

WATER CONSERVATION - A LOCAL AND REGIONAL PERSPECTIVE

**SUBMITTED TO THE
WORLD WATER FORUM**

By

The City of Los Angeles



and

The Metropolitan Water District of Southern California



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WORLD WATER FORUM ISSUE PAPER

WATER CONSERVATION - A LOCAL AND REGIONAL PERSPECTIVE

D) OVERVIEW

CITY OF LOS ANGELES

Water has been an integral part of the City of Los Angeles (City) since its founding in 1781. Today, a culturally-diverse population resides within the City, attracted in large part by comfortable Mediterranean-like weather and a vibrant economy. With almost 4 million residents, Los Angeles is the second most populous city in the United States.

Water is a key resource that has fueled Los Angeles and southern California into the 10th largest economy in the world. It has supported a City that has grown from 44 square miles (114 square kilometers) in 1900, to 464 square miles (1,201 square kilometers) today (Figure 1). And throughout the City's transformation, the efficient use of water has been a key element of bringing a sustainable water supply to the homes and businesses in Los Angeles.

As an area that receives approximately 15 inches (34.5 centimeters) of annual rainfall, Los Angeles' natural local water supply is groundwater. Limits on the City's local water supplies were recognized early on and the City took actions to carefully manage its limited resources. One of the earliest efforts to promote water use awareness and conservation was with the installation of the City's first water meter in 1889. Full metering of the City's water system was accomplished by 1927. Today, conservation is a way of life not just in Los Angeles, but for all of southern California.

As the City and the southern California region grew, local water resources were exhausted, leading to a search for water supplies from distant places. It also became apparent during this era of tremendous growth that a regional water cooperative - an entity that would be responsible for meeting southern California's water needs - was needed. The City of Los Angeles took a leadership role in developing the region's early imported water supply systems and helped found the Metropolitan Water District of Southern California (MWDSC), the regional water cooperative responsible for serving the supplemental water needs of 18 million people in southern California. The City, through the Los Angeles Department of Water and Power (LADWP), and the entire southern California region has relied on MWDSC to make-up the deficit between demand and local supplies for over 75 years.

With increasing demand for imported water from people, agriculture, commerce, and the environment, water conservation programs are an important element of water resources management for the entire southern California region. This paper will provide insight to the institutional arrangements as well as the social, financial, and environmental issues associated with implementation of water use efficiency programs in Los Angeles, highlighting the importance of conservation in allowing LADWP to fulfill its mission to "deliver a dependable supply of safe, quality water to our customers in an efficient and publicly responsible manner."

Sources of Supply

Beginning with local groundwater, the citizens of the City approved incremental investments that have resulted in a water supply infrastructure that delivers water to Los Angeles. The first major aqueduct to deliver imported water supply to southern California was the First Los Angeles Aqueduct. Completed in 1913, this aqueduct tapped into the waters of the Owens River, located approximately 230 miles (370 kilometers) north of Los Angeles in the Owens Valley (central California). Two years after its founding in 1928, MWDSC took over the engineering and construction of the Colorado River Aqueduct from the City, tapping into the waters of the Colorado River. Completed in 1941, the Colorado River Aqueduct has a capacity of 1.48 billion cubic meters per year. The second Los Angeles Aqueduct was completed in 1970 to enable an annual delivery capacity of 714 million cubic meters from both Los Angeles

Aqueducts. In 1972, MWDSC began receiving water from the State Water Project, which delivered water from northern California. MWDSC has a contract for up to 2.47 billion cubic meters of water from the State Water Project. Southern California's major water supply aqueducts are shown in Figure 2.

