

Table 25: PROJECTED COSTS AND SEASONAL-WATER-USE-SAVINGS OF TURF REPLACEMENT WITH DROUGHT-TOLERANT PLANT MATERIAL; PILOT PROGRAM (10 HOMES, 0.27% OF ALL SFR METERS) SINGLE-FAMILY RESIDENCE CATEGORY, OVER 20 YEARS (SAVINGS: 16% OF ANNUAL WATER USE)

Year	SFR #Meters	#Meters (0.27% of SFR Meters) (10 homes)	Est'd popul'n (10 homes)	SFR AFY (Seasonal) Required w/o Measure	Saved: SFR AFY/All Meters (16%/ Meter/Yr)	Cost of Water/AF w/3% inflat.	\$\$Savings/ Year	Rebate (up to \$500 ea)	10% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates, Costs)
2008	3647	10	34	3.650	0.58	\$2,060.00	\$1,203.03	\$5,000.00	\$6,890.00	\$1,189.00	\$13,079.00	-\$11,875.97	<10
2009	One-time investment yielding results over years.				0.58	\$2,121.80	\$1,239.12	\$0.00	\$0.00	\$118.90	\$118.90	\$1,120.22	
2010					0.58	\$2,185.45	\$1,276.29	\$0.00	\$0.00	\$122.47	\$122.47	\$1,153.83	
2011					0.58	\$2,251.02	\$1,314.58	\$0.00	\$0.00	\$126.14	\$126.14	\$1,188.44	
2012					0.58	\$2,318.55	\$1,354.02	\$0.00	\$0.00	\$129.93	\$129.93	\$1,224.09	
2013					0.58	\$2,388.10	\$1,394.64	\$0.00	\$0.00	\$133.82	\$133.82	\$1,260.82	
2014					0.58	\$2,459.75	\$1,436.48	\$0.00	\$0.00	\$137.84	\$137.84	\$1,298.64	
2015					0.58	\$2,533.54	\$1,479.57	\$0.00	\$0.00	\$141.97	\$141.97	\$1,337.60	
2016					0.58	\$2,609.55	\$1,523.96	\$0.00	\$0.00	\$146.23	\$146.23	\$1,377.73	
2017					0.58	\$2,687.83	\$1,569.68	\$0.00	\$0.00	\$150.62	\$150.62	\$1,419.06	
2018					0.58	\$2,768.47	\$1,616.77	\$0.00	\$0.00	\$155.14	\$155.14	\$1,461.63	
2019					0.58	\$2,851.52	\$1,665.27	\$0.00	\$0.00	\$159.79	\$159.79	\$1,505.48	
2020					0.58	\$2,937.07	\$1,715.23	\$0.00	\$0.00	\$164.59	\$164.59	\$1,550.65	
2021					0.58	\$3,025.18	\$1,766.69	\$0.00	\$0.00	\$169.52	\$169.52	\$1,597.17	
2022					0.58	\$3,115.93	\$1,819.69	\$0.00	\$0.00	\$174.61	\$174.61	\$1,645.08	
2023					0.58	\$3,209.41	\$1,874.28	\$0.00	\$0.00	\$179.85	\$179.85	\$1,694.43	
2024					0.58	\$3,305.70	\$1,930.51	\$0.00	\$0.00	\$185.24	\$185.24	\$1,745.27	
2025					0.58	\$3,404.87	\$1,988.42	\$0.00	\$0.00	\$190.80	\$190.80	\$1,797.62	
2026					0.58	\$3,507.01	\$2,048.08	\$0.00	\$0.00	\$196.52	\$196.52	\$1,851.55	
2027					0.58	\$3,612.22	\$2,109.52	\$0.00	\$0.00	\$202.42	\$202.42	\$1,907.10	
								TOTAL:	11.10	n/a	\$32,325.83	\$5,000.00	\$6,890.00
				AVERAGE:	0.58	n/a	\$3,078.65	\$476.19	\$656.19	\$388.02	\$1,520.40	\$1,548.61	

COST-BENEFIT ANALYSIS: The study upon which this is based (Sovocal, Kent A. *Xeriscape Conversion Study, Final Report, 2005*. Southern Nevada Water Authority) was selected because it was the most complete and detailed study available, and the savings given were well within the savings reported by studies on other water purveyors and regions. Because of the vast differences in climate between Southern Nevada and Nipomo, the two areas' evapotranspiration rates were used to convert the savings in Southern Nevada into savings more likely to occur in Nipomo. SNWA's savings were 30% of annual water use; converting with Nipomo's ET rate, the savings for Nipomo's residents would be 16%.

(Table 25) For the **pilot program, 10 homes only**, the costs-benefits are as follow:

Savings in AF over 20 years:	11.10
Average AF/Y savings:	.58
Total net savings in \$\$\$ over 20 years:	\$16,260.44
Average net \$\$\$/year savings:	\$ 1,548.61
Years until costs are paid off:	<10
% Water savings, all meters:	.02%
Savings:Cost ratio:	2.1:1

The costs for the pilot program are more per participating account and the costs take longer to pay back because the shared program and administrative costs are distributed across only 10 accounts.

If the pilot program proved successful and savings were believed to warrant expansion of the program, it is recommended that the program then be expanded in increments of 5% or less of the SFRs (182 homes).

(Table 26) The costs-benefits for **5% of SFR residences** are as follow:

Savings in AF over 20 years:	212.98
Average AF/Y savings:	10.65
Total net savings in \$\$\$ over 20 years:	\$283,381.45
Average net \$\$\$/year savings:	\$ 22,847.96
Years until costs are paid off:	<5
% Water savings, all meters:	0.29%
Savings:Cost ratio:	4.4:1

Table 26: PROJECTED COSTS AND SEASONAL-WATER-USE SAVINGS WITH XERISCAPE TURF-REPLACEMENT PROGRAM, 5% MARKET PENETRATION (182 HOMES), SINGLE-FAMILY RESIDENCES , OVER 20 YEARS

Year	#SFR Meters	#SFR Meters (5% MP)	Estimd. Popul.	SFR AFY (Seasonal) Required w/o Measure	Saved: AFY w/ measure (16%)	Cost of Water/AF w/3% inflat.	\$\$Savings/ Year	Cost of Rebates (Max: \$500 ea)	10% Share of Shared Program Costs	Office Admn Costs (10% of Prg.Costs)	Total Costs	NET SAVINGS (Total Savings minus Total Costs)	Years to Pay Off Original Invest. (Rebates , Costs)
2008	3647	182	627	66.557	10.649	\$2,060.00	\$21,937.23	\$91,175.00	\$6,890.00	\$9,806.50	\$107,871.50	-\$85,934.27	<5
2009	Initial investment with benefits reaped over years.			66.557	10.649	\$2,121.80	\$22,595.35	\$0.00	\$0.00	\$980.65	\$980.65	\$21,614.70	
2010				66.557	10.649	\$2,185.45	\$23,273.21	\$0.00	\$0.00	\$1,010.07	\$1,010.07	\$22,263.14	
2011				66.557	10.649	\$2,251.02	\$23,971.40	\$0.00	\$0.00	\$1,040.37	\$1,040.37	\$22,931.03	
2012				66.557	10.649	\$2,318.55	\$24,690.55	\$0.00	\$0.00	\$1,071.58	\$1,071.58	\$23,618.96	
2013				66.557	10.649	\$2,388.10	\$25,431.26	\$0.00	\$0.00	\$1,103.73	\$1,103.73	\$24,327.53	
2014				66.557	10.649	\$2,459.75	\$26,194.20	\$0.00	\$0.00	\$1,136.84	\$1,136.84	\$25,057.36	
2015				66.557	10.649	\$2,533.54	\$26,980.03	\$0.00	\$0.00	\$1,170.95	\$1,170.95	\$25,809.08	
2016				66.557	10.649	\$2,609.55	\$27,789.43	\$0.00	\$0.00	\$1,206.08	\$1,206.08	\$26,583.35	
2017				66.557	10.649	\$2,687.83	\$28,623.11	\$0.00	\$0.00	\$1,242.26	\$1,242.26	\$27,380.85	
2018				66.557	10.649	\$2,768.47	\$29,481.80	\$0.00	\$0.00	\$1,279.53	\$1,279.53	\$28,202.28	
2019				66.557	10.649	\$2,851.52	\$30,366.26	\$0.00	\$0.00	\$1,317.91	\$1,317.91	\$29,048.35	
2020				66.557	10.649	\$2,937.07	\$31,277.24	\$0.00	\$0.00	\$1,357.45	\$1,357.45	\$29,919.80	
2021				66.557	10.649	\$3,025.18	\$32,215.56	\$0.00	\$0.00	\$1,398.17	\$1,398.17	\$30,817.39	
2022				66.557	10.649	\$3,115.93	\$33,182.03	\$0.00	\$0.00	\$1,440.12	\$1,440.12	\$31,741.91	
2023				66.557	10.649	\$3,209.41	\$34,177.49	\$0.00	\$0.00	\$1,483.32	\$1,483.32	\$32,694.17	
2024				66.557	10.649	\$3,305.70	\$35,202.81	\$0.00	\$0.00	\$1,527.82	\$1,527.82	\$33,674.99	
2025				66.557	10.649	\$3,404.87	\$36,258.90	\$0.00	\$0.00	\$1,573.66	\$1,573.66	\$34,685.24	
2026				66.557	10.649	\$3,507.01	\$37,346.67	\$0.00	\$0.00	\$1,620.87	\$1,620.87	\$35,725.80	
2027				66.557	10.649	\$3,612.22	\$38,467.07	\$0.00	\$0.00	\$1,669.49	\$1,669.49	\$36,797.57	
TOTAL:				1,331.143	212.98	n/a	\$589,461.59	\$91,175.00	\$6,890.00	\$34,437.36	\$132,502.36	\$283,381.45	
AVERAGE:				66.557	10.65	n/a	\$29,473.08	\$8,683.33	\$344.50	\$1,721.87	\$6,625.12	\$22,847.96	

In summary, estimates indicate that a turf-replacement program would require an initial outlay, but should pay for itself in less than five years, and after that continue to produce both water and costs savings.

It is felt that, because of the initial costs over administering the program, a minimum of 10 enrollees is required each year for the program. The exception would be the first year when word may not have reached all of the District's customers, and customers may not have yet become inspired by the new water rates' impact on their water bills next summer.

It is felt that, based on the personnel hours required to administer and set up the program, 50 customers would be the maximum number accepted each year. Should more personnel be made available, the program could be expanded.

RECOMMENDATIONS: It is recommended that an initial turf-replacement pilot program be initiated, with expansion to more participants per year if analysis of the pilot program warrants. If the pilot program shows savings as expected, and the program was expanded to 5% of SFR homes (182 meters), the costs of the expanded program would be returned in less than five years, and after that (except for yearly administrative costs), there would be almost pure savings in water and costs for water, totaling \$283,381 over 20 years, or \$22,847.96 a year in costs.

