

**How to Implement a Cost-effective
Landscape Water Efficiency Program**
*Proven Outdoor Water Conservation
Strategies Benefit Agencies, Consumers,
Industry and the Environment*

A WHITE PAPER
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Executive Summary

In the face of fast growing populations, straining infrastructure, increasing regulation, and long-term drought conditions, water agencies across the country are challenged to deliver a reliable, high quality water supply to their customers. The pressure is not likely to ease. Meeting future water demand requires that we act immediately to conserve twenty-five percent of our current supply, according to the Metropolitan Water District of Southern California, the nation's largest water provider.

Grappling with other water-related issues, many agencies have decided to delay conservation projects until the public perceives a critical shortage. Some agencies face political barriers or consumer resistance to saving water. Past conservation programs have produced largely disappointing results, causing enthusiasm to dwindle. Given all of these constraints, how can water providers stretch existing supplies and develop new sources while they hold down infrastructure costs?

This white paper answers these questions, drawing on years of experience in designing and implementing landscape conservation programs. We'll discover that the causes of landscape water waste, and the need for water efficiency, are essentially the same in every provider's service area, regardless of the differences in our climates. We'll explore why landscape water efficiency offers agencies a cost-effective new water supply and review proven methods for achieving conservation objectives. The cost-sensitive programs described galvanize consumer and industry support, and they are applicable to agencies of all sizes, in all regions.

Extending Water Conservation to the Outdoors

The widespread implementation of low-flow plumbing devices has saved significant amounts of water in the past decade. In Los Angeles, California, the powerful combination of a federal code requiring low-flow plumbing devices in new developments and rebates for installing these devices in homes and commercial sites has reduced water demand by twenty-five percent. This savings relieved the city's dependence on the Owens Valley reservoir, helping to restore the region's lake environment, while providing a reliable supply for the nation's second largest city.

Today, with low-flow plumbing devices specified in new construction projects and firmly established in consumers' minds, the focus of new conservation efforts is quickly transitioning from the indoors to the outdoors. Dan Griset, a board member of the Metropolitan Water District of Southern California, aptly describes landscape water efficiency as, "the next frontier."

This trend is fueled by several compelling factors. Consider that agencies must ensure that their water infrastructure can satisfy peak demand and emergency flow requirements. Take, for example, Bend, Oregon, a city in the state's high desert region which receives less than five inches of rainfall during its seven-month irrigation season. In Bend, indoor water use is relatively flat during cool months. As the weather gets warmer, water demand rises. It peaks in the hottest weather period when demand for landscape water is greatest.

Analysis has shown that agency demand curve peaks have been pushed to artificially high levels because landscapes need significantly less water than is typically applied to them. However, if landscape water use were efficient, the water infrastructure and supply would accommodate many more customers without costly upgrades. Moreover, customers would pay less for water. The result is a win-win for elected water officials: a more reliable water supply and satisfied customers.

Examining current agency programs and past studies data, we see that it is likely that as much as fifty percent of current landscape water could be saved. For example, in Irvine, California, landscape water conservation programs have reduced commercial irrigation by forty-five percent. It is estimated that as much as fifty percent of Colorado's home landscape water is wasted. A University of Florida study found overwatering levels of between twenty-nine percent and eighty-two percent, regardless of plant type, in examining residential irrigation practices.

If a city like Bend reduced current landscape water use by fifty percent, peak water use would be reduced to 16.5 million gallons per day in the summer. This savings of nine million gallons per day would provide water for an additional two-thousand households without any new infrastructure or water supply. Bend is making progress toward its water conservation objectives through the adoption of weather-based irrigation management by the City government as well as businesses and homeowners in the area.

