WATER EDUCATION FOUNDATION

Water Leaders Class of 2009

# Water Conservation:

# A Solution For California's Water Woes?

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## 2009 WATER LEADERS CLASS OF 2009



### Appendices

# I. Introduction

How many Water Leaders does it take to solve a crisis?

This year the magic number is 20 and we've had our work cut out for us. The Water Education Foundation's 2009 Water Leaders Class is the biggest in the program's history and is a diverse group of young professionals, which is good news because California's water problems are going to take a whole range of expertise to fix.

Throughout the year as we've traveled across the state (and some across state lines) learning about the many pieces of California's water puzzle, we've been helped by the broad expertise of our class members. We include those who represent policy leaders and state officials, law and engineering firms, agricultural interests, environmental nonprofits, communities, and water districts.

We are a sampling of our professions and well as our home bases, which range from towns to big cities, from San Diego up to Sacramento.

Over the course of the year, our differing perspectives and professional experiences have allowed us to build on what we know about water issues, challenge each other and the many experts we've encountered, and help refine the potential challenges and solutions the state faces. To get California through its current crisis will likely take a combination of solutions from the community to the state level and involve activists, legislators, scientists, water purveyors and water users of all kinds -- which means that each Water Leader in this year's class has an important contribution to make. Of course, no crisis can be solved without some fun along the way. And we've had that, too.

## II. Water Conservation

The 2009 Water Leaders' class was assigned the topic of water conservation. Given the current environmental and regulatory drought in California and the building pressures of population growth and climate change, this topic could not have been more timely.

Water conservation is often identified as the easiest and most cost-effective way to find "new" water supplies. In comparison to building more dams, water transportation infrastructure or desalinization plants - conservation is a relatively inexpensive and simple method for reducing water needs thereby freeing up water for other uses. Though some may debate whether water conservation is the primary tool for solving California's water crisis, few would argue that it is at least an important tool. Water conservation can include installing water efficient devices, improving existing water infrastructure, modifying water use habits, or changing water intensive items such as lawns.

The American Water Works Association estimates that installing water efficient devices in homes can reduce water usage by 30 %.[1] Taking water efficiency and conservation efforts to outdoor landscaping leads to even more dramatic reductions in water use. Many areas of California have already taken significant water conservation steps with impressive water saving results. Los Angeles still uses the same amount of water today that it did in the 1970s even though its population has grown by 1 million people.[2] Successful examples, such as Los Angeles, were achieved in part through water conservation and support the argument that conservation is the most efficient and cost-effective method for making limited water supplies stretch further.

And right now California is stretched to its limits. The state is in its third consecutive year of drought and is faced with mounting court rulings requiring water allocations for declining ecosystems. Additional stress will be put on our already overburdened water supply in the future by growing populations and climate change. These stressors have brought water concerns to the forefront of many people's lives, and water conservation will be a critical part of any solution to our water problems.

Governor Schwarzenegger's 2008 Executive Order calling for a 20% reduction in water use by 2020 (20x2020) exemplifies the importance of water conservation in achieving a reliable water supply for urban, agricultural, and environmental needs in California. The question is now how best to achieve the 20% reduction and beyond. Who will lead the water conservation efforts and what are the barriers that California is facing and

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[1] American Water Works Association. Drinktap.org (http://www.drinktap.org/consumerdnn/Home/WaterInformation/Conservation/WaterUseStatistics/tabid/85/Default.aspx)

[2] Mono Lake Committee. Water Conservation (http://www.monolake.org/about/waterconservation)

will face as it tries to deal with the reality that there is not enough water to support continued use of this resource as we have in the past?

## III. What We Gained From Our Mentors

### A. Mentors

In order to enhance the Water Leader's experience, each Water Leader was assigned a mentor, a water professional from a different background than the Water Leader. The table below lists each of the mentors and the assigned Water Leader. More detailed information can be found in Appendix A.

| Mentor | Water Leader |
|---|---|
| **Timothy Brick**<br>Chairman, Board of Directors<br>Metropolitan Water District of Southern California | **Kari Fisher**<br>Associate Counsel<br>California Farm Bureau Federation |
| **Dennis Falaschi**<br>General Manager<br>Panoche and Pacheco Water District | **Teresa Chan**<br>Attorney<br>Ellison, Schneider & Harris |
| **Teresa Geimer**<br>Drought Water Bank Coordinator<br>California Department of Water Resources | **Kimberly Brown**<br>Manager<br>Westside Mutual Water Company |
| **Donald Glaser**<br>Mid-Pacific Regional Director<br>Bureau of Reclamation-Mid Pacific | **Kimberly Houdling-Kaufmann**<br>Field Representative<br>Congressman Radanovich |
| **Dana Haasz**<br>Water Conservation Administrator<br>San Francisco Public Utilities Commission | **Kristen Mignone Crane**<br>Water Conservation Manager<br>City of Poway |
| **Ellen Hanak**<br>Research Fellow<br>Public Policy Institute of California | **Tara Lohan**<br>Senior Editor<br>AlterNet |
| **Paul Jones**<br>General Manager<br>Irvine Ranch Water District | **Brian Heywood**<br>Water Resources Engineer<br>CDM |
| **Randele Kanouse**<br>Special Assistant to General Manager<br>East Bay Municipal Utility District | **Meghan Moda**<br>Conservation Program Administrator<br>Resources Legacy Fund |
| **Jay Lund**<br>Professor, Civil & Environmental Engineering Dept<br>University of California Davis | **Lisa McPhee**<br>Assistant Resource Specialist<br>Metropolitan Water District of Southern |
| **Wendy Martin**<br>Drought Coordinator<br>California Department of Water Resources | **Derek Larsen**<br>Project Manager<br>MBK Engineers |
| **James Nickel**<br>Real Estate Manager<br>Nickel Family, LLC | **Matt Notley**<br>Public Affairs Assistant Director<br>California Department of Water Resources |
| **Jennifer Persike**<br>Director of Strategic Coordination and Public Affairs<br>Association of California Water Agencies | **Allison Dvorak**<br>Water Resource Specialist<br>State Water Contractors |