COSTS: \$13,079 for the pilot program.

2.3. Landscape irrigation efficiency equipment.

There are a number of low-cost equipment items that can assist in efficient irrigation of the residential landscape. Poor irrigation scheduling (watering too often and for too long) is the primary source of water waste associated with landscape irrigation. Other contributing factors are inefficient and poorly maintained irrigation systems.¹³³

A garden hose can deliver up to 10 gallons per minute. Equipment such as automatic shut-off nozzles for hand-watering and timers that shut off hose-end sprinklers can help eliminate wasted irrigation water. To help eliminate overwatering, a soil moisture probe can give an objective assessment of the soil moisture content. The stick-finger-in-soil method is highly subjective and, unless the applicator is very strong, does not reach 3" to 4" to assess if there is still water available at the plant root level. Rain gauges are inexpensive and a good way to reinforce homeowner awareness of the hydrologic cycle, and give objective feedback regarding what kind of plants can reasonably be supported by the native climate and the amount of funds dedicated to pay for landscape irrigation. Finally, educational products, such as a water drop wheel, can give easily accessible information regarding amount of water used and saved by water conservation measures.

RECOMMENDATIONS: It is recommended that 250 sets of outdoor irrigation efficiency equipment be provided to SFR customers. The kit would contain a soil moisture probe, lawn sprinkler timer, garden-hose nozzle, rain gauge, and water-drop education/information wheel.



Water Wheel

¹³³ Vickers, Amy. *Handbook of Water Use and Conservation*. Amherst, MA: Water Plow Press, 2001.

Studies on actual savings from these measures could not be found. The cost for each set would be \$18.19 (\$4,547.50 for 250 kits). The benefits would include those listed on page 65 "General Benefits and Costs of Landscape Water Conservation."

NOTE: An integral part of the landscape portion of the program would be working with local growers, nurseries and landscapers to ensure that the program design is appropriate for our area, and to facilitate revenue from changes in residential landscape design and maintenance remaining, when possible, with our local businesses.

Table 27: COMPARISON/ TALLY OF SAVINGS FOR NON-CORE PROGRAM MEASURES

Measure	Target Category	Total Savings Avg. AFY	Avg. AFY Consum. For All Categories	# of Meters All categories	% AF Savings for All District Categories	Total \$ (not NET) Savings	Total \$ Costs	Savings: Costs Ratio	Years to Pay off Initial Invest.	Ranking
Low-volume toilets	SFR	8.83	3698.743	xxx	0.24%	\$208,554.35	\$0.00*	100:0*	0*	1
Indoor plumbing retrofit (non-toilet)	SFR, MFR	2.044	3698.743	xxx	0.06%	\$48,276.47	\$14,454.00	3.3:1	<3	2
High-Efficiency Clothes Washer	SFR	127.7	3698.743	xxx	3.45%	\$372,019.75	\$40,289.50	9.2:1	~2.5	1
WeatherTRAK PILOT program	SFR, .27% (10 homes)	0.91	3698.743	xxx	0.0246%	\$34,960.98	\$48,407.45	0.7:1	<11	6
WeatherTRAK 5% SFR	SFR, 5% 182 homes	16.64	3698.743	xxx	0.45%	637,513.52	175,084.70	3.6:1	<5	7
Xeriscape turf-replacement PILOT program	SFR, .27% (10 homes)	0.58	3698.743	xxx	0.02%	32,325.83	15,862.98	2.1:1	<10	4
Xeriscape turf-replacement	SFR, 5% 177 homes	10.65	3698.743	xxx	0.29%	589,461.59	132,502.36	4.4:1	<5	5
Irrigation efficiency equipment	SFR	Unknown	Unknown							3

*San Luis Obispo County will be performing a plumbing retrofit program to offset new development. The costs will be born by the County.

COMPARISON AND DISCUSSION OF NON-CORE WATER CONSERVATION PROGRAM MEASURES

For evaluation purposes, comparison and ranking of the proposed non-core water conservation measures was performed using the following criteria:

- Amount of potential water savings.
- Cost to District (savings:cost ratio).
- Years to pay off initial investment in equipment or rebates.
- Ease of designing, promoting and administering the program for the measure.

High-efficiency clothes washer rebates (ranked #1). This measure would provide an anticipated 3.45% water savings of the District's annual water consumption (all categories).

As is true for all indoor hardware refit programs, the HEW rebate program would require an initial outlay for rebates, but once those have been processed, further expenditure of staff time and District funds (except for program assessments) would not be needed. These programs are easy to set up and easy to administer. For the high-efficiency clothes-washer rebate program, it is estimated that the savings:cost ratio would be greater than 9:1, and it would take less than 2.5 years to pay off the initial investment in rebates. After that, for the life of the machine, savings would continue to accrue. The District's savings are such that the expenditure on rebates is a good investment, and will stimulate more customer interest in HEWs.

It is recommended that the HEW rebate program be initiated. In addition to the District rebate, information will be provided regarding the rebate program from the So. Ca. Gas Company. The two rebates together will provide a strong stimulus for customers to invest in a more efficient clothes-washer. It is recommended that this program be started in 2008.

Indoor plumbing (non-toilet) retrofit (ranked #2) It is recommended that kits that include a high-quality, low-flow showerhead, a high-quality, low-flow faucet aerator, leak-detection dye tablets, and a shower timer be provided, free, to SFR customers. It is estimated that this kit will provide residential customers the tools they need to decrease indoor water use. Although the anticipated water savings from this measure are small (0.06%), the support of other water-saving measures would provide much more in the way of additional benefits. There is a 3.3:1 savings:cost ratio, and the initial funds would be paid back in water savings in less than three years.

It is recommended that the indoor plumbing kits be provided to SFR and MFR requesting customers (one per account, on a first-come/first-served basis), with an initial purchase of 250 kits, to be provided one to a household, first-come/first-serve basis. The kits can be either provided at the District's office facility, or provided at the time of the water audit. If the kits are provided through the office, it is recommended that the customer's old showerhead must be exchanged for the kit. This will help ensure that the showerhead (and hopefully the other items) will actually be installed. It is recommended that this program be started in 2008.

Irrigation outdoor efficiency equipment (ranked #3). This kit of several components (soil moisture probe, educational water-wheel, rain gauge, timer for hose-end sprinkler, and automatic shut-off hose nozzle) is designed to educate, increase water-use awareness, and encourage and assist with water use efficiency. Studies for water savings from the use of these items are not available. However, considering the fact that up to 10 gallons of water per minute can come out of a hose, measures that stop unneeded water from exiting the hose will decrease water waste and

conserve water. In addition, these items will serve as a support for other water conservation measures, by educating and making customers more aware of water use, especially unintended water use.

It is recommended that an initial order of 250 kits be placed, with provision of these kits to requesting SFR customers, one to a household, on a first-come/first-serve basis.

Xeriscape/turf-replacement, pilot and expanded program (ranked #5,6) There are significant savings reported when turf is replaced by xeriscape plants. Many water suppliers are funding turf-replacement by customers. Since the outlay for the rebates would be high, and because it is anticipated that the program would be more challenging to design and administer, it is strongly recommended that, if this measure is considered, that a pilot program of 10 homes first be accomplished before making the larger investment in an expanded program. If the post-pilot-study analysis warrants it, the program could then be expanded. Because of the staff resources required to initiate and administer the program, it is recommended (if the expanded program is warranted) that the program be expanded in increments, with each increment containing a minimum of 10 residences and a maximum of 30 residences.

The amount of savings, over the years, is predicted to be very large. If this measure is initiated, it is recommended that the pilot program be started in 2008.

WeatherTRAK Smart Irrigator program, pilot and expanded program (ranked #8, 9). There are significant savings that have been reported by many sources for Smart irrigation systems. Some of our customers may be reluctant to replace or reduce the amount of their property devoted to lawn. For these customers, it is estimated that the most amount of increased efficiency in water use can occur in landscape irrigation. Turf uses, by far, the largest percentage of water used for most SFR customers. Therefore, ensuring that their landscape irrigation is at maximum efficiency could bring significant savings from these customers and ensure that the water that is dedicated for irrigating their lawns and landscape is not being wasted by unintended usage. Since the outlay for the rebates would be high, and because it is anticipated that the program would be more challenging to design and administer, it is strongly recommended that, if this measure is considered, that a pilot program of 10 homes first be accomplished before making the larger investment in an expanded program. If the post-pilot-study analysis warrants it, the program could then be expanded.

Because of the staff resources required to initiate and administer the program, it is recommended (if the expanded program is warranted) that the program be expanded in increments, with each increment containing a minimum of 10 residences and a maximum of 30 residences.

If this program is selected, it is recommended that the Smart irrigator rebate program be undertaken initially as a pilot program and, if warranted, expansion to a larger program. The amount of savings, over the years, is predicted to be very large. If this measure is initiated, it is recommended that the pilot program be started in 2009 or 2010. This program, out of all those recommended, would take the most staff time for planning, promoting and administering.



X. Comparison of Measures, Discussion and Final Recommendations

A successful water conservation program contains support, incentives and assistance by many means. If the program is designed well, the individual measures of the program support each other, and the sum of the whole is greater than the sum of the individual components.

The proposed water conservation program has two main categories: **core** and **non-core** measures.

The **core** measures are designed to complement each other, and to provide a strong, multi-footed base which supports each of the individual core measures, as well as the non-core measures. The most important element of all of the measures would be a strong conservation-based, multi-tiered rate structure. Studies have repeatedly demonstrated a strong customer response to a rate structure that gives pocketbook incentive to conserve. The best designed, voluntary toilet-replacement rebate measure in the world will be largely unsuccessful if there is no pocketbook incentive for the customer to conserve water. The savings by this measure will depend on the strength of the rate structure passed by the Board of Directors.

The other core measures (public education and outreach) are vital to the success of any water conservation program, but not quantifiable individually. However, it seems obvious that a customer who does not know about the need for water conservation, or the rebate measures offered, will not be motivated to save water or take advantage of the rebate measure.

The **non-core** measures include individual measures that may or may not support each other. For instance, the landscape "irrigation efficiency equipment" measure would support the ET-controller rebate and xeriscape/turf-replacement measures, but not the high-efficiency clothes-washer measure (although the argument can be made that conservation of any kind makes the consumer more aware of water use in other situations). The non-core measures range from easy to not-so-easy to design and run, and it is recommended that the easy ones with the greatest potential savings be attempted first before escalating to the measures which require more staff time, effort, and District funding.

For xeriscape/turf-replacement and ET-controller rebate measures, because of the difficulty in designing and running the programs, and the expense involved, it is recommended that small pilot programs of 10 SFR accounts for each measure be performed before expanding to programs with more participants.

Perhaps the most important part of any water conservation program is the customers' willingness to participate. There are many District customers who simply are not willing to conserve water if it is going to be used for new housing and further growth.