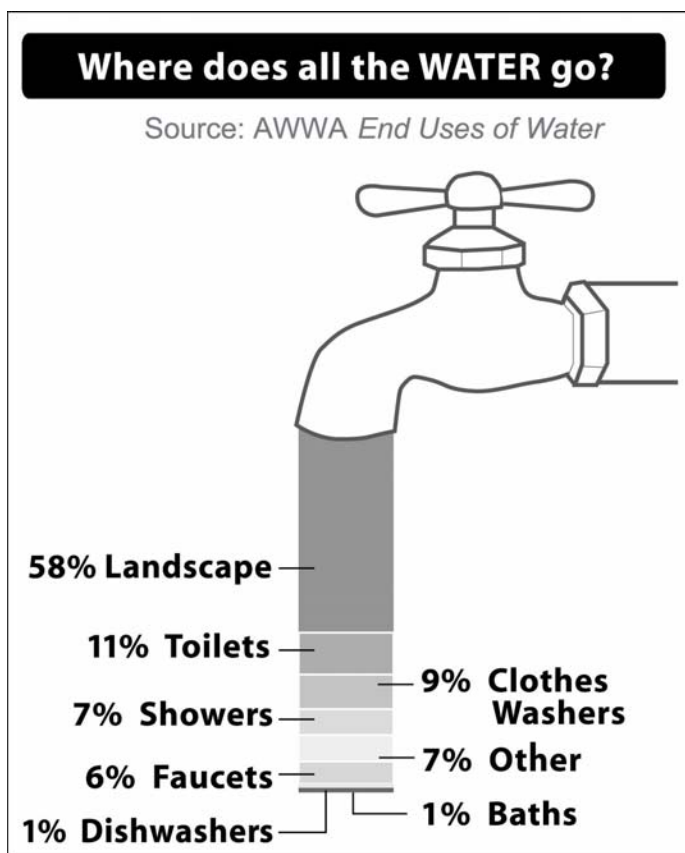
The advantages to landscape water conservation are far-reaching. Not only is the need for expensive infrastructure upgrades reduced, but there are also measurable environmental benefits. Efficient landscape water use yields significant dividends by reducing the tremendous costs incurred in pumping and transporting water. It is estimated that it requires ten percent to thirty percent of California's total energy supply to move water from its source to the regions in which it is consumed (California Urban Water Conservation Council, 2001). Reducing water waste would reduce energy requirements by a corresponding percentage.

Additionally, landscape water runoff contains pollutants from fertilizers, pesticides, and herbicides that are now being measured in our lakes, streams, bays, and oceans. Metropolitan Water District of Orange County (MWDOC) conducted a peer-reviewed study that documented the relationship between landscape water waste and non-point source water pollution. It is now plainly evident to a growing number of providers that a successful long-term landscape water conservation program will protect water supplies and achieve additional environmental benefits while it secures a new water supply for any service area.

Consumer support is spurring rapid adoption of landscape efficiency programs. Regardless of the climate or region of the country, consumer support can be quickly won through significant cost savings in individual water bills and overall water delivery system costs. In fact, landscape water efficiency is likely to be a water provider's cheapest supply of new water.

Evaluating Program Cost-effectiveness

A Southern California-based water district operating in a region served predominantly by one water source recently determined the cost-effectiveness of a service area-wide landscape efficiency program. Based on pilot program results that were extrapolated across a larger customer base, the water district found that the installation of weather-based irrigation controllers would save thirty-five percent of water currently applied to landscapes in the service area. The water district determined that installing the controllers would cost twenty-nine percent less than securing more water through infrastructure expansion and water purchases.



In Colorado, deep groundwater aquifers are the primary source of water. Area population estimates show that demand is outpacing supply. In twenty-five years, demand will surpass aquifer yield capacity. The city aims to reduce landscape water use by twenty-five percent to postpone the need for new water supplies, safeguarding public funds to meet future demand.

Indoor water savings have been realized in most communities. But the American Water Works Association (AWWA) reports that fifty-eight percent of non-agricultural water is applied to residential and commercial landscapes, whereas toilets use just eleven percent. Low-flow toilets save water automatically with every flush, but they were a tough sell to many consumers. By contrast, convincing consumers to adopt

effective outdoor conservation appliances has been easier because people enjoy spending

time in their gardens. Eighty percent of American households participate in some form of gardening for enjoyment, environmental benefit, or enhanced property value (National Gardening Association survey, 2003).

This is very good news for agencies because the demand for water is outpacing supply. Based on a survey of state water departments, the U.S. General Accounting Office concluded that thirty-six states will have “water shortages in average rainfall years by 2010.”

Examining Past Methods for Outdoor Water Conservation

Historically, agencies have employed these three primary methods to manage landscape water use:

1. Educating the public and green industry professionals.
2. Implementing design/construction guidelines and permitting approvals.
3. Restricting water usage, primarily during water-short periods.

While these methods achieved short-term successes, each suffered from some degree of negative public response and failed to produce sustainable water savings. Historically, when public awareness campaigns concluded, water use quickly reverted to pre-campaign levels. The Metropolitan Water District (MWD) discovered that residential water savings lasted just four months following public education outreach programs.

