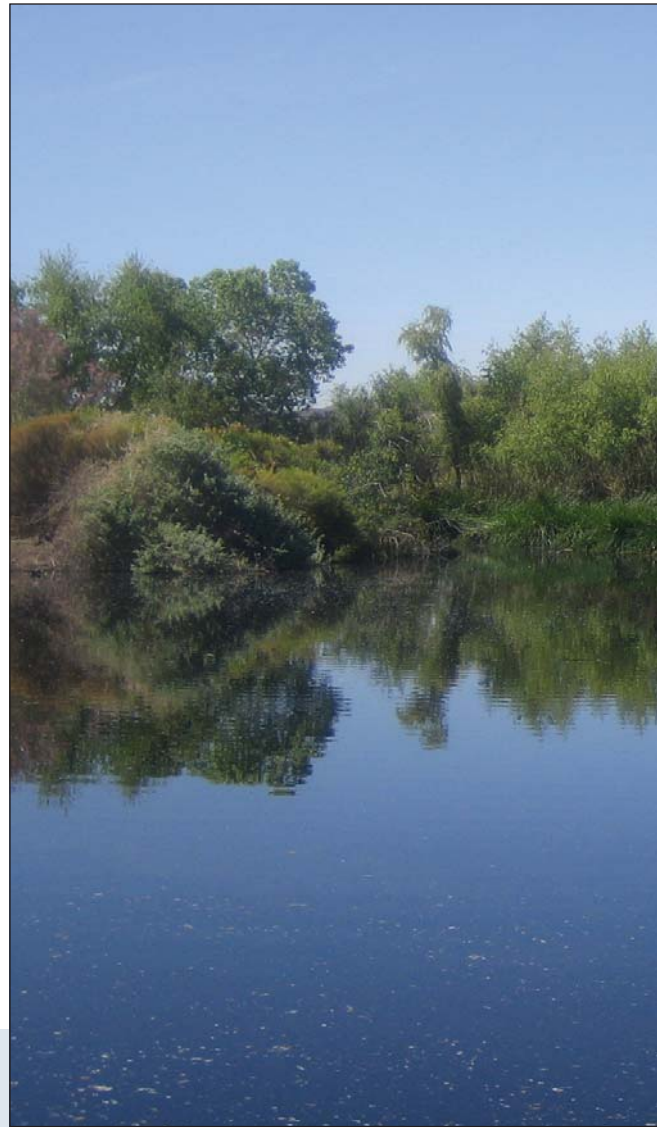


BY ANDREW SCHWARZ AND SHARON B. MEGDAL

# Conserve to Enhance—

## voluntary municipal water conservation to support environmental restoration



AN INNOVATIVE MUNICIPAL  
WATER PROGRAM ENCOURAGES  
CONSUMERS TO CONSERVE WATER  
AS A MEANS OF FUNDING  
ENVIRONMENTAL  
ENHANCEMENT PROJECTS.

**P**ublic views of the value of water in its natural setting are changing significantly (Katz, 2006). The conception that water flowing in natural channels is a waste of a valuable resource has given way to today's growing acceptance that the environment is a legitimate water-using sector (NSTC, 2004). There is greater interest in the need to protect remaining natural water flows, return some water to the environment in overallocated areas, and preserve and enhance riparian habitat (Katz, 2006).

In tandem with this changing conception of water, riparian restoration efforts have increased significantly in the United States (Bernhardt et al, 2005). In arid areas, these restoration activities often require supplemental inputs of water to support revegetation efforts (Megdal et al, 2006). In water-scarce areas, providing supplemental water for restoration activities may be a barrier to project implementation or continuation. Few mechanisms currently exist that enable the allocation of water for environmental restoration projects.

Municipal water conservation traditionally has been viewed as a strategy for stretching existing water supplies to meet increasing human demands for water. Given the growing understanding and acceptance of environ-



PHOTO: DEIRDRE BROSNIHAN

The Sweetwater Wetlands is an effluent recharge and tertiary treatment facility in the city of Tucson, Ariz. This urban site, which is easily accessed and walked, is an example of what can result from developing an area with sufficient long-term water supplies.

cle considers the design and implementation of such a program as well as potential obstacles.

### CONSERVE TO ENHANCE OFFERS INNOVATIVE RESPONSE TO ENVIRONMENTAL WATER NEEDS

**Developmental process was a collaborative effort.** The Conserve to Enhance program was developed collaboratively by the authors and an array of stakeholders. Initially, the authors worked with representatives of Tucson Water, a public water utility in Tucson, Ariz. The authors conducted meetings and interviews with Tucson Water representatives from multiple departments to identify and analyze the potential challenges of implementing a voluntary municipal water conservation program to support environmental enhancement. Representatives of other water utilities, both public and private, were then consulted to explore how their concerns and the challenges they envisioned differed from or mirrored those of Tucson Water.