Therefore, it is recommended, as a vital part of the water conservation program, that the Board consider enacting an ordinance that guarantees our customers that the water they conserve will not be used to support new housing growth in the District.

It is believe that an approach which provides the District's customers with the pocketbook incentive, education and assistance, technical help, rebates, and other supportive measures, while guaranteeing that the water they save will not be used for new growth, will be more readily accepted by the District's customers, and will meet with greater success.

FINAL RECOMMENDATIONS

CORE MEASURES PROGRAM:

1. **Multi-tiered, inclining block, conservation-based rate structure.** It is recommended that a strong conservation-based rate structure be instituted for both residential and nonresidential customers for SFR, MFR, commercial and landscape accounts.
2. **Public outreach materials and events, NCSD landscape/demonstration garden, technical assistance (water audits, etc.) and other supportive measures.** These measures will complete the core measures program foundation upon which the rest of the program is built.

NON-CORE MEASURES PROGRAM:

1. **High-efficiency clothes washer rebates in increments of 10% (~365) of SFR accounts.** Each increment is projected to produce 3.45% water savings for the entire District, all categories. This program can be easily accomplished, and has a quick, high-rate return in water savings.
2. **Low-volume-flush toilets.** This program will be administered by San Luis Obispo County. For every 365 toilets that are replaced, it will save 8.83 AF/Y (or \$18,192/year), or 0.24% savings of all the water consumed by the District.
3. **Indoor plumbing (non-toilet) retrofit and leak detection aids, in increments of 250 residences (6.9% of residences in 2008).** This measure will add only 0.06% savings, if estimated on its own, but the savings will be increased when it is considered as part of the water-audit/education and leak-detection program.
4. **Irrigation efficiency equipment in increments of 250 residences (6.9% of residences in 2008).** Quantifiable savings are not available for this measure. However, especially when provided as part of a water audit/leak-detection program, this measure will serve as incentive to save water in the landscape.
5. **Turf-replacement rebate program.** Once the pilot program has been performed, monitored and analyzed, and expansion of the program warranted to increments of 5% of SFR homes (~180 homes), each 180 increment can be expected to produce 10.65 AF/Y water savings (or net savings of \$22,847.96/year in supplemental water costs), 0.29% water savings for the entire District.

ORDINANCE:

To gain the most customer support possible for the water conservation program, it is recommended that the Board consider enacting an ordinance which guarantees customers that the water they conserve will not be used for new growth.

NOT RECOMMENDED BUT AVAILABLE FOR CONSIDERATION:

- **Smart ET-controller irrigation rebate.** This measure would be the most complicated and time-consuming to design, launch, administer and monitor. However, the reported returns are huge. If the recommended measures are not sufficient to meet District's water conservation goals, then this measure could be considered.



In Closing

The NCSD and its customers are facing water challenges that can only be met with proper planning and customer support. Water conservation plays a vital role in meeting these challenges. Fortunately, there is a wealth of information and statistics compiled by those who have been down this road before us, and we are now on notice regarding the anticipated impending "permanent drought" that may affect us as early as 2050, the anticipated multi-year drought in the nearer future, and the insecurity of the provision of State water. Throughout the State of California, politicians and managers of water suppliers are taking the lead in initiating plans now for the events predicted to occur in the future.

People in the future will look back on those making water policy decisions at this crucial point, and will view us as either heroes or failures. By moving forward now in a decisive manner, we stand a chance of being regarded as the former and not the latter.

**CALIFORNIA URBAN WATER CONSERVATION COUNCIL
BEST MANAGEMENT PRACTICES**

1. **Water survey programs for single-family residential and multi-family residential customers.** Survey, including water audit, 15% of residential customers within 10 years.
2. **Residential plumbing retrofit.** Retrofit 75% of residential housing constructed prior to 1992 with low-flow showerheads, toilet displacement devices, toilet flappers, and aerators.
3. **System water audits, leak detection and repair.** Audit the water utility distribution system regularly and repair any identified leaks.
4. **Metering with commodity rates for all new connections and retrofit of existing connections.** Install meters in 100% of existing un-metered accounts within 10 years; bill by volume of water use; assess feasibility of installing dedicated landscape meters.
5. **Large landscape conservation programs and incentives.** Prepare water budgets for 90% of commercial and industrial accounts with dedicated meters; provide irrigation surveys to 15% of mixed-metered customers.
6. **High-efficiency washing machine rebate programs.** Provide cost-effective customer incentives, such as rebates, to encourage purchase of machines that use 40% less water per load.
7. **Public information programs.** Water utilities to provide active public information programs to promote and educate customers about water conservation.
8. **School education programs.** Provide active school education programs to educate students about water conservation and efficient water uses.
9. **Conservation programs for all commercial, industrial and institutional accounts.** Provide a water survey of 10% of these customers within 10 years and identify retrofiting options; OR reduce water use by an amount equal to 10% of the baseline use within 10 years.
10. **Wholesale agency assistance program.** Provide financial incentives to water agencies and cities to encourage implementation of water conservation programs.
11. **Conservation pricing.** Eliminate non-conserving pricing policies and adopt pricing structure such as uniform rates or inclining block rates. Incentives to customers to reduce average or peak use, and surcharges to encourage conservation.
12. **Conservation coordinator.** Designate a water agency staff member to have the responsibility to manage the water conservation programs.
13. **Water waste prohibition.** Adopt water waste ordinances to prohibit gutter flooding, single-pass cooling systems in new connections, non-re-circulating systems in all new car wash and commercial laundry systems, and non-recycling decorative water fountains.
14. **Residential ultra-low flow toilet (ULFT) replacement programs.** Replace older toilets for residential customers at a rate equal to that of an ordinance requiring retrofit upon resale.

XERISCAPE: SEVEN PRINCIPLES

1. Planning and design. Assessing the landscape for exposure, topography, climate, soil, planting zones (hydrozones). A good design is the backbone of a good xeriscape.

- Start the project with a basic scaled drawing of the property, including buildings, walks, and other hardscape.
- Identify sunny and shady areas, slopes and views.
- Include in your design large shrubs and trees that you wish to remain in the landscape. Be sure to draw them to scale so you don't add new plants too close to the existing plants.
- Evaluate the needs of the people, pets and wildlife who will be using the landscape: play areas for children and/or pets, deck for entertaining, herb garden, cutting garden, vegetable garden, hummingbird/butterfly garden, etc., and incorporate these needs into the design.
- Group plants with similar water and exposure needs into zones to make watering easier and more efficient.
- If an herb, vegetable or wildlife garden is desired, place it so it is up-slope and up-wind from any turf or other areas of the landscape that may require pesticide applications. Toxin-laden wind-drift and run-off should not be allowed into areas where food items will be grown (this includes fruit trees) which, for safety's sake, should not be planted in a lawn or garden area which will be treated with chemicals.

2. Improve the soil. Test the soil for nutrient content by collecting a sample and sending it to a soil lab. Most soils benefit from adding 2 to 3 cubic-yards of organic matter (such as commercial compost or aged manure) for every 1000 square-feet of landscape area. Soil with adequate organic matter absorbs and retains water much better than OM-poor soil, and the reward will be healthy grass and good plant growth, which will require less water. Note that some native plants have evolved to thrive in poor soil. Check for specific plant requirements.

3. Irrigate efficiently. Review the landscape design and choose the most efficient irrigation for the landscape. The new drought-tolerant plantings will require supplemental water in the first year or two, but afterwards will need little irrigation. Select an irrigation system that can be programmed depending on the needs of the plant and climate. Choose appropriate, efficient spray heads and/or emitters. Maintain the system regularly, assessing for distribution uniformity and amount delivered. As the landscape matures, the needs of the plants will change. Once plants have reached the desired size, experiment with decreasing the amount or frequency of irrigation. Any excess growth beyond the size you want is water, money, and maintenance-energy wasted.

4. Limit traditional turf areas. Include only the amount of turf actually needed in the landscape. Replacing all or a portion of an existing lawn area with other attractive landscaping will save money in water costs, maintenance, and chemicals. Consider using a turf alternative, such as *Carex praegracilis*, which is very drought tolerant.

5. Select appropriate plants. A wide selection of plants are available for xeriscaping. Choose plants based on the role they will play in the landscape. Group plants according to water and exposure needs. Place plants grown for eating (fruit trees, herb garden, vegetable garden) up-wind and up-slope from plants, such as turf grass, that may require applications of toxic chemicals. **BE SURE TO SELECT PLANTS THAT ARE NOT INVASIVE IN YOUR AREA.**

6. Use mulch. Mulch moderates soil temperatures, increases the soil's moisture-holding capacity, increases the soil's fertility (cation-exchange capacity), slows erosion, and suppresses weeds that would compete with landscape plants for nutrients and water.

7. Maintain regularly. All landscapes need some maintenance, even xeriscape landscapes. Maintenance can be decreased, once plants have reached the desired size, by decreasing the amount of irrigation applied. It will save money and energy spent on irrigation and maintenance.

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APPENDIX V: SOURCE MATERIAL, EXCERPTS, QUOTES.

Henderson, Gary, Munds, R. *City of San Luis Obispo 2006 Water Resources Status Report, June 2006*

"Based on policies contained in the Water Element of the General Plan, the City has adopted a per capita planning use rate of 145 gallons per person per day (gpcd) for projecting future water supply needs and determine the availability of water for new development. The 145 figures is not the amount that the average person uses but takes into account all water uses including residential, commercial, industrial, landscape, etc. The city wide water use is monitored to insure that actual use remains below the adopted planning figure so that the City does not exceed our available water resources." Pg. 3

"This last year's per capita water use was approximately 122 gpcd, a decrease from the last year's use of 126 gpcd." Pg. 3

"The non-residential water savings have been achieved through the replacement of pre-rinse spray valves in restaurants, hospitals and grocery stores city-wide, with water conserving hardware. Like the toilet retrofit program, this is a "hard-wired" water conservation measure that will provide reliable, ongoing water savings estimated at 20 acre feet per year." Pg. 6

"The Water Conservation Program is an integral part of the City's overall water management strategy and is now being considered as a new source of supply, contributing to our safe annual yield based on the water saved." Pg. 7

"With the adoption of the UWMP in 1994, toilet retrofitting had been identified as a significant water demand management strategy and integral part of the City's overall water management plan." They replaced "...approximately 83% of all toilets within the City of San Luis Obispo. This represents an annual estimated water savings of over 1,400 acre feet." Pg. 8

"As part of the 2001-03 Financial Plan, a High Efficiency Washing Machine Rebate Program was implemented. A \$150 dollar rebate was offered for qualifying machines. The budgeted amount was for 100 machines for each fiscal year. Funding for the 2001-02 and 2002-03 fiscal years was fully utilized by January 2003...It is estimated that about 6 acre feet of water will be saved annually by these water efficient machines with considerable energy savings as a side benefit." Pg. 9

According to table entitled "Washing Machine Rebates," (Pg. 9), a total of 354 rebates have been given, with a total estimated savings of 5.97 afy.