| | |
|---|---|
| **Frances Spivy-Weber**<br>Board Member<br>State Water Resources Control Board | **Summer Bundy**<br>Water Resources Engineer<br>CH2M Hill |
| **Ted Trimble**<br>General Manager<br>Western Canal Water District | **Andrea Schmid**<br>Environmental Planner<br>New Fields |
| **Peter Vorster**<br>Staff Hydrologist<br>The Bay Institute | **Vincent Marchand**<br>Senior Consultant<br>Senator Gloria Negrete McLeod |
| **Michael Wade**<br>California Farm Water Coalition | **Aracely Campa**<br>Legislative Consultant<br>California State Assembly Member Caballero |
| **Mark Weston**<br>General Manager<br>Helix Water District | **Lisa Skutecki**<br>Senior Engineer<br>Brown & Caldwell |
| **Leo Winternitz**<br>Director of Delta Projects<br>The Nature Conservancy | **Lisa Mash**<br>Senior Project Scientist<br>ENTRIX, Inc. |
| **John Woodling**<br>Executive Director<br>Regional Water Authority | **Jeffrey Payne**<br>Water Resources Engineer<br>MWH Americas, Inc. |
| **Greg Zlotnick**<br>Special Counsel for Strategic Planning/Delta Policy<br>Santa Clara Valley Water District | **Michelle Yeh**<br>Hydrogeologist<br>Shaw Environmental & Infrastructure Group |

## B. The Mentor Experience

Over the past year, the Water Leaders have learned about a multitude of things from our mentors, including learning about different water-related professions, California's water system, problems facing the state due to water shortages, and the need for water conservation. Although everyone agrees that "water conservation" is needed, there is no unified definition on conservation. Opinions differ on how conservation should be achieved and which sectors of the state should be held responsible.

Our mentors came from many different backgrounds. As a way to see trends in opinions across different markets and interest groups, we were able to break the mentors down into several rudimentary groups: water suppliers, advocacy groups for water interests, water users, agencies and special interest/environmental groups. Water suppliers, water users and advocacy groups for water interests could be further broken down into having urban and agricultural interests. While some catered to both interests, oftentimes, one sector (either urban or agricultural) was more prevalently served by that group. Such division was useful when analyzing the mentors' responses to the conservation questions developed by the Water Leaders.

## IV. Range of Responses from Mentors

The following summarizes a series of questions that the class developed by topic and a summary of the responses from our mentors. A list of the final questions is provided in Appendix B. This summary is intended to provide a cross-section of the viewpoints held by those engaged in finding solutions to California's water struggles.

### A. Policy / Regulation

A majority of the water suppliers, both agricultural and urban, expressed the opinion that water conservation should not be a regulatory driven process. Surprisingly, some of the government agencies concurred in this opinion. Those that felt that regulation had a place in water conservation felt that it needed to be done at a local level because of the diversity of needs of different water users.

A majority of the groups believed that a state-administered "Water Conservation Transfer Market" or a "Water Conservation Bank" would be a good tool to reapportion conserved water to areas that needed in it times of drought. However, they flagged several issues as being of concern. The first is that water being sold into a conservation bank would need to be water that was actually conserved instead of just paper water. The second concern was that the Drought Water Bank had not worked as well as hoped this year and many buyers did not get the water they were hoping to get through the Water Bank—in addition, conveyance of the water will continue to be an issue in the future. Those groups that were opposed to a state-run water bank thought that it would simply create more red tape and create a false sense of accomplishment as well as potentially decreasing supply reliability within local areas.

### B. Economics

Almost all of the groups were in agreement that economics could play a role in encouraging conservation, although the groups representing water interests were more reserved in adopting the stance that creating financial penalties to curb water use would result in additional conservation.

The main concern that arose was that there might be an environmental justice issue of creating a pricing system that would make it impossible for economically disadvantaged sectors of the population to receive an adequate water supply. Another concern that arose from several groups during the discussion of whether water should be priced like other commodities was that access to water was a basic human right and need, and therefore, should not be priced like other commodities.

Interestingly, when asked about the interplay of economics and conservation, most groups immediately thought about tiered pricing structures, or other "punitive" type measures meant to motivate water users to use less water. A small minority of groups from all different sectors viewed the question in a more positive light, contemplating that economics be used in a manner that created a positive incentive for water users to

reduce use of water. Even those groups that expressed reluctance to embrace the use of economic measures to encourage conservation admitted that there were instances where a tiered rate structure worked, pointing to East Bay Municipal Utility District and Irvine Ranch Water District as two districts that had successfully achieved reductions in water use as a result of initiating a tiered rate plan (although one group pointed out that East Bay Municipal Utility District had not made customers too happy when it attempted to create another tier in its pricing structure when faced with the news of a drought last year).