Figure 1
Water Distribution System of the City of Los Angeles

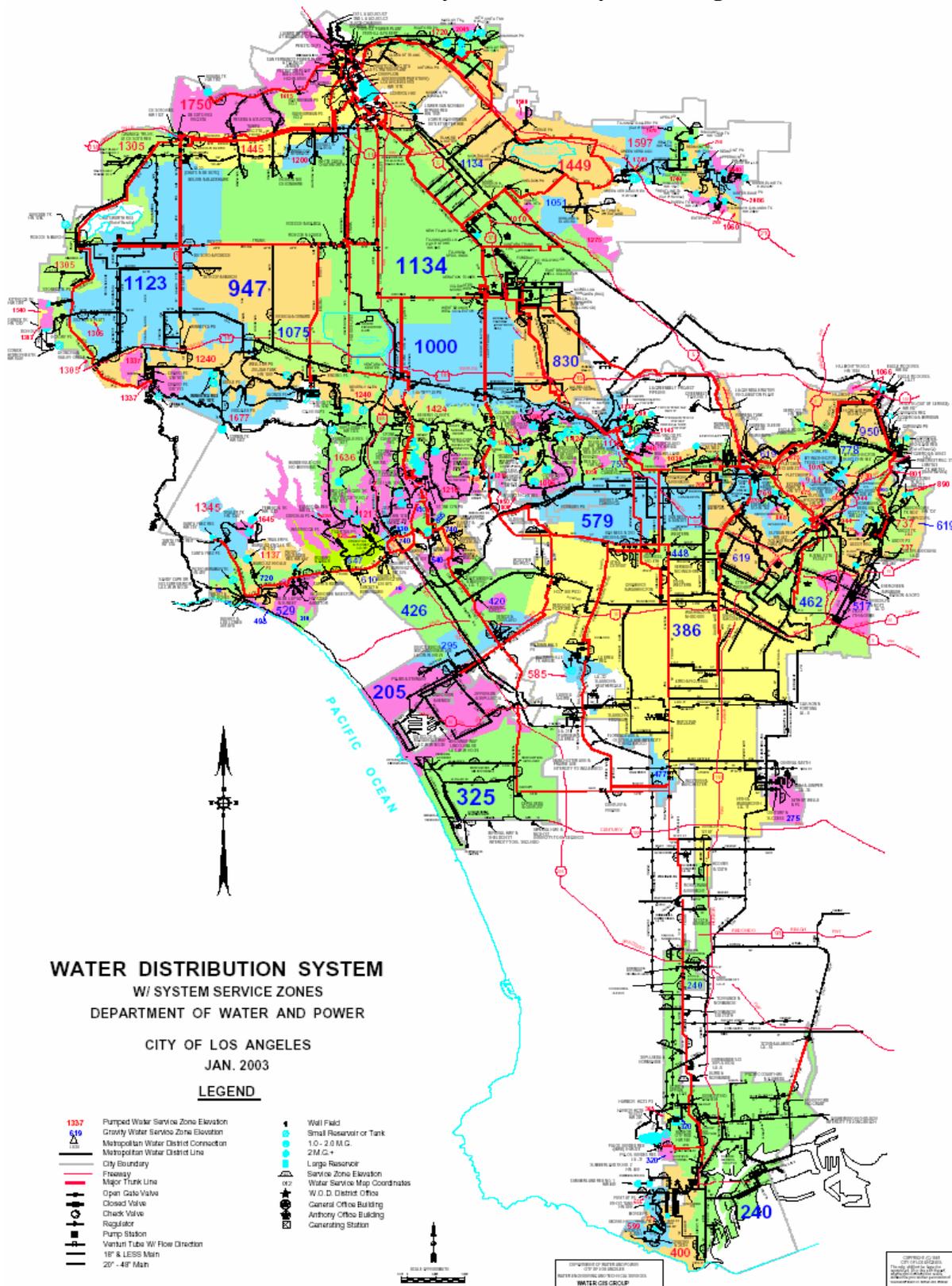


Figure 2
Major Sources of Water Supply for Los Angeles



The City of Los Angeles receives approximately 85 percent of its water supply from imported sources. Only 15 percent of the City water is supplied locally, by groundwater. The amount that the City can pump is regulated to ensure no long-term adverse impacts to the aquifer, keeping the percentage of pumped groundwater as a source of supply relatively constant each year. LADWP is also developing a water recycling program that will, in the future, make up a larger piece of the City's water supply portfolio.

Imported water is delivered through the City's own Los Angeles Aqueducts or through purchases from MWDSC. While the percentage of total water acquired from imports is constant on an annual basis, the quantities delivered by the sources are not. This is due to the variable hydrology in the City's watersheds, which directly affect the amount of deliveries from the City's own aqueducts. Therefore, in years with low snowpack, less water is delivered from the Los Angeles Aqueducts and more water is purchased from MWD. The reverse is true for years with abundant snowpack.

