demand in the future, any adjustments to that demand that can be calculated on known or measurable factors, and conduct a "what if" analysis.
- Describe planned facilities—Decide what improvements are planned for the water system, estimate the total, annual unit cost per gallon of these supply-side improvements and additions, and prepare a preliminary forecast of the total water capacity needed based on the improvements and additions.
- Identify water conservation measures—Review any conservation measures that have been implemented or are planned, discuss any legal or other barriers to the plan, and identify measures that may need further analysis.
- Analyze benefits and costs—Estimate the total implementation cost and water savings, conduct a cost effectiveness assessment for the recommended conservation measures, and compare how much it will cost to implement the plan versus the avoided supply-side costs.
- Select conservation measures—Develop selection criteria for choosing your conservation measures, select measures, and set up a strategy and timetable for implementing the selected conservation measures.
- Integrate resources and modify forecasts—Modify water demand and supply capacity forecasts to reflect the effects of the conservation measures, discuss the effects of the measures on planned water purchases, improvements, and additions, and discuss the effects of the planned conservation measures on the overall revenues.
- Present implementation and evaluation strategy—Outline approaches for implementing and evaluating the conservation plan and finally, have the plan approved by the system's governing body.

Important Points

Flowers added that a very important conservation measure for water utility operators is a leak management program. Leaks should be determined in the plant, lines, and at the end user. "Plant operators need to do a system audit to figure out where the water is going by using a water accounting system such as the one in the guidelines," said Flowers. "Then, a plan should be developed for detecting leaks using electronic listening equipment or other techniques."

Vickers agreed, adding that leak issues are often neglected. "It's very important system wide that mains, pipes, and connection valves are regularly audited and checked for leaks. It sounds so simple—just fix the leaks. But from the point of a water source to the water plant, the incidence of leakage and losses can sometimes be quite high in volume," said Vickers.

"That's not often looked at. Just because it's been neglected doesn't mean it's something we should continue to not pay attention to."

Flowers said metering is a very important part of leakage management. "You can't do an effective system audit if you're not metering what goes out and what your

customers are using. You can't estimate water loss," he said.

Flowers cautions that sometimes it may not be cost effective to continually repair a water main segment, and pipe replacement may be necessary. Good record keeping and testing may allow you to predict when pipes may fail and timely replacement could prevent leakage.

Another conservation issue is backwash water, according to Vickers. "A really key thing is to look at recycling backwash water. Reusing it may be an option," said Vickers.

"Obviously you have to have standards for how you reuse the backwash water. If it's really contaminated and can't be properly treated, obviously you wouldn't want to do that, so the standards for recycling that backwash water must meet potability requirements and safety. Some of the backwash just has to be discarded because it's so dirty. It can't be economically or efficiently treated or cleaned, but that's just the cost of doing business."

Rebate and Retrofit

Flowers added that water utilities may also consider some type of rebate or retrofit program with their customers, such as encouraging the use of low-flow showerheads and washer changeovers or low-flow toilets.

For example, the city of Albuquerque plans to reduce its water usage by 40 percent by 2014. In 1994, Mayor Martin J. Chavez called for a 30 percent reduction in water use over the next 10 years. In that time, per person usage dropped from 250 gallons per capita per day to 177 gallons by the end of 2004.

Albuquerque has used a rebate program successfully. To date, more than 50,000 high-flow toilets have been converted to low-flow toilets with customers receiving rebates of up to $125 per toilet. In addition, more than 9,000 high water use washing machines have been changed to low water washers with $100 rebates per machine.

"Traditionally it's been difficult for a very small water utility to offer some of these same kinds of programs that have been used successfully by large facilities, but there may be a way to work with the state," said Flowers.

It also might be feasible to work with other small utilities on a regional basis going together to set up a rebate or retrofit program. "By pooling your resources, you might get more bang for your buck."

Most states have conservation criteria in their Drinking Water or Clean Water State Revolving Loan Fund (SRF). "SRFs can also make water conservation measures eligible for funding. If a state approves such an eligibility, a utility could borrow SRF money to set up a rebate program, for example, and pay it back over time," he added. "The eligible cost of the conservation in this case would be the administrative costs and the rebates themselves. But many other conservation measures could be eligible if the state elects. These programs have been a very effective way of helping to reduce water use and wastewater generation in a service area, particularly in the West and in coastal regions where there is high growth and limited water availability."

Final Thoughts

Once a water utility has initiated a conservation plan, Flowers said an important follow-up step to any plant conservation program is to try to measure results. Flowers said, "You need to know whether you've been effective, and then you can demonstrate to the town or the city that you've gotten your money's worth. It's very important to try to plan a way to measure your results and show how you've benefited."

In the end, the main benefit and the easiest one to show is an obvious one—saving water. "Some things in life are simple," said Vickers.

And with that comes a savings in money, via operation and maintenance costs. "For every gallon of water you save, you're saving X amount of money in costs for chemicals and power to treat that water," Vickers added.

Saving water also can help systems avoid, downsize, or postpone water construction projects, according to Flowers.

Water development is really a matter of supply and demand. The facilities used to treat and supply drinking water are sized to meet their demand. If the demand is high because of wasteful use, residents and industry alike are paying more for both services than necessary.

But aside from finances, from an ecological perspective, water conservation may also have an affect on our health relating to the way we use water. "Water conservation is increasingly important to our health. There is a relationship between how we use water and the chemicals and other pollutants in our lives," said Vickers.

"We have a growing national and global population, and yet nature's water budget is fixed. Over time, we need to learn to use water more wisely if we're going to meet our essential water needs in the future."

For more information about conservation, contact Vickers at (413) 253-1520 or Flowers at (202) 564-0624. The EPA booklet "Water Conservation Plan Guidelines" can be downloaded at www.epa.gov/OW-OWM.html/water-efficiency/wecongid.htm#pdf.

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