Similarly, landscape design guidelines that mandate agency review prior to installation seldom include any mechanism for monitoring ongoing water use. There is simply no feasible means of ensuring that the landscape is efficiently irrigated post-installation. Landscape water waste has not been consistently reduced through such programs as the following example from a Bay Area-based water district illustrates.

Water district staff reports that water use is actually higher today in new homes than in older homes with comparable lot and structure sizes. This is despite: 1) increased agency conservation programs, 2) mandated installation of low-flow plumbing devices into all homes built since 1992, and 3) use of low water need plants suggested by state legislation (AB 325). Efficient indoor water use is considered a widespread practice in the area, which points to increased landscape water use, despite conservation measures.

Educating the Public and Green Industry Professionals

Educational programs intended to reduce landscape water waste have largely failed to produce consistent and measurable results. Why?

- There has been little or no incentive for homeowners and landscape professionals to reduce landscape water use due to the low price of water and lack of penalty for over-watering.
- It takes significant time and skill to manage landscape water efficiently, either by the homeowner or the landscape professional. Even highly skilled professionals typically over-water by thirty-three percent.
- Landscape professionals are rarely contracted to fix irrigation systems and manage water according to changing local weather conditions and actual plant needs.
- Educational programs must be ongoing to be successful, and that makes them expensive. Even then, it is difficult to effectively measure their results.

Implementing Design/Construction Guidelines and Permitting Approvals

Past efforts to save landscape water have focused on new homes and commercial landscapes. Most encourage low water use plant types and efficient irrigation system design. Additionally, several programs require that new landscapes meet local or state allocations for landscape water use. While these guidelines are important, on their own they lack the “teeth” necessary to sustain water savings because:

- Local governments typically cannot spare staff resources to conduct site audits and plan checks.
- Local government employees are rarely *also* landscape irrigation experts.
- Proper installation of an approved system is seldom verified.
- Once installed, even well-designed landscapes are usually over-watered.
- There is no formalized monitoring of landscape site maintenance, which is essential in keeping irrigation systems efficient and detecting over-watering.
- There is no site water use tracking, i.e., comparing actual use to a site’s water budget, or water need, to highlight and educate the site owner about excessive water use.

To estimate the water budget for any residential or commercial landscape, use the water savings calculator at www.hydropoint.com/calculator

Public awareness campaigns, design/construction programs, and landscape ordinances have been thoughtfully conceived, but they’ve failed

to fulfill their promise due to: 1) limited enforcement, 2) insufficient financial incentives, and 3) lack of mechanisms to monitor water use efficiency post-installation.

Nowhere was this scenario more clearly demonstrated than in California following the adoption of a comprehensive state landscape conservation ordinance in 1992 (AB 325). Prompted by a severe five-year drought, the California Department of Water Resources partnered with landscape experts and public agencies to develop a landmark scientific approach to designing and installing water-efficient landscapes for new developments. Ten years later, a review of the ordinance evaluated its performance to date. Analysis revealed that the state law failed to bring about water savings.

Recognizing that the original ordinance did not succeed in reducing landscape water waste, runoff pollution, peaking, and other issues, lawmakers authorized the state to rewrite the ordinance. New recommendations will go to the state legislature for approval in January 2006.

Restricting Water Usage

Typically a last resort measure, water restrictions are implemented during water shortages, drought, or crisis situations; they usually last only as long as the community is threatened. Once Mother Nature has provided enough rain or snow to fill reservoirs for the season, landscape water use restrictions are lifted. Merely a short-term fix, restrictions do not drive long-term customer water efficiency. Furthermore, their disruptive nature can lead to political upheaval for the agency and economic damage to local building and landscape industries.

Consider this example from Colorado, which enacted strict landscape water restrictions in virtually every community in response to severe drought conditions in 2000-2003.

Ramifications of the restrictions included:

- A loss of 11,000 jobs in the landscape industry.
- Political upheaval in Denver (e.g., a new mayor, new water board members, and consumer lawsuits against the water provider for inequitable water restriction application across the consumer base).

- The hiring of “water police” to enforce water restrictions.
- A hot-line telephone number for neighbors to report neighbors who did not comply with restrictions.