In addition, background research and interviews with other professionals in the water community and other areas were conducted to investigate specific issues. Technical experts were interviewed to gather information on utility billing systems, environmental restoration activities, and the effect of weather on municipal water use. Background research was conducted on similar programs used by energy utilities to connect environmental concerns and energy use. This research provided insight into program design and critical factors for success.

A stakeholder roundtable was conducted in southern Arizona to

mental water requirements, municipal water conservation should also be seen as a potential source of water for the environment.

This article introduces Conserve to Enhance, an innovative municipal water conservation program that aims to develop a source of water for environmental restoration projects by connecting residential water conservation and environmental enhancement. Residential water customers who reduce their water consumption are given the option of agreeing to continue to pay for water at their previous, higher rate of consumption. The money paid for conserved water is then used to purchase water to meet the needs of environmental enhancement projects. In this way, the pro-

posed mechanism attempts to create a direct connection between individual water use behavior and environmental concerns.

Although most municipal water utilities have some type of conservation program, few programs, if any, fully activate environmental motivations. At least anecdotally, there seems to be a perception that in most cases municipal water conservation does not directly benefit the environment. This study attempted to address this issue, making a direct connection between water conservation and water for environmental purposes. To the authors' knowledge, no mechanism like the proposed Conserve to Enhance program has been implemented in the United States. This arti-





The Rio Salado Phoenix project is an urban park and riparian nature area that uses low-quality groundwater to irrigate vegetation within the park.

gather interested parties and discuss the design and implementation of a Conserve to Enhance program. Participants included water utility representatives; local elected officials; federal, state, and local agencies; regional and national conservation groups; academics specializing in water resources; and interested citizens. The roundtable served to draw out additional issues of program management, use of funds, and design considerations.

All of the perspectives collected through meetings, interviews, and the workshop were synthesized to further shape the Conserve to Enhance mechanism and develop recommendations. On some issues,

stakeholder perspectives varied significantly, and no recommendations emerged. On these points, the authors have provided an overview of the significant considerations and the trade-offs involved.

**Program relies on support of both customers and water providers.** Conserve to Enhance is a voluntary water conservation program, i.e., only water customers who “opt in” participate in the program. Once a customer is enrolled, a water use monthly baseline is established. Conservation is measured against this baseline, with any water use less than the baseline representing conserved water. Participants continue to pay for water at their baseline rate or above, whichever is larger. Whenever

participants reduce their water use to below their baseline, the monetary difference between the baseline rate and the amount they would have paid after reducing their water use is contributed to the Conserve to Enhance fund. In other words, participants pay for water they do not use in order to provide funds to purchase water for environmental enhancement projects.

The water service provider facilitates the program and performs all billing and money collection. The utility then channels the funds collected to an external account managed by a third party. Decisions about the use of project funds are made by a governing board established to administer program funds.

**Conserve to Enhance puts the environment “at the table” as a water customer.** One of the drivers behind the development of the Conserve to Enhance mechanism was the need for supplemental water for environmental enhancement projects. In Arizona, this need was clearly demonstrated by a recent study that looked at 30 environmental enhancement projects and found that 80% had a need for supplemental water inputs (Megdal et al, 2006). The majority of these projects were voluntary and unrelated to compliance with state or federal regulations. The projects ranged widely in both sponsorship and goals. Sponsors included cities, the US Army Corps of Engineers, nonprofit environmental groups, and universities. Among project objectives were preservation of endangered species habitat, general environmental restoration and enhancement, wetlands development, recreation, education, and research.

Conserve to Enhance creates a mechanism to meet the need for supplemental inputs of water on a variety of projects. The mechanism provides a revenue stream to purchase water at market rates, putting the environment “at the table” as a water customer, potentially competing with other water uses for available supplies.

**Measuring conservation against actual past water use offers benefits, poses problems.** The Conserve to Enhance program works by calculating the water conserved by program participants. In order to measure reductions in water use, an initial baseline water use rate must be established. Once a baseline water use rate is set, the difference between the baseline rate and monthly water use below this baseline is counted as conservation.

The authors looked at several ways to establish baseline water use rates such as deriving baselines from community-wide averages for household water use, average use rates for specific customer classes, and actual past water use at a specific meter. A baseline derived from actual past water use

at a specific meter is the only baseline type that targets above-average water users and creates the greatest pool of potential participants. Utility representatives and roundtable participants stated that these objectives were essential to the program design because they would maximize the amount of water conserved and therefore the amount of money that could be generated. In addition, only the baseline based on actual past water use requires participants to reduce their water consumption to below their previous use rates in order to contribute to the fund.

However, the individualized past water use baseline requires that past water use data on individual customers be available and that the utility billing system be capable of handling additional calculations and accounting. Utility representatives pointed out other issues that could complicate the calculation of an individual's past use baseline. For example, weather can significantly affect water use rates. If a participant's baseline water use rate is established on the basis of an abnormally cool and wet year, it is likely to be artificially low. This will make it more difficult for the participant to realize conservation gains over the baseline rate during average years or years that are hotter than average. Conversely, an abnormally dry year baseline could inflate conservation gains.