### C. Public Outreach

Across all sectors and groups, the biggest challenge faced in launching an effective outreach campaign regarding long-term water conservation in both periods of drought and wet years is the lack of funding to implement a long term plan. Another concern voiced by some water suppliers was the fact that it was difficult to keep customers conserving in wet years. Additionally, customers were often resistant to raising fees, often questioning where previous fee raises had been applied. One water supplier pointed out the difficultly in delivering a consistent and united message statewide when each region had its own local issues to deal with regards to dealing with drought.

Most of the water suppliers emphasized the use of financial incentives (or disincentives) in triggering behavioral changes about water use in the consumer market. Most groups also felt that a deeper understanding of the situation played a role in creating a lasting commitment to changes in attitudes towards more water efficient behavior. Television and radio were the popular modes of social media embraced by most water groups, with some emphasis on public education with the realization that children were a strong vehicle to bring the message of conservation into the household.

### D. Technology

Most of the groups saw new technology as being an integral part of the conservation effort. However despite its utility, several groups indentified cost of implementation as a potential factor for preventing these technologies from being used. Several government agencies and environmental special interest groups identified better implementation of already existing technology as being the driving factor.

Each of the groups of mentors mentioned wide ranges of the types of technological developments that could realize water conservation. The technologies spanned many uses from urban outdoor (weather-based irrigation controllers, use of recycled (purple pipe) water), urban indoor (ultra-low flush toilets, high-efficiency clothes washers), commercial/industrial (pre-wash sprayers for dish washing, re-using cooling tower water), agricultural (drip irrigation, satellite/weather based irrigation, development of drought-tolerant hybrid plants), and water delivery (replacement of canal control structures to eliminate operational or tail water spills).

Three key points noted across the board by all mentors regarding the role of technology in achieving water conservation are:

- Technology is only as good as the implementation, operation, and management of the technology. Just having the technology is not sufficient; it must be implemented and operated efficiently and correctly.
- A focus on more effective implementation of the existing technologies is key to short-term water conversation.
- Technology accounts for part of water conservation, but behavior will account for the majority of conserved water.

Examples of both existing and emerging technologies were cited, and several key challenges were identified. These are described in further detail below.

## TECHNOLOGY IN THE URBAN SETTING

In the urban setting, conservation was discussed in terms of residential indoor use, residential outdoor use, commercial use, and recycled water supplies.

### INDOOR RESIDENTIAL EFFICIENCY

Many examples of past indoor water conservation technologies were cited, including low water use toilets/showerheads/and washing machines that have been at the heart of savings in the last two decades. The nexus of these indoor technologies and regulatory requirements (through plumbing or building codes) was identified as a success factor in their implementation. Even with the success of these indoor conservation technologies, newer technologies continue to emerge, including the water broom, with a concentrated spray of water that is intense and more efficient than spraying with a hose. It is widely believed that in areas lacking metering, simply metering will lead to more informed water use, and thereby reduce use.

### OUTDOOR RESIDENTIAL EFFICIENCY

With regard to conservation technologies, an emphasis was placed on residential outdoor water use, as much of the conservation savings to be gained over the next few years will need to come from this sector, which comprises the largest use of residential water. Emerging technologies such as smart meters show leaks more quickly than remote meter-reading to give users and water managers real-time information on their water use, and have been shown to contribute to conservation.

Climate-controlled irrigation technologies were cited as having water savings potential, but were also noted to potentially increase water use, since many of them use agronomic evapo-transporation factors, which encourage maximum growth of plant matter. Therefore, use of climate-controlled irrigation technologies would need to be

paired with education and an implementation program to track effectiveness. Properly used, however, technologies such as satellite watering systems, which track weather in your area, could result in water conservation.

The nexus of education and technology was also cited as a key challenge. Recognizing that, for example, successful use of drought tolerant landscape will rely on educating the landscape industry and the public at large, is key to developing appropriate strategies for implementation.

### COMMERCIAL AND INDUSTRIAL EFFICIENCY

For some urban districts, the greatest potential for conservation lies not with reduction of outdoor residential use, but with commercial or industrial customers. For this sector, there may be existing technologies that could enjoy more widespread implementation, such as pre-rinse spray valves in restaurants, filtration loops to enable nurseries to re-circulate water (in-nursery reuse), x-ray water machine bath recyclers, and cooling tower mechanisms that allow for water to be used many times in cooling a building.

### RECYCLED WATER SUPPLIES

Finally, many identified recycled water as an important long-term component for conservation of potable supplies. Implementation of recycled water programs crosses over into policy and regulatory areas, as well as into economic considerations. Some areas will directly use recycled water supplies to offset outdoor demands on potable supplies, while others, such as Orange County, generate recycled water for groundwater recharge.

## TECHNOLOGY IN THE AGRICULTURAL SETTING

In the agricultural setting, water use efficiency was described in terms of both on-farm water use and conveyance efficiency.

### ON-FARM IRRIGATION EFFICIENCY

With regard to on-farm water use, many farmers are already implementing conservation irrigation methods. Examples included drip irrigation systems, use of probes and canteen-ometers, and use of local evapotranspiration data, which farmers use as a decision-making tool to determine when to irrigate. Understanding the baseline of current water conservation implementation, and the water needs of specific crops in specific weather conditions, is an issue that is very important to agricultural users. Additional technologies are emerging, including climate-driven irrigation systems and satellite/GPS irrigation systems that provide real-time data for irrigation decisions. Additional technologies such as the development of "drought tolerant hybrids" also were cited.