During the shortage, Colorado’s restrictions achieved water savings of approximately twenty percent. However, anecdotal evidence suggests that savings were unfairly borne by consumers. Many consumers did not adhere to the restrictions while others made severe water use cuts that resulted in property damage.

Another example of the inadequacy of landscape water restrictions comes from Florida. Pinellas County commissioned Boulder, CO-based water management consultancy AquaCraft Inc. to evaluate conservation performance in the region. A key finding was that forty percent of single family accounts did not adhere to the landscape water use restriction, which limited watering to one day per week. The survey further revealed that these households were aware of the restriction and simply opted not to comply. Without enforcement and incentives, non-compliance with restrictions is likely to result in any community.

Providers with large service areas and limited resources find water use restrictions exceedingly difficult to enforce. In fact, restrictions have actually increased water use in some cases. During the severe drought of 2002, a municipal government in Colorado limited residential landscape watering to two days per week. Interestingly, water use actually increased by one percent, compared to prior year meter readings. In explaining this result, city officials surmise that residents attempted to maximize water consumption on designated watering days. That restrictions could actually increase demand was not really a surprise to many conservation professionals across the country – they’d seen such results before.

Over and over, these traditional methods for reducing landscape water demand have proven to be difficult to enforce and monitor, expensive for long-term use, politically unpopular, and, in some cases, actually counter-productive. In light of study results about typical landscape watering behavior, these lackluster results are not surprising after all.

Study after study has shown that nearly everyone, from novices to experts, over-waters. Why? Scheduling irrigation requires complex scientific equations that must be calculated daily as local weather changes. The fact is that accurately setting and adjusting irrigation schedules is difficult and time-consuming. Add to that, many homeowners mistakenly believe that the more water applied, the healthier the landscape. It’s time to stop deluding ourselves about the willingness and ability of homeowners and professionals to calculate efficient irrigation scheduling. A lot of time and money has already been poured into programs that have not altered landscape water use. That’s why leading water providers have charted a new course for achieving their goals.

Introducing Weather-based Irrigation Management

In 1998, the first weather-based controller was tested for its ability to accurately schedule and adjust irrigation by MWD and the Irvine Ranch Water District (IRWD). Existing residential controllers were removed and replaced with WeatherTRAK-enabled controllers in forty homes. New levels of water usage were compared against historical water usage for the same households. Following are the results of this pioneering study:

- Landscape water use in average water use households was reduced by sixteen percent to twenty-five percent.
- Plant health and appearance improved.

- Water bills were reduced.
- Customer satisfaction was measured at ninety-seven percent.

Why were satisfaction levels so high among study participants? Homeowners reported that their plants looked as good as or better than they did prior to WeatherTRAK installation, their water bills were lower, and that they did not have to do anything. Participants appreciated the convenience offered by the WeatherTRAK-enabled controller, which fully automates irrigation. This study, which opened the eyes of agency officials, marked the first time a controller was shown to maximize conservation by accurately irrigating in accordance with plants' varied needs and daily, local weather conditions.

Encouraged by the MWD-IRWD results, agencies conducted further studies of weather-based irrigation controllers. The table below summarizes study findings:

Study Name	Product(s) Tested	Objective	Key Findings	Notes
Irvine Ranch Water District (IRWD)/ Metropolitan Water District (MWD)	WeatherTRAK – enabled (daily ET, auto scheduling engine)	Test performance of auto ET and scheduling	16%-25% water savings; 97% customer satisfaction	Plant appearance improved; water bills reduced
Los Angeles Department of Water and Power (LADWP)	WeatherTRAK-enabled and Water2Save (managed schedules)	Compare performance on commercial sites	WeatherTRAK sets benchmark of 95% of conservation potential realized	Advantages of WeatherTRAK service model were proven
Santa Barbara County and Partners	WeatherTRAK-enabled	Test water savings	26%-59% savings	Customer service abilities noted by agency
California Environmental Protection Agency (Cal/EPA)	WeatherTRAK-enabled	Test runoff reduction and water savings	71% runoff reduction; 22% savings	71% reduction in mass loading of pollutants
Denver Water	AquaConserve (historical ET)	Test water savings	20% savings	Manufacturer report
City of Seattle	AquaConserve (historical ET)	Test water savings and user-friendliness	40% of homes had higher water bills; many found controller hard to use	Average savings for group
Los Angeles Department of Water and Power (LADWP)	WeatherTRAK-enabled	Test installation and savings in homes	40% savings to date	Customer service approach tested and passing
University of Nevada, Reno (UNR)	WeatherTRAK-enabled	Compare automated watering to expert, restrictions and landscaper	27% savings over landscaper; better plants compared to restrictions	
Boulder, Colorado	WeatherTRAK-enabled	Test water savings	Up to 59%	
City of Cotati, California	AquaConserve (historical ET)	Test water savings	No savings found	Units removed by agency