In addition, actual month-to-month water consumption at the individual household level can show extreme variations that are not explained by weather or any other communitywide variable. These variations may be caused by the filling of a swimming pool, sporadic irrigation behavior, or temporary changes in demand attributable to houseguests. Figure 1 shows water use at four residences in the same neighborhood as well as the neighborhood average over a six-year period. Not only does use vary from home to home (as would be expected), but there are also larger-than-expected variations in use from year to year. Some erratic behavior from month to month is found

within the same household. These variations complicate the use of individual past water consumption as a baseline. In order for the baseline to be effective, these variations must be

cussion hosted by the University of Arizona Water Resources Research Center in Tucson.

**Keep it simple.** Simplicity should be a hallmark of every aspect of the

*The type of billing system in use could make or break the possibility of implementing a conservation program such as Conserve to Enhance.*

smoothed out to some degree in order to provide program participants with a reasonable water use baseline for each month. A possible solution might be to take a customer's total annual water consumption and distribute it over a typical seasonal curve, with higher use in the summer and lower use in the winter.

#### **PROGRAM SUCCESS DEPENDS ON KEY COMPONENTS**

The municipal water conservation program described here does not provide a complete blueprint for all of the details of a readily implementable program. The design of each program is determined by the human, technical, and environmental resources and constraints of the program area. In addition, community values and individual needs will play into the specifics of program design. Nonetheless, the authors can point to general considerations and recommendations for overall design that have been gleaned from research of similar conservation programs in the energy sector, interviews with water utility representatives and experts in water and environmental issues, and a roundtable dis-

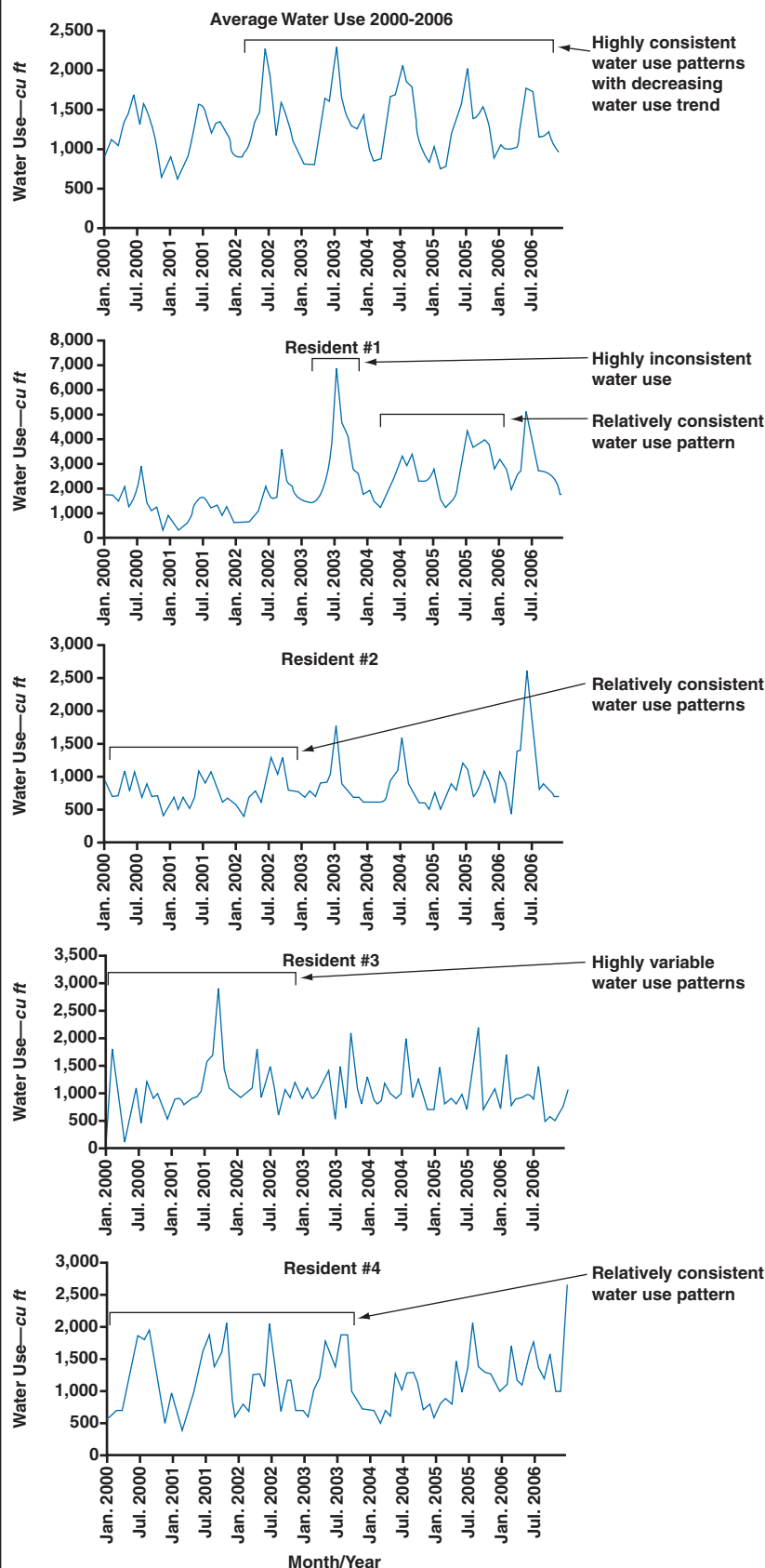
program. The public must be able to easily grasp the entire process, from the mechanism used to generate the funds through the selection of projects to be supported. Research on similar programs found that the most successful programs were those that could be clearly and briefly articu-