Over time, environmental considerations have required that the City use a significant portion of its imported water supply for mitigation purposes. While this change has posed a significant challenge to the City's water resources, LADWP has embraced its commitment to the environment and has developed resource management tools to change the City's approach toward water stewardship. Since the drought of 1987 through 1992, water conservation and recycling have become important resources for supplementing the City's water supplies. Though it is LADWP's goal to maximize the use of conservation and recycling to offset the need for supplemental imported water, additional environmental regulations, and even the potential impacts of climate change, necessitate the development of alternative water supplies to meet future demands. Current plans for alternative water supply development for the City include seawater desalination, water transfers, and additional capture of local stormwater runoff.

The region's heavy reliance on imported sources requires a strong program that will ensure the efficient use of water be implemented to continue the reliability of these imported supplies.

General Infrastructure

In addition to the Los Angeles Aqueduct System, the City's water distribution system consists of 11,424 kilometers of pipelines, 275 pressure regulator stations, 71 pumping stations, 27 chlorination stations, and a main water filtration plant to treat the water supply prior to distribution to customers. LADWP has approximately 680,000 service connections.

METROPOLITAN WATER DISTRICT OVERVIEW

The Metropolitan Water District of Southern California (Metropolitan) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities. The agency was enabled by the adoption of the original Metropolitan Water District Act (Metropolitan Act) by the California Legislature "for the purpose of developing, storing, and distributing water" to the residents of Southern California. The Metropolitan Act also allows Metropolitan to sell additional water, if available, for other beneficial uses. In 1992, the Metropolitan Board of Directors adopted the following mission statement: "to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way."

The first function of Metropolitan was building the Colorado River Aqueduct to convey water from the Colorado River. Deliveries through the aqueduct began in the early 1940s and supplemented the local water supplies of the original Southern California member cities. In 1960, to meet growing water demands in its service area, Metropolitan contracted for additional water supplies from the State Water Project (SWP) via the California Aqueduct, which is owned and operated by the State of California Department of Water Resources (DWR). SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) the Colorado River water via the Colorado River Aqueduct and (2) the State Water Project

Service Area

Metropolitan's service area covers the Southern California coastal plain. It extends about 200 miles (322 kilometers) along the Pacific Ocean from the city of Oxnard on the north to the international boundary with Mexico on the south, and it reaches as far as 70 miles (112 kilometers) inland from the coast as shown in Figure 3. The total area served is nearly 5,200 square miles (13,468 square kilometers), and it includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table 1 shows that although only 13 percent of the land area of the six Southern California counties is within Metropolitan's service area, nearly 90 percent of the populations of those counties reside within Metropolitan's boundaries.

Member Agencies

Metropolitan is currently composed of 26 member agencies, including 14 cities, 11 municipal water districts, and one county water authority (Table 2). Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities.

Currently, member agencies receive water from Metropolitan at various delivery points, and they pay for service through a rate structure made up of multiple components. The majority of these components consist of uniform volumetric rates, and the majority of the revenue is collected through a tiered volumetric supply charge. The second tier of this rate is set at the cost of developing new supplies.

**Figure 3
Metropolitan's Service Area**



**Table 1
January 1, 2005 Area And Population In The
Six Counties Of Metropolitan's Service Area**

County	Total County	In MWD Service Area	Percent In MWD
Land Area (square kilometers)			
Los Angeles	10,517	3,646	35
Orange	2,043	1,810	89
Riverside	18,688	2,737	15
San Bernardino	51,934	626	1
San Diego	10,877	3,677	33
Ventura	4,778	945	20
Total	98,817	13,441	13
Population (Thousands)			
Los Angeles	10,227	9,392	92
Orange	3,057	3,057	100
Riverside	1,887	1,358	72
San Bernardino	1,946	797	41
San Diego	3,051	2,951	97
Ventura	813	588	72
Total	20,971	18,143	87

Source: California Department of Finance, California Statistical Abstract, and Metropolitan-developed statistics.