### CONVEYANCE EFFICIENCY

Aging conveyance systems were cited as a potential source of conservation, though this is district specific. Upgrades could include the installation of automated delivery systems to reduce over-deliveries and spills or centralized reservoirs to capture tailwater and reuse it within the district.

### CHALLENGES TO IMPLEMENTING CONSERVATION TECHNOLOGY

Technology is recognized as an important component to achieving water savings, however the dearth of applied research was noted as a concern. Though some agencies do have grant programs in which they give grants to researchers/developers to develop new water conservation products, even these agencies think that the state would benefit from additional applied research.

Several mentors cited the need to institutionalize proven technologies in new developments. These technologies included the installation of purple pipes for recycled water supplies for outdoor uses and building codes related to sprinkler controllers.

Finally, the rate of adoption of many technologies is seen as a challenge. Though technologies such as weather based controllers and soil moisture content sensors are available, their adoption has been slow.

## E. 20% by 2020

With the Governor's adoption of the 20x2020 goal, the Water Leaders wanted to know if our mentors viewed the goal of a 20% reduction by 2020 as achievable, and if so, what measures need to be implemented immediately. Responses addressed several issues associated with 20x2020, and can be categorized as follows:

- Overall perspective on the program
- Establishment of appropriate baselines by which to judge conservation, and the need for programs and goals to be regionally specific.
- Implementation
- Data needs

### PROGRAM PERSPECTIVE

Most mentors believe that the Governor's goal of 20% by 2020 is definitely achievable if all California residents continue and/or begin to curtail their water use. However, achievement of the goal will not be without its challenges, and some uncertainty remains as to how it will be achieved. Several comments addressed the overall perspective of the program, including perceived strengths and challenges.

Many view the reduction of water demand as California's first, and least expensive, option in meeting our water challenges. Some viewed the 20% reduction goal as

achievable based on their knowledge of the California Water Plan evaluations that showed the capacity to achieve this reduction.

Difficulties lie in educating water users in areas that do not perceive a water shortage or do not have the infrastructure to measure water use. There is also concern that any efficiency gains will continue to be offset by the growing demand for water. This concern is particularly heightened when areas that have developed a diverse water portfolio and implemented aggressive conservation feel pressured to further conserve in order to provide water for new growth in other areas.

Almost all mentors think that the implementation of the program will rely on regional and local efforts. As such, many believe that the state's role should be to provide broad policy guidance and ensure, through funding mechanisms and other means, that state policy goals are being met.

### Regional Baselines

Mentors across the board raised the issue of establishing baselines as critical to the successful implementation of 20% x 2020. It is generally recognized that the potential water savings vary regionally. Some regions have implemented aggressive water conservation programs, essentially eliminating the "low-hanging fruit" from their water conservation toolsets. Water managers in these regions seek credit for what they have already done and recognition that their contribution to the statewide goal might be less than 20%. Additionally, water managers recognized that different areas have varying water user types, which will drive the water savings potential. Water managers seek the flexibility to establish local 2020 conservation goals, taking into account the conservation and efficiency investments that make economic sense locally. As a result, those areas that have yet to implement aggressive water conservation, including those areas without meters, may be relied on for savings in excess of 20%.

Resolving the uncertainty around the issue of regional and local baselines will be critical to engaging effective conservation toward meeting the 20x2020 goal.

### Implementation

Comments regarding implementation addressed cost, immediate implementation of core best management practices (BMPs), pricing, the importance of landscape conservation, education, and regulation.

It is generally recognized that achievement of the 20% goal will require measures beyond the indoor efficiency measures implemented over the past decade. Where these measures have not yet been implemented, they are a potential tool, but where they have been substantially implemented, additional measures are required. As such, some perceive that achievement of 20x2020 will be expensive and difficult, while others think that success will need to rely substantially on incentive based measures, and still others see pricing as a key tool.

Several mentors commented on the need for immediate implementation of "core BMPs", which include water meters and conservation pricing. With regard to conservation pricing, some believe that the challenge is in locating the tipping point where the commodity costs drives behavioral changes. Where meters are not yet installed, the challenge of financing the meter installation while anticipating a declining revenue stream under the resulting conservation is recognized as a challenge for water managers.

Achieving conservation in outdoor urban irrigation use, which constitutes the majority of residential water use, is seen as a major component for achieving 20x2020 reductions. Education is seen as key to advancing this component of conservation, though it is perceived that the near-immediate changes in lifestyle that would be need to be promoted across the state could prove politically dangerous for both the legislature and local water boards. Education should focus on efficient water use, use of drought-resistant vegetation, and encouraging/requiring smart meters (i.e., has the technology to determine where water goes – indoor or outdoor, for example).

Some mentors would support a law that requires any new development to have the latest and greatest in terms of technology – smart meters, dual plumbing for indoor/outdoor, etc. and require retrofit on resale/major remodels of showerheads and toilets.

Overall, implementation, like the establishment of baselines, will need to be driven by regional and local efforts.

### Data Needs

Finally, some mentors see a need for more aggressive data collection to support the state's evaluation of water use. Specifically, one mentor suggested that the Legislature should enact, and the State Board should enforce, a law requiring universal, consistent reporting on water diversion and use by all water agencies and other diverters. This law should repeal all current exemptions to reporting, plus include reports on groundwater and pre-1914 and riparian users. Data should be collected by expanding DWR's groundwater monitoring networks and reporting by local and regional entities associated with Urban Water Management Plans and Groundwater Management Plans.