University of Nevada, Las Vegas (UNLV)	WeatherTRAK-enabled	Savings and plant health	Due September 2005	UNLV staff recommends the product
University of Arizona	WeatherTRAK-enabled, soil moisture sensor, sensor controller	Test water savings	Due 2006	
San Antonio Water System	WeatherTRAK-enabled, Weathermatic (temperature gauge)	Test water savings	Due 2006	
Metropolitan Water District	WeatherTRAK-enabled, AquaConserve (historical ET), WeatherSet (solar gauge)	Compare water use	WeatherTRAK watered at plant efficiency; historical product over- and under-watered; solar product over-watered	
University of California, Riverside (UC Riverside)	WeatherTRAK-enabled, AquaConserve, WeatherSet	Water to UC standard	WeatherTRAK met standard, other products did not	Controller installation was not standardized
Colorado State University	WeatherTRAK-enabled	Determine plant use (Kc)	WeatherTRAK was the only product able to water to ET levels for testing plants	
Soquel Creek Water District	WeatherTRAK-enabled	Test water savings	19% savings	Prompted agency to establish a program for commercial and residential landscapes
Newhall County Water District	WeatherTRAK-enabled	Test water savings	Due 2006	
City of Santa Rosa	AquaConserve (historical ET)	Test water savings	20% savings	Manufacturer report
University of Georgia	WeatherTRAK-enabled	Test water savings and plant health	Due 2006	

Verifying Weather-based Controller Benefits

A broad range of studies with varied settings and objectives has proven the benefits of weather-based irrigation management. WeatherTRAK-enabled controllers, now available from The Toro Company, Irritrol Systems, and HydroPoint Data Systems, have been tested more than all other products combined. Strangely, most so-called smart controllers do not have third party public agency studies to validate their bold marketing claims. Imagine if low-flow toilets were never tested by independent agency evaluators!

One of many programs worthy of note is the California EPA-funded study of the use of WeatherTRAK-enabled controllers in micro-watershed areas. Study methodology tested the controllers in neighborhoods of three-to-four-hundred homes with street landscapes as well

as homeowner association common areas and parks. The goal was to measure the ability of weather-based irrigation controllers to reduce urban runoff and non-point source water pollution through precise calculation of water applications.

The study found that runoff in neighborhoods with WeatherTRAK-enabled controllers was reduced by seventy-one percent, when compared to control neighborhoods. Researchers determined that the “mass loading of pollutants” into the waterway was correspondingly reduced by seventy-one percent. These impressive results led directly to the U.S. Bureau of Reclamation providing \$1.5 million in rebate funds for Orange County-based water agencies to distribute to consumers who install approved smart controllers.

Seven years of independent studies have established that proven controllers, particularly the WeatherTRAK-enabled controllers offered by Toro, Irritrol and HydroPoint, deliver significant water savings and runoff reduction while they protect landscape health. But the ability to broadcast weather-based data (local evapotranspiration, or ET, values) and automate plant-specific irrigation scheduling provides additional benefits, including:

Peaking Management Service

Weather-based irrigation management includes daily, wireless transmission of ET data for maximum water use efficiency. This broadcasting capability can be used to manage peaking. A single phone call from the agency can prompt the broadcast of instructions to a selected group of enabled controllers. For example, if a given reservoir zone experiences system-threatening peaking, the agency could contact WeatherTRAK Customer Service to have an irrigation shut-off command transmitted to those controllers, automatically suspending irrigation for a specified period.

Rain/Winter Shut-off Service

Broadcasting capability also supports automated irrigation suspension during rain and the winter season, particularly useful in colder climates. Lake Arrowhead, California took advantage of this service to preserve dwindling lake water when cold weather came early in 2004. If the community had not taken this action, landscapers and absent vacation homeowners might not have turned off their water for weeks, even though no irrigation was needed. In this case, the WeatherTRAK ET Everywhere broadcast service helped to restore lake levels after five years of drought and water waste.