PHOTO: THE NATURE CONSERVANCY

**Three Links Farm is a rural property owned by The Nature Conservancy. The property is adjacent to a small creek that sustains important riparian habitat. The groundwater pumping rights on the land have been retired to increase stream flow in the river.**

**FIGURE 1** Water consumption over a six-year period for a neighborhood and four individual households



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lated and that demonstrated easily understood results (US Department of Energy, 2006; Bird et al, 2004).

How the Conserve to Enhance program is described to potential participants is essential to its success. One popular means of furnishing water customers with information about new services is an insert or flier included with the monthly statement. The Conserve to Enhance information must be concise and provide customers with a full understanding of the program and the expected results. Program components such as the funding mechanism, the method of calculating conserved water, payment responsibilities of participants, and the use of project funds must be kept sufficiently simple so that all of the information can be conveyed in a short summary. Many roundtable participants expressed concern that a complex program would make it difficult to engage potential participants and reduce the likelihood of participation.

**Provide tangible results.** The expected results of a Conserve to Enhance program should be tangible and explicitly detailed. Analogous programs in the energy sector offer a clear parallel for a Conserve to Enhance program. The US Department of Energy has designated utility programs that provide renewable energy options to customers as "green pricing programs." In these programs, consumers who are concerned about air pollution and their contribution to greenhouse gas accumulation in the atmosphere can pay extra to mitigate the effects of their home energy use. Green pricing programs directly connect consumer behavior with a monetary contribution to be used for environmental purposes. A characteristic shared by successful green pricing programs is the demonstration of a clear and tangible result (US Department of Energy, 2006; Bird et al, 2004). One of the most effective green pricing strategies is to provide customers with the option of paying a small premium on each kilowatt-hour of electricity that they use in order to substitute



energy supplies from fossil fuel sources with renewable energy sources on a one-to-one basis.

The use of project funds should be spelled out so that potential participants have a clear picture of how their contributions will be used. Nebulous descriptions, such as “contributions will purchase water for environmental restoration projects,” may diminish interest in the program. Instead, the project description should detail exactly what the funds support and list the benefits to the local community derived from the project. Before-and-after photos could offer participants (and potential participants) visual evidence of the difference made by a Conserve to Enhance contribution.

A pool of funds earmarked for environmental enhancement projects could be used for a number of activities. These include reducing groundwater pumping or surface water diversions in specific vulnerable or valuable areas by paying the additional costs of acquiring water elsewhere; purchasing land with groundwater rights along waterways and retiring groundwater pumping; purchasing or leasing water rights for instream flow purposes; and paying for monitoring and maintenance of ongoing environmental enhancement projects. Although all of these activities may provide significant environmental benefits, they may not be equally understood by the general public. The authors’ analysis indicated that a Conserve to Enhance program could garner increased participation and support by funneling project funds toward simple, concrete activities and highly visible projects that directly benefit the local community.

In the arid southwest, the focus area of this study, supplemental irrigation water is a key input for environmental enhancement projects. Using funds for this purpose may provide visible and even dramatic results that would secure immediate validation within the community. Another advantage is that irrigation to sup-

port revegetation typically is required for only about three to five years. This means funds could be used to start a new project every few years without long-term commitments to any single

ily be reconfigured or add new modules to achieve a wide array of billing, monitoring, or information-gathering goals. Other utilities use older, less flexible systems that require major

**O**nly the baseline based on actual past water use requires participants to reduce their water consumption to below their previous use rates in order to contribute to the fund.

project. In other regions, different uses for program funds may be more appropriate. California’s Environmental Water Account, for example, could serve as a possible model for use of Conserve to Enhance funds. The Environmental Water Account purchases water from willing sellers to offset reductions in water deliveries by the California State Water Project as a result of efforts to protect instream flows for Sacramento–San Joaquin Delta fish.

#### **UTILITY COMMITMENT AND INVOLVEMENT IS ESSENTIAL**

A Conserve to Enhance program requires active participation and support from the local water utility. Several considerations arise from this involvement. How will the utility’s billing system handle the additional calculations needed to implement the program? When and where will conserved water be used? What type of water will be used for environmental projects? Will utility revenues be reduced because of conservation? How will this new water customer—i.e., the environment—affect competition for scarce water supplies? Before implementing a Conserve to Enhance program, utilities and other involved parties must address these and other questions.