## V. Obstacles and Challenges to Water Conservation

The challenges and obstacles associated with water conservation in California can be broadly classified into a few major categories including; social/economic, political, infrastructure, institutional, and legal. Within the framework in which water is managed in California, are many competing, and often conflicting interests that must be balanced. Some interest groups and issues that need to be considered when making water use decision include urban and industrial users, agriculture, fish and wildlife

habitat, water quality, wetlands, endangered species issues, Native American Tribal Trust issues, power generation, flood control, recreation and overall economic impacts. Each interest group has its own idea of how California should manage its water resources. Only by working to understand the views, positions, and interests of the different stakeholders can you begin to understand the social/economic, political, infrastructure, intuitional and legal obstacles and challenges in pursuing meaningful water conservation.

## A. Social / Economic

One of the major social obstacles to water conservation in California is society's view on the value of water. Some would argue that California water managers are a victim of their own success in managing their water resources. The lack of public consciousness on the value of water is a major challenge to conservation. Different groups of water users and stakeholders have a wide range of opinions on the highest and best use of water and the value of this limited natural resource. Major factors that impact this view are regional supply and demand. To further complicate matters, the monetary value different groups pay for water in California is based on a system of water rights that makes it challenging to develop what many would view as an equitable economic playing field. Despite the inequity, significant changes to this system will result in economic hardships for some water users and industries that have become accustom to the "cost" of their supply and economic consequences to the state in certain sectors and industries.

Enacting social change and increasing public awareness is a primary focus for water managers in the State of California. A great deal of effort is focused on education programs that teach the importance of water for food and fiber; business and industry; homes and gardens. These programs work to develop a higher social value for water. As a whole it can be challenging to get the general public to recognize the importance and value of water. Impressing the importance and value of water to the general public is even more challenging for water managers when they are faced implementing behavioral changes for water use within a community that has historically not had to conserve water.

## B. Political

The varied climate within California creates a variety of political positions on the highest and best use of water and the role of water conservation. Wet areas in northern California tend to be less conscious of their water usage than the more arid regions in Southern California. This creates water policy challenges as a region's political view on the development of water resources and the highest and best usage of these resources varies greatly throughout California.

The political and policy challenges of water conservation can be seen in the public comments provides to the State of California on the draft 20x2020 plan. The challenges

in meeting the goals set out in 20x2020 vary greatly for water managers depending on regional climate issues, supply, and the water use demands and water users within each region. More arid regions have a long history of successfully reducing water usage through conservation. Many water agencies in more arid regions have already achieved tremendous savings by implementing different water conservation techniques. Some areas with more reliable water supplies lack the basic infrastructure to implement the most basic water conservation best management practices. These discrepancies in current conservation practices and baseline conditions, including infrastructure and funding sources, around the State call into question if all water users should be held to the same standard. Some responses to the Draft 20x2020 plan question why the plan does not target agricultural water users in more detail. Aside from the equity issue, some argue that 20x2020 was selected primarily because it was politically acceptable with a nice tag line and not because it represented an adequate target for water conservation.

## C. Infrastructure

Within California there is a great discrepancy between regions that have the basic infrastructure required to successfully implement measureable water conservation. The drier regions in the south have a long history of using water meters to track and manage water usage. Some areas with more reliable water supplies lack the basic infrastructure to implement water conservation best management practices. Although advances in technology will certainly help improve water conservation, the first step of creating the basic infrastructure to effectively utilize existing technologies still needs to be addressed in many areas of the state. Without the basic infrastructure to meter and track water usage, conservation cannot be adequately measured.

Water managers often point to the effectiveness of the flex your power campaign in reducing energy usage as a model for water conservation. The basic infrastructure that allows the "flex your power" campaign to achieve reductions in power usage is metering. In order to effectively manage a resource you must be able to track and measure its usage. Water metering closes the management feedback loop and allows water managers to monitor the effectiveness of different water management strategies.

## D. Institutional and Legal Issues

At the very root of California's struggle to drive water conservation is the institutional and legal framework in which water is regulated. The agencies responsible for enforcing water conservation policies are often drastically underfunded and lack the basic resources to execute the existing policy guidance and laws. It is not clear how 20x2020 will be enforced or how the benefits in water conservation will be determined. One of the primary concerns surrounding the 20x2020 plan is its implications on water reallocation and if it can be achieved without addressing existing water rights and area of origin protections.

Another fundamental issue to addressing conservation is the state's treatment of groundwater and surface water. Currently the legal framework for the use of groundwater and surface water does not recognize that the water resources are connected and should be managed as a single system. This basic disconnect makes it challenging for water managers to implement some water conservation strategies.

### E. Overcoming the Challenges and Obstacles

The challenges and obstacles that face water conservation in California are significant. However, California has a history of innovation and will continue to work to manage its water resources to try to appease the many competing interests. The policies, effectiveness, and direction of California's water conservation efforts make for interesting debates and conversations. Different interest groups may not agree on how to overcome these obstacles or even what the real obstacles are; however, all interest groups would agree that water conservation will play a role in California meeting the demand of its industries and growing population.