"During 2005, 1,814 HUL were sent to single family residential customers. The program targets residential customers that use more than 50 units of water during a two month billing cycle between April and November. From the November through March, letters are sent to customers using more than 40 units during a billing period. Conservation staff developed a monitoring system in an effort to quantify the water savings resulting from this effort. Based on the data analyzed from 2003 through 2005, the HUL program is conservatively saving an average of 100 acre feet of water per year." Pg. 10

"There are about 450 irrigation only accounts in the City. Of these approximately 80 water budgets have been developed....The goal is to inform customers that they could reduce their water use and associated bills, if their irrigation systems were operated more efficiently." Pg. 11

"The commercial sector program focused on restaurant dishwashing hardware. The City, partnering with the California Urban Water Conservation Council (CUWCC) completed the installation of 100

water/energy efficient pre-rinse spray valves in restaurants, hospitals and grocery stores city-wide. Each valve will save about 50,000 gallons of water and 335 therms of natural gas per year. A majority of the program costs were funded through a California Public Utilities Commission grant which was administered by the CUWCC. The City cost was \$50.00 per valve. This included the valve, the canvassing and contact with the potential recipients and installation of the valve. The City's cost per acre foot of water saved, based on the life of the valve, is less than \$10.00 per acre foot, with an estimated annual savings of about 20 acre feet per year." Pg. 11

"The water saved through Water Conservation Program, historically, has been the least cost option when looking at new sources of supply. The City has implemented numerous programs over the years which have resulted in a dramatic decrease in per capita water use. When evaluating the potential yield from a new conservation measure, it is very important to factor in the reliability of the program to achieve the estimated savings. That is why, in the past, toilet and showerhead replacement had been the cornerstones of the Water Conservation Program. Pg. 11

"As previously stated, numerous studies statewide are currently underway which are evaluating new water conservation technology. Advancements in irrigation technology equipment appears to be the next major source of water savings." Pg. 12

"The third area of focus will be to continue to improve our conservation efforts. Efficient use of our resources stretches the availability of our water supplies and has proven to be very cost effective." Pg. 13

SLO Rates: website

SFR	Inside City	Outside City
1-5 ccf	3.28	6.56
5-25 ccf	4.11	8.22
>25 ccf	5.14	10.28
All Other Customers		
1 to 5 ccf	3.28	6.56
>5 ccf	4.11	8.22

SUMMARY: California could reduce residential outdoor water use by 25% to 40% through landscape management, hardware improvements, and landscape design. Improved efficiency and increased conservation are the cheapest, easiest and least destructive ways to meet CA's future water needs by using technology, economics, smart regulation, information, and integrated water management strategies.

--Gleick, P.H., Haasz, D. *Waste not, want not. Pacific Institute. <http://www.pacinst.org/reports/>. 2003.*

SUMMARY: Residential water demand in US averages 26 billion gallons per day, 7.8 billion gallons per day dedicated to outdoor use, primarily lawn watering, (USGS, 1998).

--Vickers, A. *Water use and conservation. WaterPlow Press. Amherst, MA. 2001.*

SUMMARY: In 1995 Albuquerque adopted the Water Conserving and Water Waste Ordinance that established a 20% turf limit for residences and required all new city properties except parks and golf courses to landscape with 100% low and medium water using plants. Combined with a new conservation-based water rate structure, a public education program, a high-efficiency plumbing program, they successfully slowed down the draw down of the groundwater supply and reduced per

person usage 23% from 250 gallons per person per day (946 liters) in 1995 to 193 gpcd (730 liters) in 2003.

--*Albuquerque, New Mexico: Long-range planning to address demand growth. Cases in water conservation: how efficiency programs help water utilities save water and avoid costs. US EPA. July 2002. <http://www.epa.gov/owm/water-efficiency/utilityconservation.pdf>*

SUMMARY: Volusia County has become the first in Florida to pass an ordinance requiring new homes to have less grass: at least 25% of new yards must have landscapes requiring little or no irrigation. According to the Orlando Sentinel, "Florida homeowners now maintain more than 3.8 million acres of lawn with 50,000 acres of new grass planted every year."

--*Florida county restricts lawns. WaterWiser, American Water Works Association. <http://www.awwa.org/waterwiser/watch/archive.cfm>. September 2004.*

SUMMARY: New single and multi-family residences will have no more than 50% of the total irrigated landscape dedicated to high irrigation water use zones including turf, annuals, and vegetable gardens. Website includes checklists, diagrams, basic Florida water info, and landscape design and irrigation info.

--*Sarasota County (Florida) Water Efficient Landscaping Regulations (Ordinance #2001-081). <http://sarasota.extension.ufl.edu/WEL/ord/docs/ord.htm>. 2001.*

SUMMARY: The comprehensive landscape code adopted in 1991 applies to new multifamily, commercial and industrial development. Limits non-drought tolerant plants to a small 'oasis' areas (less than 5% of total). Requires water-conserving irrigation systems and the use of storm water run-off.

--*Tucson, Arizona xeriscape landscaping and screening regulations- ordinance 7522. <http://www.tucsonaz.gov/water/ordinances.htm>. 1991.*

SUMMARY: Ordinance prohibits property associations, both residential and commercial, from requiring mostly high water-use grass in yards. Intends to ensure that all property owners can choose to plant a xeriscape if they wish. Up to 20% can be planted in high water-use grass. Legitimate public interest, avoiding environmental damage caused by over pumping Albuquerque's ground water supply, was justification for this action.

--*Albuquerque halts requirements for turf. WaterWiser. American Water Works Association. <http://www.awwa.org/waterwiser/watch/>. April 2004.*

SUMMARY: As part of Castle Rock's ongoing campaign to reduce water consumption, home owner association leaders could face a \$1,000 fine and risk arrest if they penalized home owners who want to use less grass and more drought-tolerant plants. Colorado State law prohibits new developments from mandating irrigated turf or banning xeriscaping. Castle Rock's ordinance applies to existing communities as well.

--*Bunch, J. Prospects greener for lawn alternatives in Castle Rock. Denver Post. November 9, 2004.*

SUMMARY: Recommended water saving features for homeowner controllers: 3 independent programs; station run times from 1-200 minutes; three start times per program; odd/even, weekly and interval program capability up to 30 days; water budgeting from 0-200%; 365 day calendar; non-volatile memory or battery back-up; "Off", "Auto", and "Manual" operation modes without disturbing programming; rain shut-off device capability; diagnostic circuitry to notify homeowner when station is shorted or power failure has occurred.

--*Irrigation controllers: timers for the homeowner. US Environmental Protection Agency et al. <http://www.epa.gov/owm/water-efficiency/index.htm>. July 2003.*

SUMMARY: Most irrigation inefficiency occurred during the fall. Sites maintained by contract landscapers were irrigated less efficiently. Sites less than two acres achieved the highest

percentage water savings. Audit water savings diminished over time (20.1%, 7.6%, and 6.5% over three years.)

-- *Whitcomb, J.B. Landscape water audit evaluation. Contra Costa Water District. August 1994*

SUMMARY: Notes Santa Clara Valley Water District's Irrigation Technical Assistance Program: 55% decrease in water use (TriNet example); North Marin study: water conserving landscapes use 54% less water; and Irvine Ranch Water District: pricing, water budgets, rebate and loan program, education and outreach very effective bringing water application to 60% of ET since 1995.

--*Gleick, P.H.; Wong, A.K. Sustainable use of water: California success stories. Pacific Institute. <http://www.pacinst.org/reports/>. January 1999.*

SUMMARY: Homeowner associations, schools, commercial sites, and public parks at 25 sites covering 83 acres were retrofitted with weather-based irrigation technologies (WeatherTrak-Hydropoint and Water2save LLC). These technologies reduced water use from 17 to 28 percent. Landscapes with dedicated irrigation meters saved 56 acre-feet per year, those with mixed-use meters saved 26 acre-feet per year. Program success depends upon landscaper participation and support and convincing customers of the dollar benefits they will experience.

--*Bamezai, A. Los Angeles Dept. of Water and Power weather-based irrigation controller pilot study. LADWP. <http://www.cuwcc.org/uploads/product/LADWP-IrrigationController-Pilot-Study.pdf>. August 2004.*

SUMMARY: Test controllers were installed in 40 homes. Compared to the reference group, the retrofit group had a 16% reduction in estimated outdoor use, 37 gallons per household per day. Post-trial survey indicated 97% of those with ET controllers found them convenient and improvement or no change to the appearance of the landscape.

--*Hunt, T.; Lessick, D. et al. Residential weather-based irrigation scheduling evidence from the Irvine "ET Controller" study. Irvine Ranch Water District. <http://www.irwd.com/welcome/FinalETRpt.pdf>. June 2001.*

SUMMARY: Chapter VII- Residential and Small Commercial Weather-Based Irrigation Controllers summarizes information about weather-based controllers. Irvine Ranch Water District estimated a 10% reduction in total household consumption with outdoor consumption reduced by 24%. Similar studies in Denver, CO, Sonoma, CA and Valley of the Moon, CA estimated 21%, 23%, and 28% declines in outdoor consumption. Programs must include significant levels of outreach and inclusion of green industry. Targeting of high-water users is important. Should tie to rates.

--*Koeller, J. A report on potential best management practices. Prepared for California Urban Water Conservation Council. August 2004.*

SUMMARY: Weather-based controllers resulted in water savings of 41 gallons per day in typical residential settings and 545 gpd for larger dedicated landscape irrigation accounts. Reduction in runoff was 50% comparing pre-intervention and post-intervention periods and 71% in comparison to the control group. In terms of cost effectiveness, initial targets for program expansion should be large landscapes such as parks and street medians.

--*Residential runoff reduction study. Municipal Water District of Orange County and Irvine Ranch Water District. <http://www.mwdoc.com> (Using Water Wisely). July 2004.*

SUMMARY: Best development practices that improve on-site management of storm water runoff include minimizing impervious surfaces, preserving native soil and vegetation, and establishing minimum soil quality and depth standards in landscaped areas. Requires a topsoil layer with a minimum organic matter content of 10 percent with a minimum depth of 8 inches. Subsoils to be scarified (loosened) at least 4 inches.