#### **Is the billing system adequate?**

Water utility billing systems vary significantly from utility to utility. Some systems are cutting-edge and can eas-

ily be reconfigured or add new modifications to achieve even simple changes to the system (Wiseman, 2006). The type of billing system in use could make or break the possibility of implementing a conservation program such as Conserve to Enhance.

In the Conserve to Enhance program as described here, all record-keeping, billing, and revenue collection is accomplished through the utility and its billing system. Older billing systems may demand large investments of time and money to develop the additional systems needed to achieve the billing requirements of a Conserve to Enhance program. Software development experts consulted for this study estimated that an older system not designed for convenient modification could require an investment of around \$200,000 to accommodate the proposed program (Herron, 2006; Wiseman, 2006).

On the other hand, the same software billing experts stated that a newer, more flexible system could be modified to meet the program’s needs for as little as \$10,000. Representatives of one utility reported that their billing system was already capable of handling the program’s accounting and billing requirements and that modifying the system would be a simple process.

In fact, several utilities around the United States currently practice a specific type of billing—goal-based billing—which employs

**The Kino Environmental Restoration Project is an urban park and constructed wetland. The park is a storage area for storm water and has an irrigation system to deliver storm water and reclaimed water to adjacent ball fields and wetland habitat.**

billing systems that are similar to what would be required for the Conserve to Enhance Program (Wiseman, 2006). Under goal-based billing, customers are given a target water use amount for a given time period. If their actual water use falls below the target, the customers may be rewarded. If their actual water use is above the target, the customers pay a fine or an increased rate for their water. Goal-based billing (also known as water budget-based rates) has been successfully implemented by several water utilities and water districts. The Irvine (Calif.) Ranch Water District (IRWD) instituted goal-based billing in 1991 during a period of extreme drought and has kept the program in place. The IRWD uses a four-tiered system, with rates doubling from one tier to the next. The program has been successful in reducing water use in all sectors (IRWD, 2005).

Goal-based billing is similar to the Conserve to Enhance baseline mechanism in that it involves a calculation of individual water use. However, in contrast to the actual water use baseline recommended here, most jurisdictions that have implemented goal-based billing rely on average use rates based on average household size and landscaped area for residential users (Barta, 2004). The use of averages can trigger potential concerns about equity. For example, larger-than-average households may have difficulty staying within their water budget amount and be unfairly penalized (Beecher et al, 2000). Nevertheless, it may be beneficial to test



PHOTO: WATER RESOURCES RESEARCH CENTER-UNIVERSITY OF ARIZONA

implementation of a Conserve to Enhance program in a service area that already has implemented goal-based billing. One of the rewards for consuming less than the target rate of water use could be the option to pay for the water at the target rate and donate the difference to an environmental water fund.

Once baselines are established and understood, the ongoing Conserve to Enhance program must provide participants with a clear monthly accounting of their water use and contribution to the environmental enhancement fund. Figure 2 shows a sample water bill for a Conserve to Enhance participant. In this example, the customer's water use of 13 ccf (1,300 cu ft) results in a monthly bill of \$19.65. However, because the customer has elected to participate in the Conserve to Enhance Program (as indicated in the gray area), the customer pays for a baseline water use of 14 ccf, resulting in a monthly bill of \$20.75; the \$1.10 difference between \$19.65 and \$20.75 represents the customer's contribution to environmental enhancement.

**What is the value of water and how should it be measured?** Few water utilities pay a resource cost for the water

they supply. Instead, the cost of water typically is driven by the cost to pump (or divert), treat, and deliver the water. Any attempt to account for conserved water volumetrically and deliver an equal amount of water to environmental projects raises significant issues. If the conserved water is delivered at a different time of year or to a different area of the distribution network, the cost of delivering the water may differ significantly. In addition, potable quality water is not needed for environmental restoration. Effluent or low quality groundwater or surface water can be used for irrigation purposes, often with no additional treatment. Using water supplies that do not require additional treatment results in cost savings.

Conserved water should be billed and paid for by participants at the same rate they would have paid had they actually used the water. In other words, participants pay for their full baseline allocation or the amount owed for actual water delivered, whichever is higher. Of that payment, the utility receives the amount owed for the actual delivery of water used by the customer. If the customer has reduced water use, the difference goes to the Conserve to

Enhance fund. Contributions to the fund are in dollars, not gallons of water. This allows the fund to act as a water-using customer with money to spend on the most appropriate type of water available.

**Will the program increase competition for already scarce resources?**

Many water utilities, especially in water-scarce areas, are actively involved in conservation and acquisition efforts to support the future needs of their customers. What are the ramifications when a utility participates in a program to use some of that hard-won water for alternative uses? By allowing water to be used for these alternative uses is the utility “tying its hands” on possible future uses of water?

Conserve to Enhance actually requires reductions in individual water use before water can be purchased for environmental purposes. Thus, the program converts water saved in the municipal sector into water for the environment. The program is designed to stimulate additional conservation that would not have otherwise occurred. In this light, the water conserved by program participants could be viewed as actually

increasing the water available to support future human needs.