Water conservation is just one tool in a portfolio of management strategies that must be enacted to assure that California maintain its economic health and meets its growing water needs. To achieve real gains in water conservation a diversified investment strategy will need to be implemented in water conservation. This will include efforts in public outreach, education, implementation of existing and new technologies, and acceptable water conservation techniques for different water use sectors. The State will need to determine where they will invest their limited financial resources to achieve the highest level of water conservation. The easiest and most politically acceptable water users to target for conservation do not necessarily achieve the greatest gains in water conservation. The State will need to develop a sound financial strategy to assure that water conservation has adequate and reliable capital investments to fund comprehensive water conservation investment strategies.

## VI. Success Stories

Although there are many challenges and obstacles facing water conservation in California, there are also many successes. The following section outlines some of the success stories we heard during our mentor interviews, learned about on a Water Education Foundation tour, or experienced in our own careers. They are broadly classified into the same major categories described above: social/economic, political, and infrastructure.

### A. Social / Economic

As discussed above, behavioral change is key to water conservation. The following two examples demonstrate successfully changing behavior toward more-efficient water use. Irvine Ranch Water District (IRWD) has successfully developed and implemented an

escalating, five-block rate structure; those users that exceed their allocation pay more and those that stay within their allocation pay less. From a business perspective, IRWD's conservation business plan revolves around the idea that conservation results in avoided costs (i.e., cost of additional water, waste water treatment, and urban runoff control). This "allocation-based" rate structure has, in part, reduced water use within the district by 15 percent between 1988 and 2004.

East Bay Municipal District (EBMUD) has also enacted significant behavioral change in their district. Since the 1970s, EBMUD has invested millions of dollars in public outreach and education; infrastructure improvements, including advanced leak-detection technology; and a variety of customer incentives and programs to encourage water conservation and greater efficiency. Even though their customer base has increased by 10 percent increase since the mid-70s, EBMUD distributed less water in 2007 than in 1976.

## B. Political

Population growth and projects with growth-inducing impacts are often politically-charged because of the water required to support additional growth. The Camino Tassajara Intergrated Project is an example of a water conservation success story for new residential development. This community achieves a net-zero water demand through on-site conservation measures like dual-flush toilets, xeroscaping, and recycled water use. The community offsets additional water requirements through off-site mitigation, such as financing residential efficiency-update projects in other service areas.

## C. Infrastructure

Basic infrastructure upgrades are typically required to achieve measurable water conservation. One way to improve infrastructure is to provide incentives for infrastructure replacement. Many agencies provide incentives for residential improvements, such as low-flow toilets, shower heads, and appliances. Some agencies have replaced agricultural irrigation systems with more water-efficient irrigation methods. For example, about 70 percent of the total acres in Panoche & Pacheco Water Districts use new, water saving methods and equipment (i.e., pressure irrigation system, and lined ditches to reduce seepage). This new irrigation system is estimated to provide 65 to 80 percent increased water-use efficiency.

Panoche & Pacheco Water Districts have also found a way to use low-quality brackish water from the San Joaquin River to grow 6,000 acres of crops. Subsurface drain water that normally would be discharged back into the San Joaquin River is being used to irrigate salt-tolerant crops in their "Grasslands Bypass Project." Crops include Jose wheat grass, paspalum grass, and other pasture grasses. The area is being developed with subsurface tile systems and pumping facilities, to allow collection and

reapplication of increasingly saline drainage and to protect against groundwater recharge of low-quality water.

Another infrastructure success story pertains to work done by the San Francisco Public Utilities Commission. Recently, SFPUC funded a pilot program with a company, Wo Chong, that grows bean sprouts in an indoor facility in San Francisco. The company has substantial water runoff from the daily watering of the bean sprouts. To lessen the amount of water used to water the sprouts, a water recycling system was installed so that runoff is recovered and processed for reuse.

The system, designed by a specialized consulting firm from the United Kingdom, involves multiple ozone generators, seven holding tanks, a connection with the chiller, sensors for ozone levels and temperature, and various filters, including charcoal and ultra-violet light/rays (to kill bacteria).

Previously, Wo Chong watered the sprouts with a 100% single-pass system, which means all of the water used went into the sewer system.

SFPUC analyzed that the potential cost savings associated with this project was about $104,000 per year *in combined water and wastewater costs.* The project cost was $225,000. Installation of the system was completed in March 2009, so SFPUC is currently verifying actual water savings. The original projected water savings from the project was 17.4 acre-feet per year. Initial results show actual savings of about 20.7 acre-feet per year, which equates to 6.726 million gallons per year. The estimated return on investment for this project is 54% for year 1.

## VII. Recommendations From Our Mentors

Based on the responses received from our mentors, the Water Leaders were polled to see what their mentor's top three recommendations would be for achieving greater water conservation in the future statewide. The top three recommendations are more focused public education, implementation of more cost-effective water-efficient devices, and a statewide metering system. A brief summary of each of these recommendations is provided below. (See Appendix C for the survey of the mentors' responses.)

- More focused public education:
  - By developing an education program that reaches out to all sectors of life (urban, agriculture, industry, etc.) highlighting the importance of water conservation in the home (e.g. simple, daily lifestyle changes can be quite effective), at work, and on our agricultural fields (e.g. how drip irrigation has been a great investment and water conservation tool);

- Compounding education with message devices like "Water Smart Landscape - A better way to beautiful", a program recently released by the San Diego County Water Authority; and
- Focusing on presenting information at the point of purchase (i.e., through the use of brochures, newsletters, etc.).