--*Manual 2002 guidelines & resources for implementing soil depth & quality. Washington State. 2002.*

SUMMARY: The District initiated the study to determine whether the installation of artificial turf impacts groundwater or surface water quality. Preliminary lab results indicated primary concern regarding heavy metals above secondary drinking water standards (zinc) and above current concentration in the groundwater basins (zinc, copper, barium, and chromium. Collection and treatment of water from sites where artificial turf is installed may decrease the water quality impacts of artificial turf. Other concerns include human health impacts and environmentally safe disposal.
--Ashktorab, H. *Artificial turf. Santa Clara Valley Water District. Personal correspondence. 2/1/2005.*

SUMMARY: Xeriscape sites used 17% less water than traditionally landscaped single family sites in a study of 382 homes.
--Nelson, J.O.; Kruta, J.C. *Water saved by single family xeriscapes. 1994 Annual conference proceedings; American Water Works Association. June 1994.*

SUMMARY: Study quantified savings estimates of what a xeriscape conversion facilitation program could yield under real world conditions. The Southern Nevada Water Authority's Water Smart Landscape Program produced a 37% positive return, bringing in \$1.58 for each \$1.00 spent on rebate incentives, freeing up local water resources for immediate use. The averages savings of 30% (96,000 gallons) annually for those who converted from turf to xeriscape. Residents applied 73 gal/sq ft/year to turf, 17.2 gal/sq ft/yr to xeric landscapes, a per unit area savings of 55.8 gal/sq ft/yr. The savings were most pronounced in summer. Total yearly savings neither eroded or improved across the years. The average cost to convert was \$1.55/sq ft, homeowner installed \$1.37, contractor installed \$1.93. The xeric ETo was about 33% of the ETo of turf. The average savings in landscape management was 2.2 hours per month and \$206 per year in maintenance expenditures.
-- Sovocool, Kent A. *Xeriscape conversion study final report. Southern Nevada Water Authority. 2005*

SUMMARY: In response to severe drought, Clark County School District is considering a plan to remove more than 2 million square feet of existing turf that could save an estimated 60 million gallons of water a year. With 289 schools and 189 acres of landscaping, the sixth-largest school district in the nation is the largest single water user in southern Nevada. Turf is being replaced with desert landscaping or artificial turf.
--Vegas-area schools consider removing turf to save water. *WaterWiser, American Water Works Association from US Water News. <http://www.awwa.org/waterwiser/watch/archive.cfm>. September 2004.*

SUMMARY: Metropolitan Water District of Southern California approved another \$3.2 million for ongoing campaign to reduce outdoor water use by switching to drought-tolerant plants and setting sprinklers correctly. Outdoor water use can account for 40% to 70% of a home's total water use. The agency set up a website, www.bewaterwise.com, and partnered with The Home Depot and others to highlight drought-tolerant plants and offer classes. Cathedral City initiated a pilot program to offer residents up to \$500 to transform front lawns to desert landscapes.
-- Bowles, J. *Anti-drought push gets funds. Riverside Press-Enterprise. 10/13/2004.*

SUMMARY: SNWA offers a range of free services and rebate programs to help homeowners and businesses become water smart including \$1 per square foot for grass converted to xeriscape; irrigation clock upgrade rebates, a landscape awards program, and listing of water smart landscapers.
--*Water Smart Rebates and Services. Southern Nevada Water Authority. http://www.lvwd.com/html/ws_rebates.html. 2003.*

SUMMARY: Provides comparative information on California water charges for a typical single family residence monthly water service charge for an assumed average water usage of 1,500 cubic feet

(11,000 gallons) per month. Of the 350 water purveyors surveyed, 49% used uniform rate structures, 41% tiered rates, 1% declining block rates, 9% some other rate structure. Down from 24% in 2001, 16% collected additional revenues from various sources such as grants, contributions from other funds, special assessments, general fund transfers and property taxes. The service charge is relatively comparable among the four regions of the state: Northern, Coastal, San Joaquin Valley and Southern, around \$11 per month. The commodity charge is the main variant between typical bills in the four regions. Water costs for the San Joaquin Valley are one-fourth of that in the Coastal region and about one-half of that in Northern and Southern California.

-- *California Water Charge Survey 2003. Black and Veatch. 2003.*

SUMMARY: This study looks at the revenue and rate implications of conservation programs in the short and long term and how water suppliers respond to reduced sales. Water conservation can help utilities avoid both fixed capital and variable operating costs by avoiding investments in unnecessary capacity to meet inflated demand. Conservation should be viewed as a means to lower the long term cost structure and thereby reduce the revenue requirements of the water utility. It is important to communicate benefits to the customers. The revenue effects of water conservation are manageable when viewed from a planning perspective and when planning and ratemaking are integrated.

-- *Chesnutt, T. Beecher, J. Draft white paper: revenue effects of conservation programs: the case of lost revenue. March, 2003.*

SUMMARY: Conservation pricing, separate meters and public education resulted in a 43% water reduction in landscapes. Eighty percent of landscaped acres are served recycled water.

--*Highlights of Irvine Ranch Water District's landscape conservation program. Water Conservation News. July 1997.*

SUMMARY: End use of water consumes more energy than any other part of the urban water conveyance and treatment cycle. By reducing peak demand, water conservation can eliminate or delay the need for expanding treatment facilities or decrease the size of the expansion needed and help avoid power shortages. Peak demand for water coincides with peak seasonal demand experienced by electrical utilities.

--*Cohen, R.; Nelson, B.; Wolff, G. Energy down the drain: the hidden costs of California's water supply. Natural Resources Defense Council and Pacific Institute. August 2004.*

SUMMARY: About 2,000 landscaping jobs in Colorado were lost between 2002 and 2003 because of continuing drought conditions, in the \$1.67 billion industry including landscaping, nurseries, garden centers and commercial florists with revenues dropping \$60 million. To increase business, some landscapers have added artificial turf to their businesses as well as designing landscapes with drought-tolerant plants and emphasizing more efficient irrigation systems. Sales of container gardens and drought tolerant plants soared. S. Nevada Water Authority banned sod planting in new residential front yards, limited grass to 50% in back yards, and offered rebates of \$1 per square foot for turf removal.

-- *Shore, S. Landscapers suffer as drought lingers throughout the West, strategies for a water crunch. Associated Press. 5/16/2004.*

Sovocal, Kent A. Xeriscape Conversion Study, Final Report, 2005. Southern Nevada Water Authority.

"The experimental study involved recruiting hundreds of participants into treatment groups (a Xeric Study and a Turf Study Group and control groups), as well as the installation of submeters to collect per unit area application data. Data on both household consumption and consumption through the submeters was collected, as well as a wealth of other data. In most cases, people in the xeric study group converted from turf to xeriscape, though in some cases recruitment for this group was

enhanced by permitting new landscapes with xeric areas suitable for study to be monitored. Portions of xeric areas were then submetered to determine per-unit area water application for xeric landscapes. The TS Group was composed of more traditional turfgrass-dominated landscapes, and submeters were installed to determine per-unit area application to these areas as well. Submeter installation, data collection, and analysis for a small side-study of multi-family/commercial properties also took place.

"Results show a significant average savings of 30% (96,000 gallons) in total annual residential consumption for those who converted from turf to xeriscape. The per-unit area savings as revealed by the submeter data was found to be 55.8 gallons per square foot (89.6 inches precipitation equivalents) each year. Results showed that savings yielded by xeriscapes were most pronounced in summer. A host of other analyses covering everything from the stability of the savings to important factors influencing consumption, to cost effectiveness of a xeriscape conversion program are contained within the report."..." In the Mojave Desert of the southwestern United States, typically 60 to 90% of potable water drawn by single-family residences in municipalities is used for outdoor irrigation."

Whitcomb, J., Water Price Elasticities for Single-Family Homes in Texas for City of Austin, Stratus Consulting, April 1999.

"Studies done within the region have shown a price elasticity of approximately -0.20. This means that for every 10 percent increase in water prices a resulting 2.0 percent reduction in water use may be anticipated. Increase in average income must be factored in by the utility to determine the actual net impact on consumer perception and response to price. For planning purposes this number may be used."

**Urban Water Pricing and Drought Management
Moncur, JET**

"In periods of drought, urban water systems commonly rely on nonmarket programs to induce temporary conservation, leaving the marginal price of water unchanged; an alternative is to raise the price. Using pooled cross-sectional and time series observations on single-family residential customers of the Honolulu Board of Water Supply (1982), demand for water is estimated as a function of price, income, household size, rainfall, and a dummy variable denoting a water restrictions program. Short-run elasticities suggest that an increase in marginal price of less than 40% would achieve a 10% reduction in water use, even during a drought episode. An accompanying conservation program would mitigate the necessary price increase, but only slightly."

Water Resources Research WRERAQ Vol. 23, No. 3, p 393-398, March 1987. 2 fig, 4 tab, 19 ref.

**Water Conservation Measures. Municipal Research and Services Center of Washington
(<http://www.mrsc.org/>)**

"One of the most effective tools for water conservation is the rate structure. Rate structures and practices that promote the efficient use of water should be the goal to ensure sufficient resources to meet competing uses."

Vickers, Amy. *Handbook of Water Use and Conservation*. Amherst, MA: 2001.

"Increased block rate structures, seasonal rate charges, and other pricing strategies may be used to help reduce demand." Pg. 143

"The Irvine Ranch Water District (IRWD) in Irvine, California, has used pricing strategies successfully to discourage excessive outdoor water use. By implementing an increasing block rate structure, the IRWD has reduced outdoor watering among customers by nearly 50%." Pg. 144

"This [water conservation] approach has saved considerable capital and operating costs for utilities and consumers, avoided environmental degradation, and built political bridges instead of walls."
(Preface)

Hutchins-Cabibi, Taryn (Western Resource Advocates). *Better Water Rate Structures Can Encourage New Mexicans to Conserve*. February 2006.

"In a new report, "*Water Rate Structures in New Mexico: How New Mexico Cities Compare Using this Important Water Use Efficiency Tool*," Western Resource Advocates and Professor Denise Fort of The University of New Mexico, School of Law, take a close look at the wide variety of water rate structures in New Mexico cities, ranging from those that promote efficient water use to those that actually encourage wasteful use. Report findings show that, with some adjustment, new water rate designs in New Mexico cities can better protect water resources while meeting urban water supply demands. The clear conclusion: if designed appropriately, increasing block rate structures are most effective at encouraging efficient water use."

-- Hutchins-Cabibi, Taryn (Western Resource Advocates). *Better Water Rate Structures Can Encourage New Mexicans to Conserve*. February 2006.

Nipomo Community Services District Water and Sewer Financial Plans, User Rates and Capacity Charges, Final Report. The Reed Group, 2006. Pg. 36

"The typical single family residential customer in the Town Division uses an average of 32 HCF per bi-monthly billing period. The typical single family customer in the Blacklake Division uses an average of 38 HCF per billing period." Per table, fiscal year 2006-2007 typical charges are Town \$64.18, Blacklake \$68.65.

"Where does my water come from?" Water Education Foundation (<http://www.water-ed.org>)

About 30 percent of California's total annual water supply comes from groundwater in normal years, and up to 60 percent in drought years.

Stallworth, Holly. *Conservation Pricing of Water and Wastewater*. April, 2000. Environmental Protection Agency.