**Does conservation mean lost revenues?** Utility involvement in conservation efforts can raise challenging

customer, and the revenues from reclaimed water sales contribute to offsetting the lost revenue from reduced potable water use. As with all successful conservation efforts, if rev-

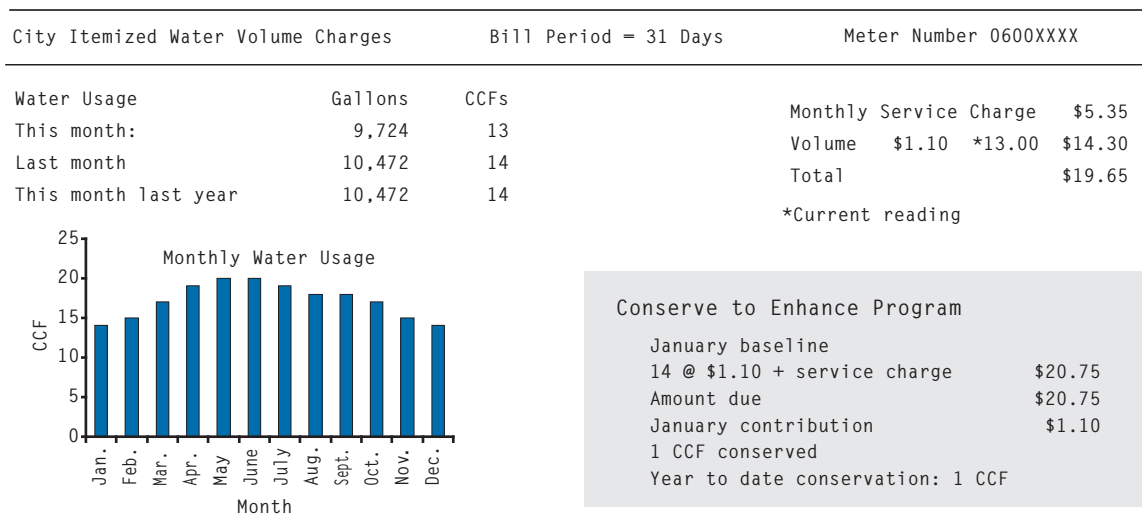
*The public must be able to quickly grasp the entire process, from the mechanism used to generate the funds through the selection of projects to be supported.*

issues. After all, water providers depend on revenues from the consumption of their product, and reduction in consumption reduces revenues. However, with a Conserve to Enhance program, it may be possible to keep total revenues constant while changing the demand for different classes of water. For instance, in service areas where reclaimed water is available, funds from the program could be used to buy reclaimed water from the participating utility. In this scenario, the environment becomes another paying

enues lost through conservation cannot be fully offset, a rate adjustment may be required to realign revenue and expenses.

An advantage of the Conserve to Enhance program is that the water conserved likely is of a higher quality than the water purchased for environmental purposes. The conserved water is potable quality water that can be used to support future human needs; water used for environmental projects does not necessarily need to be potable.

**FIGURE 2** Sample water bill for a Conserve to Enhance participant







The Lower Santa Cruz River is an incidental (unintended) restoration area. A dense community of native and non-native riparian vegetation has grown up where treated wastewater effluent is discharged to the river.

**What management and legal issues are associated with utilities collecting donations?** There are several examples of public or private utilities collecting voluntary donations from their customers and channeling the money to a third party. For instance, many gas and electric utilities allow customers to add an additional voluntary contribution to their bills to assist low-income customers in need. Problems can arise, however, when public resources are used to support nonpublic activities. For this reason, any management, administrative, or technology costs of implementing a Conserve to Enhance program should be covered by program revenues.

An additional legal issue may arise with a Conserve to Enhance program because the program potentially will result in reductions in overall water consumption by program participants. With the fixed infrastructure and management costs of delivering water remaining constant, as total water demand falls, the cost of delivering each unit of water is increased. The question then arises, how is this

increased marginal cost for water handled? Typically, as community per capita water demand falls, utilities adjust their rates upward to balance their delivery costs with the rates paid by customers.

Some utility representatives expressed concerns about the possible consequences of a Conserve to Enhance program in this context. Water conservation by program participants could, in fact, lead to increased rates for all customers. This raised an issue for utility representatives because rate increases are often met with public resistance. Several utilities had ongoing initiatives to raise water rates in order to accommodate increased operations costs, water acquisition costs, or infrastructure replacement costs. Any additional requirement to raise water rates could exacerbate the challenges associated with securing needed rate increases. A few utility representatives even suggested that increasing the marginal cost of water by encouraging program participants to conserve water could trigger a legal challenge to the program.