Drought Management Service

During emergency drought conditions, broadcasting is a powerful tool for enforcing water conservation. Far more cost-effective and precise than a public agency campaign or water “police force”, a broadcast can direct enabled controllers to irrigate to a percentage of ET that achieves the desired water savings goal. Conservation is automatic and equitable across all households with enabled controllers.

Remember that not all smart controllers provide comparable features and services. Look for a weather-based irrigation management solution that is proven in published, third party studies to:

- Achieve consistent water efficiency for any type of landscape.
- Maximize the water conservation potential of any site.
- Demonstrably reduce landscape water runoff.
- Adjust irrigation automatically and reliably based on daily, local ET transmissions from a continually monitored nationwide network of weather stations.

- Receive daily localized (one square kilometer resolution) ET based on the Penman-Monteith (FAO 56) equation for data accuracy.
- Support product performance with knowledgeable support for landscape professionals and end users. Ongoing, proactive customer service ensures consumer satisfaction, avoids unnecessary program administration costs, and encourages participation.

Case Study: Public Agency Achieves ROI

Santa Barbara County and partners identified the heaviest water users in the region, educated them about the benefits of conservation, and offered a cost-sharing program for WeatherTRAK controllers. Selected homeowners received free controllers along with a voucher to cover the \$100 installation cost. Homeowners paid \$144 for three years of WeatherTRAK ET Everywhere service, which transmits daily weather updates to each controller.

Based on savings calculated since installation began in mid-2002, WeatherTRAK returns its investment in one to five years (depending on property size) by saving homeowners from \$50 to over \$500 per year in water costs. Homeowners have reduced their overall water usage by an average of 26 percent in normal weather year conditions and 16 percent in extremely dry weather year conditions.

In addition, WeatherTRAK controllers have made work easier for the landscape contractors who install and maintain them. "Because the system is self-adjusting, we no longer have to visit our customers' homes just to reset the irrigation schedule," said Lalo Mora, president of Enviroscaping. "We can also maintain more consistently beautiful landscaping because the irrigation levels are exactly what they should be. The bottom line is that customers get a better-looking property at a lower cost, and it's easier for landscapers to keep it that way."

Designing an Effective Program

A successful public agency landscape water efficiency program can be defined as one that: 1) saves water at a lower cost than would be paid to purchase and deliver new water supplies to consumers, 2) supports any consumer segment, 3) avoids political upheaval, 4) produces sustained results, and 5) benefits consumers, the agency, and the environment.

When designing your agency's program, keep in mind that three elements are essential in maximizing outdoor water efficiency: 1) plants and their respective water needs, 2) irrigation system design, and 3) irrigation controllers. Regulating plant choice is difficult because people buy the plants they like, period. It's much easier to drive efficient irrigation, which dramatically reduces water demand regardless of plant type. Across the country, water providers are

developing cost-effective conservation programs by combining the measures listed below:

Require regionally appropriate plants, recognizing that consumers often prefer turf for some recreational and aesthetic applications:

- Regulate plant types or factors (average plant water need value) through a water budget-related ordinance.
- Mandate plant types used in the landscapes of all new residential and commercial development.
- Assign responsibility for adhering to the design ordinance to the architect or site owner. Make this a contingency for approval of plans, permits, and water hook-ups.

Require that irrigation systems meet a high standard for efficiency:

- Set a standard for irrigation system efficiency through a local ordinance.
- Apply the ordinance to all new residential and commercial development.

- Assign responsibility for adhering to the irrigation system efficiency ordinance to the architect or site owner. Make this a requirement for plans, permits, and water hook-ups.

Experience has taught us that low water use plants and efficient irrigation systems cannot guarantee efficient watering on their own. Landscapes are routinely over-watered by homeowners and landscape professionals.

Require landscapes to use a proven weather-based irrigation controller to ensure that an approved landscape is watered efficiently:

- Select smart controllers that automatically adjust watering based on daily, local weather conditions and distinct plant requirements. This avoids over-watering caused by pervasive misconceptions about how much water plants need.
- Establish ordinances for the installation of smart controllers in all new residential and commercial landscapes.
- Assign responsibility for adhering to the smart controller requirement to the architect or site owner. Make this a contingency for approval of plans, permits, and water hook-ups.