"The most frequent economists' response to the imperatives of environmental protection and resource conservation is to use the price mechanism more strategically. "Full costs" refers to the complete societal costs (environmental, social and actual) that pertain to the production and consumption of a good or service. Economics shows us that social welfare is maximized when all costs are reflected in prices. This is sometimes referred to as "full cost pricing" or the "polluter pays principle." Only then do our production and consumption decisions take into account all costs to society, resulting in the most appropriate balance of supply and demand. When prices are artificially low, we tend to consume too much. When prices are artificially high, we tend to consume too little...

"...From an environmental economics perspective, pricing can be an extremely valuable public policy tool. Prices can be more than a means of meeting revenue requirements or even turning a profit. Environmental economists have long advocated bringing the price mechanism more fully in line with "full costs" so that "users" might respond to "market signals" – reflecting the true and full costs of production and consumption. Since water is basic to life, and certainly to our quality of life, the pricing of water can be a powerful means of signaling this importance and scarcity to water users, most of whom experience very little connection between their water usage and their total bill. In our current era in which water demands are increasing while water supplies are constant or diminishing, it is important to apply economic tools to communicate the true value of fresh water. Pg. 4, 5

"...Water's importance to our survival renders it, quite literally, "priceless" but this intrinsic value of water is frequently left out under the traditional pricing method -- known as cost-based pricing -- which is an accounting system designed to ensure the financial self-sufficiency of water and wastewater systems.

"This pricing method quantifies the costs of capture, treatment and conveyance. As such, this method can often obscure the larger but less quantifiable societal interests in preserving our water resources. Moreover, given the very high fixed costs associated with water and wastewater facilities, cost-based pricing can predispose rate setting against variable (i.e. commensurate with usage) charges and thus can run counter to conservation goals.

"Cost-based pricing does not to be in conflict with conservation pricing. Supplementing cost-based pricing with incentives for consumers to manage demand is a combination that serves both financial and environmental goals. Another term that is sometimes used is "demand management pricing" to reflect the underlying motivation to lower water demand (or slow the rate of demand growth).

"Water and wastewater demand can be manipulated by price *to some degree*. Water for necessities (sanitation, cleaning and cooking) is far less responsive to price than water for more discretionary uses (lawn watering, car washing, swimming pools)... Pg. 13, 14

"...Clearly, water is "inelastic", meaning that when the price increases, consumption decreases but at a lower rate than the increase in price. Unlike such large factors as the weather, population growth, local geology and hydrology, and the economy; water managers can influence water rates, albeit with an appreciation for the consumers' response. Moreover, utility managers need to consider that price increases will not likely affect the behavior of many middle and upper income groups. For these groups, stiffer price increases or other conservation strategies might be tried.... Pg. 14

"Prices can be used to modify customer behavior to use less water at the tap, stop and prevent leakage and waste, and send less wastewater for treatment. To achieve the efficiency gains that will enable water system managers to postpone the need for new capital outlays, water utilities and local governments will need to expand their toolkit to include the widest array of conservation-oriented initiatives using prices as well as measures like universal metering, water accounting and use audits, retrofitting and public education...Pg. 14

"...In addition to the politics of competing interests that can dominate rate setting, three key issues emerge: the service population's ability to afford higher rates, the effects of conservation rates on a utility's revenues, and their actual effectiveness in reducing water demand....Pg. 16

A&N Technical Services, Inc. *BMP Costs and Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices.* March 2005.

“An important step in conservation pricing is accounting for water demand’s reponse to charges in the real price of water. A “first-order” estimate of demand response can be obtained by multiplying the scheduled change in price by a price elasticity (assuming $E_{\text{price}} \approx -.09$) to produce a predicted change in use. For example, 10 percent increase in price would yield approximately one percent decrease in use ($\Delta P \times E_{\text{price}} = .10 \times (-.09)$).

“The reason why predicting demand response is difficult is obviously not due to the intricate algebra—change in price times the price elasticity. Instead, demand response predictions go wrong because inaccurate values are used in the prediction. The change in price, ΔP , should be expressed in inflation-adjusted “real” terms. When wastewater costs are recovered through a commodity charge on water use, this adds an additional price to water consumption that needs to be incorporated into the measure of price. The other parameter in the equation (the price elasticity parameter E_{price})

“Persistence: There are two applicable estimates of water savings that can result from conservation pricing:

1. Water reductions that can be expected in the long run, and
2. Water reductions that can be expected in the short run.

“Table 2 is an often-cited summary of empirical price elasticity estimates, taken from Dziegielewski, et al. (1991), refers to **long run** price estimates.

Table 2: Summary of Long Run Elasticity Estimates for Planning Purposes	
Single Family Residential Customers	Range of Estimates
Winter season	-.10 to -.30
Summer Season	-.20 to -.50
Multiple Family Residential Customers	
Winter season	-.00 to -.15
Summer season	-.05 to -.20
<i>Source: Dziegielewski, et al. (1991)</i>	

“Analysts should note that these ranges apply to long run price elasticity estimates for the purpose of long run water planning. These are the estimates that would be required for estimates of the long run costs that are avoided by implementation of conservation planning. *They are not sufficient for rate design and financial planning.*

“Revenue prediction for rate design requires a short run price elasticity estimate that would reflect the demand response possible within a one- or two-year period. Most of the published empirical literature on price elasticity focuses on long run estimates. Estimates of short run price elasticities are not as common. Table 3 is from CUWCC’s Handbook on *Designing, Evaluating and Implementing Conservation Rate Structures*. It provides the following recommended ranges for short run price response.

Table 2: Summary of Short Run Elasticity Estimates for Planning Purposes	
Single Family Residential Customers	Range of Estimates
Winter season	-.00 to -.10

Summer Season	-.10 to -.20
Multiple Family Residential Customers	
Winter season	-.00 to -.05
Summer season	-.05 to -.10
<i>Source: Designing, Evaluating, and Implementing Conservation Rate Structures, July 1997</i>	

"In rate design, it is important not to make the mistake of using long run response estimates developed for planning purposes..."

Cases in Water Conservation. U.S. Environmental Protection Agency, July 2002.

Turf Replacemen: "Padilla and Torres (2004) report 398 gallons per day participant-weighted average savings at commercial and residential sites from a turf rebate program. Sovocool and Rosales (2004) report 33% reduction average, and 39% reduction in the summer months in terms of "main meter" overall consumption at single family residences. More relevant for large landscape is the decrease in mean irrigation use only. Irrigation use, in gallons per square foot per year, was 79 at turf sites and 17 at xeriscape sites. The City of Austin (1999) reports average water savings per participant site of 214 gallons per day in the summer compared to preexisting landscapes as a result of their landscape rebate program."

"Goleta established a water efficiency program that emphaxized plumbing retrofits, including high-efficiency toilets, high-efficiency showerheads, and increased rates. The program was highly successful, resulting in a 30% drop in district water use. Goleta was able to delay a wastewater treatment plant expansion."

"IRWD's primary conservation strategy was a new rate structure instituted in 1991. The five-tiered rate structure rewards water-efficiency and identifies when water is being wasted. The goal is to create a long-term water efficiency ethic, while maintaining stabile utility revenues. After the first year of the new rate structure, water use declinded by 19%. Between 1991 and 1997, the district saved an estimated \$33.2million in avoided water purchases.

--Cases in Water Conservation. U.S. Environmental Protection Agency, July 2002.

"Since 1989, Tampa's water conservation program has included high efficiency plumbing retrofits, an increasing-block rate structure, irrigation restrictions, landscaping measures, and public education. Particular emphasis has been put on efficient landscaping and irrigation. Tampa's landscape evaluation program resulted in a 25% drop in water use. A pilot retrofit program achieve da 15% reduction in water use.

--Cases in Water Conservation. U.S. Environmental Protection Agency, July 2002.

HDR Engineering, Inc. "Utility Billing System Enhancements, City of San Luis Obispo, Volume 1 – Utility Rate Structure Evaluation." March 2006.

"Today, water conservation is more important due to constrained water resources in the west. In addition, as the cost of wastewater treatment has increased, many utilities have moved away from flat charges for residential sewer customers and have focused more on volumetric sewer rate structures, out of "fairness or equity" concerns on customer bills...."

"The State of California Urban Water Conservation Council (Water Council) was created to increase efficient water use across California. The Water Council's goal is to integrate urban water conservation with Best Management Practices (BMP's) into the planning and management of California's water agencies/utilities...since the early 1990's, there has been a fairly significant amount of research on the response to water demands, as a result of price. The Water Council

noted the following "lessons learned" concerning prices and demand in their recently drafted policy statement concerning water rate structures:

- Lesson 1: Rates influence demand.
- Lesson 2: "Price elasticity" is the percentage change in demand induced by a one percent change in price, all other factors being constant.
- Lesson 3: Demand can be thought of as a sum of demand for different end-uses of water.
- Lesson 4: Demand for outdoor use is more price elastic than demand for indoor uses.
- Lesson 5: Demand for water during peak (summer) periods is greater than demand during off-peak (winter) periods.
- Lesson 6: Residential water demand is relatively inelastic. The response of residential demand to rate changes, though not zero, is relatively small.
- Lesson 7: Demand is more elastic in the long-run than in the short-run.
- Lesson 8: Demand is influenced by forces other than price –including population growth, the economic cycle, weather fluctuation, and income growth.
- Lesson 9: The response of demand is more difficult to predict for large changes in price....

"Water pricing in California does not generally reflect the true cost of water, nor the next increment of water supply.

Consumers generally pay relatively low rates for water, especially when compared to other resources such as electricity and gas.

If an individual user or business does not feel a personal responsibility for the amount of water used monthly or annually, there is very little motivation to conserve.

New landscape water conservation technologies, design and plant alternatives, and metering options will not achieve the potential water savings unless the water customer is motivated personally or economically to reduce water use...

"...The Water Council's draft policies do provide a definition of a conservation-based rate structure. It is as follows:

'A conservation rate structure encourages efficient water use and discourages waste by ensuring that customer bills communicate the full cost of providing water services, including the cost of new water supplies. A conservation rate structure shall: 1) provide a price signal to customers to reduce average or peak use, or both, and financial consequences for inefficient use; and 2) takes into account the long-term marginal cost rate structure options, water agencies should consider the feasibility of incorporating a peak season or excess use surcharge to encourage appropriate use throughout the year, taking into account the range of climatic and other conditions in their service area. Conservation rates shall be designed to recover the cost of providing service and billing shall be based on metered water use. A conservation rate structure shall also be fair and equitable across customer classes/sectors.'...

"...The Water Council encourages utilities to incorporate a customer education process regarding the environmental and resource value of pricing for conservation and efficiency. It is also necessary to provide the customer with education as to how the rate structure works, resolving allocation variances and in remedying high water use....

"...The California Urban Water Conservation Council does provide guidelines encouraging the adoption of volumetric-based sewer utilities. The water Council and other conservation experts believe that having volume-based sewer rates, where the billing is based upon water consumption, may encourage water conservation..."