- Use of more water-efficient devices:
  - By focusing on technology-driven solutions where you can get the same end value you are trying to achieve while using less; and/or
  - By having the urban sector test emerging technologies (e.g., more water-efficient plumbing devices) and then rebate those home and/or business owners for a period of time to get more people to transition to these new water-saving devices.

- Implementation of a statewide metering system:
  - To reduce water consumption and to best determine the level of water use; and
  - The deployment of "smart" water meters (meters that eliminate the need for gears and mobile parts achieving a meter of great precision at low flow volumes and with minimal head loss) to manage this resource more effectively.

In summary, the message on the importance of water conservation needs to continually be conveyed to our consumers regardless of water year type (i.e., drought, normal or wet year).

## VIII. What Should Happen Now? What We Think

As Water Leaders, our opinions are as diverse as our backgrounds, which only serves to enhance our experience. However, as diverse as we are there was a surprising cohesiveness to what we all took away from this experience. We did not discover the "silver bullet" that would solve our water woes in California but we are richer for the knowledge, experiences, friendships, and networks that were formed.

The California water system is inarguably broken. Our population has outgrown the water system that our forefathers built for us. We have not made a major investment in our water infrastructure in over forty years. We are only one earthquake away from complete levee failure in the Delta that provides drinking water and agriculture and industrial water to over 25 million Californians. Something must be done, but what? A Peripheral Canal around the Delta, additional water storage, new technology, water conservation or a combination of these? We can all agree that the answer is not easy and there is not one single solution to solve our water issues in California, just as there is no one size fits all solution to achieve conservation.

Water Leaders were able to reach consensus on a variety of issues relating to water conservation. The majority of Water Leaders agree that water conservation is an "important" or "highly important" component of solving the state's water problems. In addition, it was determined that the focus of water conservation should be through public outreach and education and economic considerations (imposing higher rates, etc).

In a survey of the Water Leaders, the three most acceptable measures that we thought should be employed to help the state conserve water include: (1) using educational measures and public outreach to trigger behavioral changes; (2) using economic measures to promote water conservation (ie: rate structure, etc); and (3) use of water meters. (See Appendix D for the survey of the Water Leaders' opinions.)

The three measures that we thought would likely not work or would be more difficult to employ include: (1) water conservation met through legislation; (2) pricing water like other commodities; and (3) focusing efforts on the Governor's goal of 20% by 2020.

In order to achieve the greatest increase and success in conservation, Water Leaders feel conservation should target the urban residential sector as well as the urban landscape irrigation section (urban water used for landscape irrigation such as golf courses, parks, medians, greenbelts, etc).

## IX. The Water Leaders' Take Away Points On Conservation

The Water Leaders were able to come to some consensus as it relates to water conservation. Our key "take away" points on conservation include:

- Conservation is important and will help reduce California's water problems but will not resolve them.
- The Governor's 20% x 2020 executive order is laudable and well meaning. Generally, our mentors felt that this was an achievable goal. However, the Water Leaders do not feel that it will resolve the current water crisis. Additionally, more specific details are needed to be developed in the Governor's 20% x 2020 Plan.
    1. Who is the beneficiary of the "conserved water"?
    2. Who will pay for the technology and infrastructure to reach the conservation goal? Should you pay to reach conservation goals that you are not the beneficiary of? (i.e. If you reside in Northern California and have a plentiful water supply, should you be required to invest in water conservation technologies and measures that benefit another region such as Southern California?)

3. How is the baseline utilization determined?

4. Will Best Management Practices be determined by an industry-by-industry basis?

- Increased public education, outreach, and awareness about water are needed to change our perceptions about water. Is water a right for one region or a resource for the entire state?
- People must recognize the fact that we do not have an infinite water supply.
- There is no "one size fits all" approach to water conservation that will work throughout the state and across industry lines.

Bottom line, water conservation is an important, though not the only, tool to aid in California's water crisis. Just as there are many different types of water users throughout the state, there are many ways to approach conservation. Nevertheless, the key factor for any solution is action. Given the state's water woes, water conservation needs to be a way of life for California.

# APPENDIX A

## 2009 WATER LEADERS' CLASS MENTORS

# 2009 Water Leaders' Class Mentors

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# APPENDIX B

## LIST OF CONSERVATION QUESTIONS

# WATER LEADERS 2009 CONSERVATION QUESTIONS

*Overarching Goals:*

Generally, all of the questions proposed by the group fell into the following general categories or themes. These three themes can be used to focus our research.

1) What are the goals of conservation? What benefits can be gained through conservation?

2) What are the most effective ways to meet the goals of conservation and where should efforts be focused to achieve greater conservation?
   a. Which sectors should be the focus of conservation efforts to achieve the greatest increase/success in conservation?

3) What are some current impediments to meeting conservation goals? What are ways for achieving greater conservation?
   a. E.g., outreach, regulation/legislation, physical and economic constraints?

*Specific Questions:*

In addition to the three general categories, the questions can be grouped into various sub-themes, which touch on: (1) economics, (2) policy and regulatory issues, (3) public outreach, and (4) technology. The specific questions the class has decided to pursue include:

1) What are the three biggest obstacles to water conservation gains in California today and what can be done to overcome these impediments?

2) What are the main barriers to imposing mandatory conservation measures? And, what can we learn from what has already been done in other areas of the world?
   a. (i.e., what is distinctive about California from other places that have successfully increased -- or could we say even nearly maximized -- conservation, such as Australia? Or even within California, what are the main factors that have enabled Southern California to more successfully reduce per capita consumption compared to Northern California?)