The use of proven smart controllers is far more effective, sustainable, and consumer-friendly than restrictions, allocations, or mandatory plant lists. Why? Proven controllers automate landscape water efficiency and protect plant health – no enforcement required.

Effectively combining these three elements in local ordinances provides the best opportunity to realize significant, sustainable landscape water savings at the lowest cost. One of the most powerful tools at an agency's disposal is the promotion of program successes. Every time consumers hear stories about how a neighbor, local business, or park saved water and enjoyed

water bill savings, they are further motivated to achieve the same benefits. Agencies should also utilize water use histories to monitor the relative water efficiencies of landscapes. These records not only motivate consumers, but they also help agencies precisely target consumers who can benefit most from landscape conservation.

Meeting Specific Objectives through Program Customization

The following program examples outline features necessary for successfully implementing landscape conservation programs across all consumer segments. These examples are culled from programs either deployed or planned by water providers across the U.S.

Programs for New Development

New developments present an opportunity to achieve efficient residential and commercial landscapes that maximize water savings right from the start. Programs focused on new developments benefit water providers by: 1) reducing future costs of retrofitting homes and businesses to gain needed water savings, 2) requiring new development to achieve higher per capita efficiency than existing development – a positive political story for existing voters, and 3) simplifying program administration. Building water-efficient homes and businesses enables builders to comply with water restrictions. Greater water efficiency means there is more supply to support the next street of homes and offices. This translates into lower infrastructure costs and greater profitability, which drives builder support for water efficiency programs.

Following are examples of programs for residential developments. Select any combination of recommended program elements to fit your agency's goals and needs:

- Specify landscape design, irrigation system, and irrigation controller features for all new single family detached homes.
- Reduce water hook-up fees for home builders that install water efficient landscapes.
- Provide development fee credits for conservation measures taken by builders.
- Encourage builders to offer well-designed landscape packages for homebuyers. A package may include design and installation of a front and rear yard landscape, complete with an efficient irrigation system and smart controller. The cost of the package is rolled into the overall house cost and mortgage. This ensures that an efficient irrigation system, appropriate plants, soil amendment, grading to reduce runoff, and additional conservation-friendly features are part of every new home.
- Require that the builder, architect, or builder representative verify compliance with the design and installation specifications before a water hook-up is approved. Some agencies opt to have enforcement officers conduct scheduled or random site inspections.
- Use the water billing activation process (typically a phone call from the customer to the agency's customer service department) to communicate conservation information, e.g., rebates, restriction exemptions for smart controllers, over-watering penalties, or higher rates for excessive water use. Verify compliance with conservation ordinances *before* activating service.
- Place the service fee for daily weather-based irrigation adjustments and customer service directly on the water bill.

These new development specifications cost the agency little, but return a high level of efficiency and significantly reduce per capita usage. For these reasons, MWD and USBR are partnering with builders to offer homeowners efficient landscape packages at the time of purchase. Called "The California Friendly Builder Program", this pilot program is a significant step toward aligning the public and private sectors in achieving conservation objectives.

Following are examples of programs ideally suited to multi-family housing, apartments, condominiums, community common areas, street landscapes, parks, schools, and similar applications:

- Require a separate landscape meter for all new developments to accurately measure landscape and indoor water use efficiency.
- Require that landscapes meet state- or locally-determined design, irrigation, and controller feature specifications.

Programs for Existing Development – Residential (Single-family Detached Homes)

- Offer consumers specified smart controllers:
 - Paid (in part or in total by the agency) as a direct rebate to consumers.
 - Paid (in part or total by consumer) with an assessment or conservation fee on the existing water bill.
- Offer consumers irrigation system upgrades:
 - Paid (in part or in total by the agency) as a direct rebate to consumers.
 - Paid (in part or total by consumer) with an assessment or conservation fee on the existing water bill.
- Require a retrofit on resale upgrade or verification of efficient landscape appliances (smart controller and irrigation efficiency standard met) at billing activation:
 - Paid by new incoming consumer with an assessment or conservation fee upgrade on the water bill.

- Offer an “Exemption from Water Restrictions” retrofit program:
 - Install a smart controller and receive an exemption from local water restrictions.
- Place the fee for daily weather updates and customer service directly on the water bill.
- Train green industry professionals to install smart controllers for water efficient landscapes (a vehicle to promote the programs listed above to consumers).