## PARAMETERS ARE NEEDED TO DETERMINE HOW FUNDS ARE USED AND WHO DECIDES

A revenue stream earmarked to help fund environmental restoration projects is likely to attract numerous proposals for environmental enhancement projects. It is essential that a Conserve to Enhance program include clear guidelines on the kinds of projects that will be funded and the entity that will ultimately select the projects. A decision-making body will be needed to evaluate possible uses for program funds and manage program expenditures. Although the specific characteristics of this decision-making body, the method of project selection, and the advertising and reporting strategies of an individual program will be determined by local values and resources, the authors have developed some broad principles for designing these program elements, based on input from stakeholders.

**Use of funds should be determined by an independent board.** The authors' analysis indicated that the decision-making board should be constructed to maximize public trust and instill confidence that decisions are being made appropriately. Recommendations to help ensure this trust and confidence include the following:

- Water utility and local political representatives should be given at least an advisory position on the board so that pertinent infrastructure, resource, and political issues are given consideration in the use of program funds.
- The credibility and trustworthiness of the program will be tied to the perceived credibility and trustworthiness of the board members. The decision-making board should be populated with stakeholders who will make decisions based on environmental and public benefit.
- The composition of the board should be diverse enough to represent a variety of values and perspectives.
- Citizen participants should be represented on the decision-making board. Participants may have interests

not shared by technical experts, utility personnel, or political representatives. In addition, citizen participation on the board will demonstrate and provide for increased transparency.

Another question that must be addressed is how much leeway the board will have in making its decisions. Special attention should be given to the trade-off between ensuring decision-making flexibility and setting pre-established criteria to limit decision-making disputes. The community context may dictate whether a detailed mission statement and criteria need to be developed to guide decision-making or whether the board should have broad discretion to approve or reject potential projects.

**Selecting the right project is essential to program success.** The projects supported by Conserve to Enhance program funds constitute concrete expressions of the program and its operations. Each project must offer the public a clear example of how the program works and the benefits it generates. Projects that are local enough to provide visibility and demonstrate public use benefit will enhance the program's profile and help spark community involvement. The project selection process will have to address additional questions about the specific characteristics of supported projects, taking into consideration the local community's values.

- What should be the objective of environmental enhancement projects supported by the funds? Is habitat creation important? Is the presence of endangered species paramount? Is convenient public access a requirement?
- Within what geographical range will project funds be used?
- Given available water supplies, what are viable locations for projects?
- How much money will be allocated to a single project and for how long?
- How will projects with long-term supplemental water requirements be handled?
- Can program funds be used for purposes other than purchasing water?

The project selection process also will have to consider the variable amount of money that will be available each year to fund program projects. For example, weather may significantly affect participants' ability to contribute to the fund, resulting

tions, available water supplies, and options for acquiring access to those water supplies must be analyzed to determine the most appropriate implementation strategy.

**The choice of partner may make all the difference.** The authors' analysis

**O**ne of the drivers behind the development of the Conserve to Enhance mechanism was the need for supplemental water for environmental enhancement projects.

in program revenues falling in hot and/or dry years. These are potentially the same years in which demand for water for environmental needs would peak.

Past conservation efforts have taken advantage of a number of different water sources to supplement the water needs of specific projects (Megdal et al, 2006). Groundwater, surface water, and effluent have all been used to supply restoration projects with needed water. In most cases, acquiring and delivering these water supplies to the project have entailed significant costs. In other cases, projects have taken advantage of insecure water flows that could be redirected at any time, compromising the characteristics of the restoration project. These difficulties in securing water sources to support restoration activities may pose barriers to some projects. Funds from a Conserve to Enhance program could reduce these difficulties, providing additional financial support to secure water supplies for environmental enhancement projects.

The specific strategy for using program funds for environmental enhancement, the type of water used (effluent, surface water, or groundwater), and the agreements for use of the water likely will vary greatly from region to region, from program to program, and possibly from project to project. Local environmental condi-

of the costs of environmental enhancement projects indicated that a Conserve to Enhance program is unlikely to generate enough money to fully fund the purchase, planning, construction, and operation of an average-sized project. However, the Conserve to Enhance program is not intended to be a stand-alone effort capable of planning, designing, managing, and maintaining environmental projects. Indeed, as envisioned, the primary purpose of the program is to develop a revenue stream to buy water for environmental purposes.

Because a Conserve to Enhance fund is meant to serve as a source of revenue that contributes to new or ongoing environmental restoration activities, partnerships with outside groups will likely be a necessary element in the success of the program. Partnerships could be developed to leverage program funds and help generate additional restoration funds. Many grant programs that support environmental enhancement activities require matching funds. The Conserve to Enhance program could assist project sponsors in both meeting this requirement and increasing the money available for environmental restoration work.

In the context of using program funds to purchase supplemental water for environmental enhancement, partnerships could be formed

with organizations that are either planning projects or managing ongoing projects. The partner organization or agency would carry out the planning, construction, and management of the project, with Conserve to Enhance program funds going toward the pur-

A visible, local, and accessible restoration project that benefits from Conserve to Enhance funds both promotes the program and offers a means of providing feedback to the community. The project could have a sign at its entrance noting the assis-

tions. Instead, participants make a flat-rate contribution each month.