3) Is the Governor's goal of 20% by 2020 achievable (20% reduction in per capita water statewide by 2020)? If so, what do we have to do immediately at the statewide and regional level?

4) There have been many examples of behavioral changes using public outreach and education to aid in increasing conservation of water. What are the major challenges and obstacles that conservation agencies face in launching effective public outreach campaigns to help enact positive behavioral changes?

5) What are the most effective and/or feasible ways of promoting and increasing water conservation?
   a. Are audits, penalties, incentives, water budgets, allocations, rationing by days of the week, etc, possible methods for achieving conservation?
   b. What action does it take to enact those types of measures?

6) In times of drought, should urban growth be restricted (ie: Goleta)? Would such a restriction work to conserve water?

7) Other than through price (which some say only results in temporary behavior change), how do you achieve long-term behavior change in how people think about water?

8) Do consumers have sufficient information to measure and evaluate their water consumption, and compare their water consumption rates to local and state averages for their family size? Can/should consumers be provided with more information on their water bills? Please explain your answer.

9) Who has the primary responsibility for enacting conservation measures? Is it a local level (town, city), a regional level (county), or a state level? Is it the role of urban users, to enact conservation measures?

10) Outdoor irrigation is the largest sector of urban residential water consumption. Should government (e.g. municipalities, counties, state) take a stronger role in restricting landscape design for new construction?

# APPENDIX C

## SURVEY OF MENTORS' RESPONSES

| *Table 1: Survey of Mentor's Responses on How Best to Achieve Greater Statewide Water Conservation in the Future* | | |
|---|---|---|
| *Question* | | *Response Percent* |
| ☐ | Targeted/focused public education | 88.9% |
| ☐ | Greater regulations | 0% |
| ☐ | Cost-effective pricing mechanism | 44.4% |
| ☐ | Implement more cost-effective, water-efficient devices | 55.6% |
| ☐ | Development of standards | 0% |
| ☐ | Voluntary reduction in use with built-in incentives | 33.3% |
| ☐ | Rebate program | 0% |
| ☐ | Drip irrigation use | 22.2% |
| ☐ | Metering | 55.6% |

# APPENDIX D

## SURVEY OF WATER LEADERS' OPINIONS

*Table 2: Survey of Water Leaders' Opinions on How Best to Achieve Greater Statewide Water Conservation in the Future*

| **1. What category should be the focus of water conservation? (Pick one)** | |
|---|---|
| | **Response Percent** |
| 1. Technology | 13.3% |
| 2. Public Outreach and Education | 33.3% |
| 3. Policy and Regulatory Changes | 20.0% |
| 4. Economic Considerations (imposing higher rates, etc) | 33.3% |
| 5. 20% by 2020 | 0.0% |

| **2. In order to help the state to conserve water, which measures are most acceptable to you? (Pick 3)** | |
|---|---|
| | **Response Percent** |
| 1. Focusing efforts on the Governor's goal of 20% by 2020. | 12.5% |
| 2. Water Conservation becoming a regulatory driven process (ie: enforcement by State, Cities, Counties, DWR, etc). | 6.3% |
| 3. Water conservation met through legislation. | 6.3% |
| 4. Pursuing a "Water Conservation Transfers Market" or a "Water Conservation Bank." | 31.3% |
| 5. Using economic measures to promote water conservation (ie: rate structure, etc). | 68.8% |
| 6. Pricing water like other commodities. | 6.3% |

| | |
|---|---|
| 7. Using educational measures and public outreach to trigger behavioral changes. | 81.3% |
| 8. Use of new technologies. | 43.8% |
| 9. Use of water meters. | 50.0% |
| Other (please specify)<br><br>Focusing specifically on regional planning. | 6.3% |

| **3. What measures do you think will not work or will be more difficult to resolve? (Pick 3)** | |
|---|---|
| | **Response Percent** |
| 1. Focusing efforts on the Governor's goal of 20% by 2020. | 50.0% |
| 2. Water Conservation becoming a regulatory driven process (ie: enforcement by State, Cities, Counties, DWR, etc). | 50.0% |
| 3. Water conservation met through legislation. | 81.3% |
| 4. Pursuing a "Water Conservation Transfers Market" or a "Water Conservation Bank." | 37.5% |
| 5. Using economic measures to promote water conservation (ie: rate structure, etc). | 18.8% |
| 6. Pricing water like other commodities. | 62.5% |
| 7. Using educational measures and public outreach to trigger behavioral changes. | 6.3% |

| | |
|---|---|
| 8. Use of new technologies. | 6.3% |
| 9. Use of water meters. | 6.3% |
| Other (please specify) | 0.0% |

| **4. How important is conservation to solving our water problems in CA?** | |
|---|---|
| | **Response Percent** |
| 1. Very high | 33.3% |
| 2. High | 40.0% |
| 3. Medium | 20.0% |
| 4. Low | 0.0% |
| 5. Not important | 6.7% |

| **5. Which sectors should be the focus of conservation efforts to achieve the greatest increase/success in conservation?** | |
|---|---|
| | **Response Percent** |
| 1. Urban/Residential | 68.8% |
| 2. Urban Use for Landscape irrigation (golf courses, parks, medians, greenbelts, etc). | 75.0% |
| 3. Industrial and Commercial Use | 37.5% |
| 4. Water Districts | 18.8% |
| 5. Agriculture | 37.5% |
| 6. Environment | 12.5% |
| Other (please specify) | 0.0% |