"...The Water Council and other conservation experts believe that having volume-based sewer rates, where the billing is based upon water consumption, may encourage water conservation..."

“...In contrast to the water utility, implementation of the sewer rate structures, particularly for single-family residential customers, will require more thought. It is difficult to transition from a 10)% fixed rate to a 100% volumetric rate. Therefore, the City should consider some transition period where the fixed charge is reduced and the volumetric charge increased over time. The city certainly could implement a 10)% volumetric charge immediately but HDR’s sense is that the City would receive a number of customer complaints concerning the change in the size of the bills. Customer education and information about the change in billing approaches will be an important element of the rate transition plan.”

Water Conservation Programs—A Planning Manual (M52). American Water Works Association. 2006.

“Conservation-oriented water rate structures by themselves do not constitute an effective water conservation program. Rate structures work best as a conservation tool when coupled with a sustained customer education program. Customer education is important to establish and maintain the link between customer behaviors and their water bill. Utility customers require practical information about water-conserving practices and technologies. Participation in other water conservation programs, such as plumbing-fixture retrofit and replacement programs, can also be enhanced by rate incentives and customer education. Finally, public acceptance of rate structure changes is often enhanced if customers understand the need for and benefits of water conservation.”

Wastewater User Charge Survey F.Y 2006-07. State Water Resources Control Board, California Environmental Protection Agency, May 2007. <http://www.swrcb.ca.gov/>

In a State Water Resources Control Board Wastewater User Charge Survey F.Y 2006-07, 926 surveys were sent, 753 agencies submitted completed surveys, 625 (83%) reported a fixed (flat rate) fee for residential customers. For San Luis Obispo County, 67% (12 of 18 agencies) use a flat fee for residential customers. Arroyo Grande, Avila Beach CSD, Cambria CSD, Grover Beach, Morro Bay and San Simeon use commodity-based charges.

What is the Infrastructure Problem, and What are the Solutions? H2O Coalition. February 2001.

“Even though water services have generally been under priced in this country relative to other utility and related services, raising rates significantly for water and sewer is at a minimum a major political and marketing challenge for utilities.”

“To minimize any future drain on the Treasury, we believe the water industry should move toward becoming self-sustaining, like the electric, gas, and telecommunication utilities. Since this can happen only if utilities charge their customers full cost of service rates, any assistance program for the industry should be structured to assure water utilities, if they are not already doing so, eventually charge rates that cover the full cost of service. An additional benefit of full cost of service rates is they send the proper economic signals to consumers, helping to assure they make appropriate market choices.”

Stavins, Robert. *As Reservoirs Fall, Prices Should Rise, an Economic Perspective.* Environmental Law Institute (The Environmental Forum, November/December 2006.

"...I can refill an eight-ounce glass 2,500 times with water from the tap for less than the cost of a single can of soda. Under these conditions, it is hardly surprising that we have so little incentive to conserve our scarce water supplies. Throughout the United States, water is under-priced. Efficient use of water will take place only when the price reflects the actual additional cost of making water available. Lest one fear that higher water rates would mean that Americans would go thirsty, take note: On average, each of us uses 183 gallons of water a day... There is plenty of margin for change if people are given the right price signals.

"Fifty years of economic analyses have demonstrated that water demand is responsive to price changes, both in the short term, as individuals and firms respond by making do with less, and in the long term, as they adopt more efficient devices in the home and workplace...

"But prices are typically set well below the social costs of the water supplies since historical average costs are employed rather than true additional (marginal) costs of new supplies... Although water scarcity typically develops gradually across seasons of low rainfall and low accumulations of snow pack, pronounced droughts are usually felt in the summer months of greatest demand. The economically sensible approach is to charge more at these times, but such "seasonal pricing" is practiced by less than 2 percent of utilities across the country."

"A reasonable objection to jacking up the price of water is that it would hurt the poor. But we can take a page from the playbook of electric utilities who subsidize the first kilowatt hours of electricity use with very low "life-line" rates. Indeed, the first increment of water use can be made available free of charge. What matters is that the right incentives are provided for higher levels of usage.

"Droughts, like so many public policy dilemmas, present both challenges and opportunities. Inevitably, citizens and businesses do their best to cope with mandatory restrictions. And with equal inevitability, once droughts have passed and the restraints are lifted, they return to their previous habits of water use and abuse.

"...the affected areas can introduce progressive water pricing reforms that send the correct signals to individuals and businesses about the true value of this precious resource."

Simmons, Ann. *Palmdale Water Board Orders Conservation Measures.* Los Angeles Times. 08/30/2007

"The Palmdale water board voted unanimously Wednesday to clamp down on customers who ignore the city's voluntary water conservation policy, but rejected a resolution that would have imposed mandatory rationing -- at least for now... In May, the district asked its 25,000 customers to reduce water usage by 15% by voluntarily adopting many of these conservation policies, said General Manager Dennis LaMoreaux. But only a 5% reduction was achieved. The agency is now demanding that customers reduce their usage by at least 10%..."

Dobuzinskis, Alex. *Court Could Devastate Water Supply: Half of Southland's Imported Resources from North at Risk.* Los Angeles Daily News, 08/30/2007.

"Southern California officials are bracing for a federal judge's ruling that could cut back the local water supply from Northern California by up to 50 percent. U.S. District Judge Oliver Wanger could rule as early as today after hearing evidence this week in a case brought by the Natural Resources Defense Council that, to protect the endangered smelt fish, could force the state to temporarily shut down pumps in San Joaquin-Sacramento River Delta... Two-thirds of the Southland's imported water comes from the delta via the north-south California Aqueduct, up from one-third several

years ago. The rest comes from the Colorado River, which used to provide 60 percent of the district's imported water but is now going through an unprecedented dry spell..."

If the Levees Fail in California. Business Week (www.businessweek.com), 08/20/2007.

"If you were to draw up a list of the most worrisome infrastructure risks facing America, the leak-prone network of levees that run east from the San Francisco Bay up to Sacramento would rank right near the top. This 2,600-mile-long system of berms protects half a million people, 4 million acres of farmland, and the drinking water supply for most of Southern California. Vulnerable to either an earthquake or flooding, it is "like a ticking time bomb," warns Lester Snow, director of the California Water Resources Dept. "

Duarte, Jesse. Water shortage hurts Upvalley vineyards; St. Helena's lower reservoir at less than half its capacity. Napa Valley Register, 08/31/2007.

"Water conservation measures and the threat of rationing have made St. Helena residents aware of the drought's effect on Bell Canyon reservoir. But the city's lower reservoir is hurting even more. Spring Mountain Vineyard and Robert Louis Stevenson Middle School have agreements with the city to use water from the lower reservoir. After the last rainy season yielded little rainfall, Public Works Director Jonathon Goldman told the vineyard and school that 2007 would be a difficult year. Unlike typical years when the lower reservoir spills over, it never got beyond 38 percent of its 160-acre-foot capacity this year, said Ron Rosenbrand, vineyard manager at Spring Mountain Vineyard. According to Rosenbrand, the drought will result in a 10 percent to 15 percent crop reduction at Spring Mountain Vineyard, although quality is not expected to suffer..."

Atagi, Colin. New Plans to Curb Water Usage. Desert Sun, 08/31/2007.

"As drought conditions continue to plague Southern California, Coachella Valley water suppliers have created conservation plans that will change how local developers landscape their projects. A revised Coachella Valley Water District landscaping ordinance, which goes into effect Oct. 1, reduces the amount of water new developments can use to create features within their existing plans. Under the new plan, a project site can have enough water for areas equivalent to 25 percent of the overall project.... It also regulates sprinkler systems, which - under the new plan - need to be 24 inches from curbs and driveways to prevent water from running off into streets. The sprinklers have to be operated by control systems that adjust to climate changes. The revised ordinance is expected to save 1,770 acre feet of water per year... Experts say water conservation in the desert is a top priority because of increased demand due to a combination of drought and development.... In addition, the Colorado River's water supply has diminished, and levee problems have affected the Sacramento-San Joaquin river delta, which supplies much of California with water.... The agency also is installing water-efficient landscaping outside its building. "You would certainly understand people's disdain if you say, 'Do as we say, not as we do,'" Luker said.... Under CVWD's ordinance, golf courses are limited to 4 acres of grass per hole. "For an average golfer, that's what you need," La Quinta Resort and Club Golf Course Superintendent Glenn Miller said. He added golf courses around the valley support water conservation installed sprinkler systems with lower trajectory. Also, many use water-efficient turf. "It is our part. We're on board with it," Miller said.

Curiel, J. Forced water conservation could follow dry winter. San Francisco Chronicle. 09/05/2007

"A federal judge's ruling that limits the amount of water that can be pumped out of the San Joaquin-Sacramento River Delta increases the likelihood of rationing in much of the Bay Area if the coming winter is as dry as the last one, water officials said Tuesday.

Agencies that supply water to millions of customers in Santa Clara County, the Livermore area and other places dependent on the delta described Friday's court decision as the back half of a double whammy that started with last winter's skimpy storm totals.

"We are looking at the potential for mandatory conservation, but we're not going to know until we get into late January or early February," said Susan Siravo, a spokeswoman for the Santa Clara Valley Water District, which serves 1.7 million residents and gets half its water from the delta. "Here in Silicon Valley, people don't connect the delta to the Bay Area. They think, 'What does that have to do with me?' But it does."...

Rogers, P. *Water rationing could be on horizon; Ruling on delta fish may limit supply pumped to valley.* San Jose Mercury News. 09/05/2007

"Silicon Valley may be heading toward its first mandatory water rationing in 16 years, after a federal judge's decision to protect a tiny endangered fish by reducing the amount of water that can be pumped from San Francisco Bay's delta.

Santa Clara Valley Water District officials said Tuesday that they will produce a range of options - including mandatory rationing - by November for the district's board to consider for 2008. ..."

1 Weiser, M. *Less Delta water means dry times; Calls to redesign the estuary follow order to curtail pumping.* Sacramento Bee. 09/06/2007

2

"....Stephen Patricio, chairman of the Western Growers Association, estimated economic effects in the farm sector from the court order could reach \$400 million next year -- if the state is blessed with normal rainfall. Zlotnick said his agency may have to reduce the amount of water projected to be available for new housing and commercial development. While some blamed the judge and environmental laws for causing the cutbacks, others said it was only a matter of time. Rep. George Miller, D-Martinez, said California has long relied too heavily on the Delta as a water supply even as danger signs mounted. A longtime Delta advocate, he said the solution involves prioritizing how we use water and adopting aggressive conservation measures...."

"We're going to have to call for unprecedented levels of conservation from our 18 million customers," said Roger Patterson, assistant general manager of the Metropolitan Water District of Southern California, the largest urban consumer of Delta water.