A significant trade-off of this simplified program is that it incorporates no connection between conservation behavior and water for the environment. However, it would develop a revenue stream to support environmental enhancement activities and validate the premise that individual water users are willing to voluntarily contribute to help provide additional water supplies for environmental enhancement.

Despite its lack of connection to water conservation, such a program constitutes a reasonable first step toward putting the environment “at the table” as a water customer. The revenue stream generated by the program would provide experience with purchasing water for environmental purposes. Even a simple pilot program would also serve as an example of how a Conserve to Enhance program could work and what might be accomplished. If the pilot project proved successful, additional complexity to tie the program more directly to household water conservation could be built in.

## CONCLUSION

New and innovative strategies are needed to meet the water needs of the environment. Municipal water conservation is one possibility for meeting these needs. Although municipal water conservation has traditionally been considered a means of expanding available water supplies, it could also support efforts to return some water to the environment.

The Conserve to Enhance concept provides an innovative framework for a voluntary municipal water conservation program that encourages environmental motivations for conserving water by directly connecting water conservation to the purchase of water to restore or enhance the environment. In essence, the program puts the environment “at the table” as a water-using customer able to pay for water. The program asks customers to pay for water that they do

*The expected results of a Conserve to Enhance program should be tangible and explicitly detailed.*

chase of supplemental water. Such an arrangement could significantly reduce ongoing operations’ costs for the partner organization.

Conserve to Enhance decision making boards should exercise great care when forming partnerships and associations with other organizations and agencies. The best partners are established organizations and agencies that have performed restoration work in the past and have a proven track record. A history of success with restoration work would also serve to build public trust that funds are being spent wisely.

**Program support can be bolstered through reporting, accountability, and public feedback.** Providing participants and potential participants with periodic updates of the program may be required by law and can serve as an important advertisement for the program. The public should be informed about how much money the program generates, how the contributions are being used, and how funds will be used in the future. General reporting could occur through periodic updates on program activities distributed through a newsletter or water bill insert. Methods for distributing program information should attempt to reach a larger audience than just current Conserve to Enhance participants. Sending updates out to the larger population of water users may stimulate increased participation and community recognition of the program.

tance received from Conserve to Enhance funds. In addition, it may be beneficial to involve the community (and particularly participating water customers) in projects supported by the Conserve to Enhance program. Volunteer days or special events at project sites could be used to reinforce the connection that participants share with the projects.

## PILOT PROGRAM IS THE FIRST STEP TOWARD IMPLEMENTATION

Water providers interested in implementing a Conserve to Enhance program may want to begin with a pilot program. More than one pilot effort (of different scales and levels of complexity) could be tested simultaneously. Ideally, any Conserve to Enhance pilot program would connect actual reductions in water use to contributions to an environmental enhancement fund. However, it may be prudent to base at least some pilot programs on a simplified mechanism and billing process.

One possibility for a scaled-down voluntary program to help purchase water for the environment would be a simple check box on the customer’s water bill. Each month, the customer could elect to add a small contribution to a fund to buy water for the environment. This approach eliminates many of the overhead costs and some of the need for administrative decision-making and does not require any calculation of water use baselines or variable monthly contribu-



not use so that the extra monetary amount can be used to fund environmental restoration. Participants in the program must make actual reductions in water use below what they have historically used in order to make a contribution to the program.

These contributions can then be used to fund a needed source of water for environmental enhancement projects. The types of projects supported will depend on the particular jurisdiction involved. The authors recommend that Conserve to Enhance funds be used to purchase supplemental irrigation water for revegetation. This type of activity provides a concrete and tangible result with an easily understandable link between conservation efforts and improved environmental amenities. In addition, supplemental irrigation water typically is needed for a limited time period, which eliminates problems with long-term water allocations and allows the program to support multiple projects over several years.

A critical factor in the success of a Conserve to Enhance program is utility involvement. The authors recommend that the local water utility play an integral part in all aspects of program implementation. The water provider needs to be seen as an active partner in the program, and utility representatives

should participate in the development of the program's specific characteristics.

One of the most important considerations in developing a Conserve to Enhance program will be the water utility's billing system. The flexibility of billing systems varies widely from utility to utility. Water suppliers with older, less flexible billing systems will have limited ability to support the additional accounting and calculations needed for more complex conservation accounting.

This article does not provide a complete blueprint for the implementation of a Conserve to Enhance program but rather a framework for program development. Implementation of such a program will require additional investigation and consensus-building with consideration of local values and resources.

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#### ABOUT THE AUTHOR



**Andrew Schwarz**  
(to whom correspondence should be addressed) is an engineer with the California Department of Water Resources, 901 P

St., Sacramento, CA 95817; e-mail [Andrew.m.schwarz@gmail.com](mailto:Andrew.m.schwarz@gmail.com). He has a BS degree in civil engineering from the University of Wisconsin at Madison and an MS degree in environmental planning from the University of Arizona at Tucson. At the time of this research, he was associated with the University of Arizona Water Resources Research Center in Tucson. Sharon B. Megdal is the director of the Water Resources Research Center.

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