Programs for Existing Development – Commercial

- Offer consumers specified smart controllers:
 - Paid, in part by the agency, as a direct rebate to consumers.
 - Paid, in part or total by consumer, with an assessment or conservation fee on the existing water bill.
- Offer consumers irrigation system upgrades:
 - Paid, in part by the agency, as a direct rebate to consumers.
 - Paid, in part or total by consumer, with an assessment or conservation fee on the existing water bill.
- Require a retrofit on resale upgrade or verification of efficient landscape appliances (e.g., smart controller and irrigation system efficiency standard met) at billing activation:
 - Paid by new incoming consumer with an assessment or conservation fee upgrade on the water bill.
- Offer an exemption from water restrictions retrofit program:
 - Install a smart controller and receive an exemption from local water restrictions.
- Train green industry professionals to install smart controllers for water efficient landscapes (a vehicle to promote the programs listed above to consumers).

Landscape Conservation Programs: The Bottom Line

More than half of municipal water is applied to landscapes, which makes outdoor water efficiency the greatest water conservation opportunity. Public agencies can also achieve more efficient use of existing water supplies and storage infrastructure. Pressure to meet growing

water demands, while managing peaking and minimizing urban runoff pollution, is mounting against agencies in every part of the country. With the benefit of collective water agency experiences, we have identified programs proven to protect precious water resources.

8 Proven Ideas for Achieving Cost-effective, Sustainable Landscape Water Efficiency:

1. Establish specification and installation requirements for efficient irrigation systems and controllers
2. Require controllers that self-adjust irrigation based on daily local ET updates
3. Require controllers that automatically calculate efficient schedules
4. Require controllers with independent studies that prove maximum conservation and runoff reduction
5. Require specified technologies in all new development to eliminate agency retrofit costs
6. Confirm retrofits at the point of billing activation for properties transferring owners
7. Ensure long-term efficiency and compliance by rolling weather update fees and retrofit costs into consumer water bills
8. Design programs that benefit your agency, consumers, industry and the environment

The most successful landscape conservation programs benefit the agency, consumers, local industry, and the environment. They accomplish this by setting goals for water use efficiency and offering incentives that generate broad-based support. Fortunately, landscape water efficiency goals are now achievable through the use of proven smart controllers.

Widespread implementation of proven smart controllers across a provider's service area delivers additional benefits:

- Automated enforcement of efficient landscape watering.
- Increased resource management capabilities, including peaking reduction and drought management.
- Improved local water quality through reduced landscape water runoff.
- More sustainable water supplies for meeting future demand.

Landscape professionals and public agencies in California are seizing the opportunity afforded to them by proven smart controllers. The state's AB 2717 Task Force will recommend to the governor and state legislature that every controller sold in California be a proven, certified smart controller by 2010.

The agency's role in achieving landscape water use efficiency is facilitating the adoption of best practices and products, such as public agency-proven WeatherTRAK-enabled irrigation controllers. Effective programs need not be difficult or expensive to implement. Leverage financial support from builders and consumers who will reap lasting savings from greater water efficiency.

Use the real-world examples provided in this white paper to educate staff and drive discussion about what program options address your agency's specific challenges. To learn more about how landscape water efficiency programs can enable your agency to meet its conservation, runoff reduction, and water supply objectives, contact Tom Ash at 949.922.1968 or tash@hydropoint.com.

About the Author

Tom Ash has over 20 years experience in water management and landscape education. A graduate of the ornamental horticulture program at California Polytechnic University at Pomona, Tom has served as a University of California Cooperative Extension Advisor and the Conservation Coordinator for Irvine Ranch Water District. He conducted the first studies of the water savings and runoff reduction capabilities of weather-based irrigation controllers. He has advised numerous agencies including the National Drought Policy Commission, Utah Department of Water, Texas Nursery and Landscape Association, California Urban Water Conservation Council, Georgia Department of Environmental Protection, Colorado Green Industries, California Landscape Contractors Association, Metropolitan Water District of Southern California, New England Nursery and Landscape Association, New Mexico Drought Task Force, Southern Nevada Water Authority, Maui Water Department, and Atlanta Regional Planning Commission. Tom authored *Landscape Management for Water Savings*, published by the U.S. Bureau of Reclamation, and recently completed a drought preparedness training manual for the Nursery and Landscape Association Executives. Tom, Director of Conservation for Petaluma, CA-based HydroPoint Data Systems, Inc., resides in Newport Beach, CA.