Not everyone sees the pumping cutbacks as a calamity. Peter Gleick, president of the Pacific Institute, a nonprofit think tank in Oakland, said the pumping slowdown represents a prime opportunity to reconsider how water is used in California. Gleick said it is critical for urban and agricultural interests to use water more efficiently. "There's enough water for healthy agriculture and a healthy economy, but there's not enough to waste or use inefficiently," he said. He gave numerous examples: Replace 6-gallon-per-flush toilets with 1.6-gallon models and top-loading washing machines with more efficient front-loaders. Use precision sprinklers to irrigate fields and shift from growing crops that use lots of water to those that require less.

Gleick noted that four farming staples -- rice, cotton, alfalfa and irrigated pasture -- use about half of the agricultural water in the state but produce a small fraction of agricultural income.

"I'm not saying, 'Don't grow cotton or alfalfa' " Gleick said, "but it is worth discussing how much we grow. These have been taboo discussions in the past." ...'

Dobuzinski, A. *Water shortage ominous; Rationing may surface in Southland next year.* LA Daily News. 09/05/2007

"Southern California water officials are drawing up plans that could force rationing in some cities as early as next year, officials said Wednesday. For now, residents are being asked to voluntarily use less water, but the Metropolitan Water District of Southern California warned that mandatory rationing could become necessary for the first time since 1991. The MWD is preparing an allocation plan that would spell out how much water it might be able to provide the 26 cities and water agencies that it serves in six counties, including Los Angeles and Ventura counties, said Roger Patterson, the district's assistant general manager.

If the district tells its members it has less water to provide them, it would be up to them to decide how to ask residents to cut back. "The question is how soon do we need to go into that kind of decision-making. Do we have to do that in 2008, or do we rely on our reserve account - or (banked water) savings - to not do that in 2008? Those are the policy decisions that will be made." The district imports about 50 percent of the water used by member agencies. About two-thirds of the water comes from the delta and the rest from the Colorado River. The amount of water the district stands to lose from the court decision amounts to more than 10 percent of all the water its members use in a typical year. In the city of Los Angeles, which relies on the district for nearly 70 percent of its water, officials already are asking residents to use 10 percent less water this year. But it's a voluntary program. "If we have rationing in Los Angeles, it won't be the first time that that has happened," said David Nahai, president of the board of the Los Angeles Department of Water and Power Commissioners. "If that is what will be needed in order to safeguard our water supplies, well, so be it. But we'll have to see just what this plan is that Metropolitan Water District will be putting forward." ..."

J. Bowles, J. Miller. *Ruling spurs 'great deal of uncertainty' over water supply.* Riverside Press Enterprise. 09/05/2007

"Another dry winter coupled with a judge's ruling that will severely reduce water supplies coming to the Inland region could lead to mandatory conservation measures in some areas, officials said Wednesday.

But most agencies said they would drill new wells, possibly increase water rates to customers who use large amounts and take other steps before forcing residents to conserve.... Metropolitan Water District, whose customers include suppliers in western Riverside County and southwestern San Bernardino County, said it will create an emergency plan by November for possible cutbacks to its member agencies. The Inland area gets about one-third of its water from the delta. Board members "want to have that tool available in the event we don't see a very good winter and we find ourselves wanting to use it," said Roger Patterson, MWD's assistant general manager. "The bottom line on this is that we moved into an area of tremendous uncertainty as to where we go from here," Patterson said. "It makes it hard for us to provide a reliable water supply to our customers."... John Rossi, general manager of Western Municipal Water District, said a cutback of 20 percent or more will spur the district that serves the western half of western Riverside County to look at some sort of mandatory conservation. He said it's likely to focus on outdoor watering, which can account for 60 percent of a home's water use.... Tim Quinn, president of the Association of California Water Agencies, said that while the judge's order will last a year, "the crisis is indefinite." Randy Van Gelder, general manager of San Bernardino Valley Municipal Water District, which imports delta

water for several cities, said unlike a natural drought, this decision can have lasting impacts. "We've had droughts that have lasted one or two or three years, the potential here, though, because you're dealing with saving an endangered species, this could become a permanent way of life, not just a temporary drought," said Van Gelder.... Wanger's ruling "introduces a great deal of uncertainty into the water supply," Snow said. "This won't be the last court case, it won't be the last disaster in the delta, unless we proceed in a very, very comprehensive fashion dealing with conservation, storage, conveyance, wastewater recycling -- the entire package."... Even before the ruling, the Inland region's major water sources were in bad shape. The Colorado River is gripped by an eight-year drought; the water content of the Sierra Nevada snow pack was at its lowest level since 1990; and snowfall in local mountains that feed aquifers was 30 percent of normal. Rainfall this past season in Riverside was 1.93 inches, making it the driest year since at least 1883. Typically, it averages 10 to 12 inches. If the dire water situation persists, agencies might consider an increase in rates as an incentive to get people to conserve. "You see a number of areas in Southern California where they're talking about adopting a rate structure that if you use more than a certain amount of water, you pay a penalty," Van Gelder said. "We're not looking at that yet."... Susan Lien Longville, director of the Water Resources Institute at Cal State San Bernardino, said Inland agencies have increased their water-conservation activities. But she said it's also hard to talk conservation to residents when they see large parks and other public places irrigating several acres of water-thirsty grass. "We need to set a good example," she said. "I suspect you'll see that more."..."

Valley Farmers May Have To Cut Back With Water Reduction Plan. ABC Channel 30. 09/05/2007

"A federal judge's decision to protect the threatened Delta Smelt put a limit on the amount of water released from the reservoir. But farmers in central California worry there won't be enough water for crops next year. Farmers continue to flinch at the news their water supply could be cut considerably next year. 25 million Californians rely on Delta water but maybe none more than local growers.... Stephen Patricio, Western Growers Association, says "When farm workers don't go to work the entire economy feels it."... Meanwhile Beene says he and other farmers have to go back to the drawing board and find ways to stretch out what little water's available. The federal judge has order the water reduction plan to begin in December. Beene says unless the valley receives plenty of rain this winter, he will consider cutting jobs...."

Mandatory water restrictions for San Lorenzo Valley residents. Associated Press. 09/06/2007.

"BOULDER CREEK, Calif. -- A dry winter and failure by residents to conserve water have led officials to impose mandatory restrictions that include a ban on daytime outdoor watering. This week's restrictions follow requests by the San Lorenzo Valley Water District that residents voluntarily reduce water usage by 15 percent. Usage by customers in Boulder Creek, Brookdale, Ben Lomond, Zayante and Scotts Valley dropped only 2.5 percent. "Apparently, there's just not enough of the people who are doing their part," water agency director Jim Mueller said. The district sent letters to its 5,900 customers telling them it was necessary to cut water consumption 20 percent, and that the mandatory restrictions were now being imposed.

Mueller said water rationing and fines would come next if the newest conservation effort didn't work. The mandatory restrictions include no outdoor watering between 9 a.m. and 6 p.m., no washing at all of sidewalks, patios, decks, driveways and exterior building walls, and no car washing except with a bucket and hose with a shut-off nozzle..."

Contingency plans drawn up for possible SoCal water rationing. Associated Press.

09/06/2007

"LOS ANGELES—Contingency plans currently being drawn up could force Southern California water officials to order rationing next year. .. "If we have rationing in Los Angeles, it won't be the first time that that has happened," said David Nahai, president of Department of Water and Power commissioners. "If that is what will be needed in order to safeguard our water supplies, well, so be it. But we'll have to see just what this plan is that Metropolitan Water District will be putting forward."

...

**DRAFT BUDGET: CONSERVATION AND
PUBLIC OUTREACH SPECIALIST, FY 2007 - 2008**

**WATER CONSERVATION
SHARED EXPENSES:**

Publications/ Outreach Literature

Bill Stuffers (12 mailings, \$800 ea	\$9,600
Brochures/Flyers (out-source print)	\$7,000
PrePrinted Materials	\$4,000
Postage & mailing svc. (2/yr) 8000 @ \$1.00 ea	\$8,000
One-time charge for WUIW logo rights	\$2,500
	<hr/>
	\$31,100

WORKSHOPS

Irrigation x 2		
Stipend x 2		\$600
Hospitality x 2		\$100
Advertisement (\$400 ea)		\$800
Support Materials		\$100
Soil/Compost x 2		
Stipend x 2		\$600
Hospitality x 2		\$100
Advertisement (\$400 ea)		\$800
Support Materials		\$100
Xeriscape, California Natives x 2		
Stipend x 2		\$600
Hospitality x 2		\$100
Advertisement (\$400 ea)		\$800
Support Materials		\$100
Water Conservation x 2		
Stipend x 2		\$600
Hospitality x 2		\$400
Advertisement (\$400 ea)		\$800
Support Materials		\$100
		<hr/>
		\$6,700

Advertisement

\$12,000

Customer Promotional/Giveaway Items

\$8,000

Water Audits
Up to 120 SFR audits.

\$14,175

***Free Small Area Landscape Designs
for Customers***

\$1,000

School Outreach Program

STUDENT ART CONTEST

Prizes	\$600
Publicity/ads	\$300
Calendar production from 12 winners	\$500

CLASSROOM SUPPORT

Environthon, Nipomo HS	\$500
Science Discovery	\$4,000
Student Books, Materials	\$500
Educational DVD's for borrowing	\$500
	<hr/>
	\$6,900

Events

Entry Fees	\$1,000
Misc. Supplies	\$500
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	\$1,500

WATER CONSERVATION SHARED EXPENSES TOTAL: \$81,375

**WATER CONSERVATION
REBATES/ GIVEAWAYS:**

Rebates/ Giveaways

Washing machine rebates, \$100 ea (365)	\$36,500
Outdoor (nozzle, soil moisture probe, rain guage, lawn sprinkler timer, water-drop wheel) 250 sets @ \$18.19 ea.	\$4,548
*Indoor (showerhead replacement, teflon tape, toilet leak detector, faucet aerator, shower timer) 250 sets @\$24.84 ea.)	\$6,210
PILOT PROGRAM: Turf replacement program (\$0.48/ft2, max. 1000 ft2=\$480), (10)	\$4,800
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	\$52,058

WATER CONSERVATION REBATES/ GIVEAWAYS: \$52,058

OTHER:

PROFESSIONAL DEVELOPMENT

Conferences	
Fees	\$1,000
Lodging	\$1,000
Transportation	\$600
Sustenance	\$500
Water Conservation Practitioner Certification	\$600
Books, Magazines	\$300
Membership, Professional Organizations	\$300
Water Audit Certification Maintenance	\$500
	<u>\$4,800</u>
PROFESSIONAL DEVELOPMENT TOTAL:	\$4,800

TOTAL BUDGET FOR PROGRAM: \$138,233

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Volumetric: Rate charged per increment of sewer flow; based on metered volume (water consumption).

Volume Based: Calculated based on average water usage during winter months (flat rate based on average water usage during winter months)..