**Table 2
Metropolitan Member Agencies**

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA					
Municipal Water Districts (11)		Member Cities (14)			County Water Authorities (1)
Calleguas	Orange County	Anaheim	Glendale	San Marino	San Diego
Central	Three Valleys	Beverly Hills	Long Beach	Santa Ana	
Basin	Upper San Gabriel Valley	Burbank	Los Angeles	Santa Monica	
Foothill	Valley	Compton	Pasadena	Torrance	
Inland	West Basin	Fullerton	San Fernando		
Empire	Western				
Eastern					
Las Virgenes					

To aid in planning future water needs, member agencies advise the Chief Executive Officer/ General Manager annually (in April of each year) of how much water they anticipate they will need during the next five years. In addition, Metropolitan works with its member agencies to forecast future water demands.

Metropolitan is a water wholesaler with no retail customers. It provides treated and untreated water directly to its member agencies. Metropolitan's 26 member agencies deliver to their customers a combination of local groundwater, local surface water, recycled water, and imported water purchased from Metropolitan. For some member agencies, Metropolitan supplies all the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. The district has provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its service area.

The remaining water supply comes from local wells, local surface water, recycling, and from the city of Los Angeles' aqueduct from the eastern Sierra Nevada. In 2003, the San Diego County Water Authority began receiving water from the Imperial Irrigation District that are delivered by an exchange of water supplies with Metropolitan.

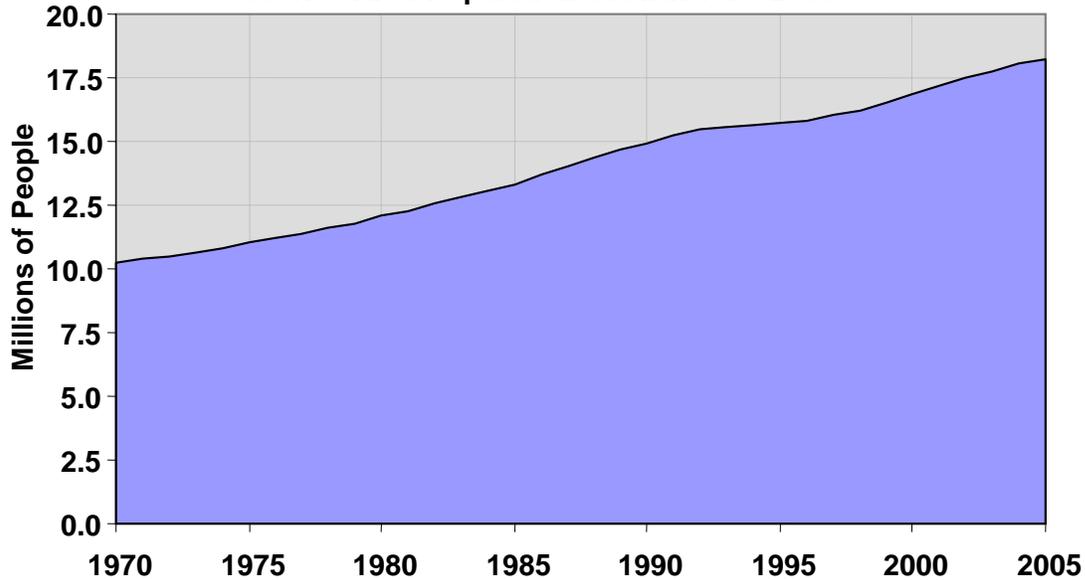
Some member agencies provide retail water service, while others provide water to the local area as wholesalers. Fifteen member agencies provide retail service to customers, 9 provide only wholesale service, and two provide a combination of both. Throughout Metropolitan's service area, approximately 250 retail water supply agencies directly serve the population.

Population

In 1990, the population of Metropolitan's service area was approximately 14.8 million people. By 2005, it had grown to 18.1 million, which represents about 50 percent of the state's population. In the past, annual growth has varied from about 200,000 annually in the 1970s and early-to-mid-1980s to more than 300,000 annually in the late 1980s. Population growth slowed during the early 1990s to just over 50,000 in 1995, before again rising to more than 300,000 per year in the period 1999 through 2002. Growth has continued at just under 200,000 per year since that time. Figure 4 shows the current, historic and projected changes in population.

Figure 4

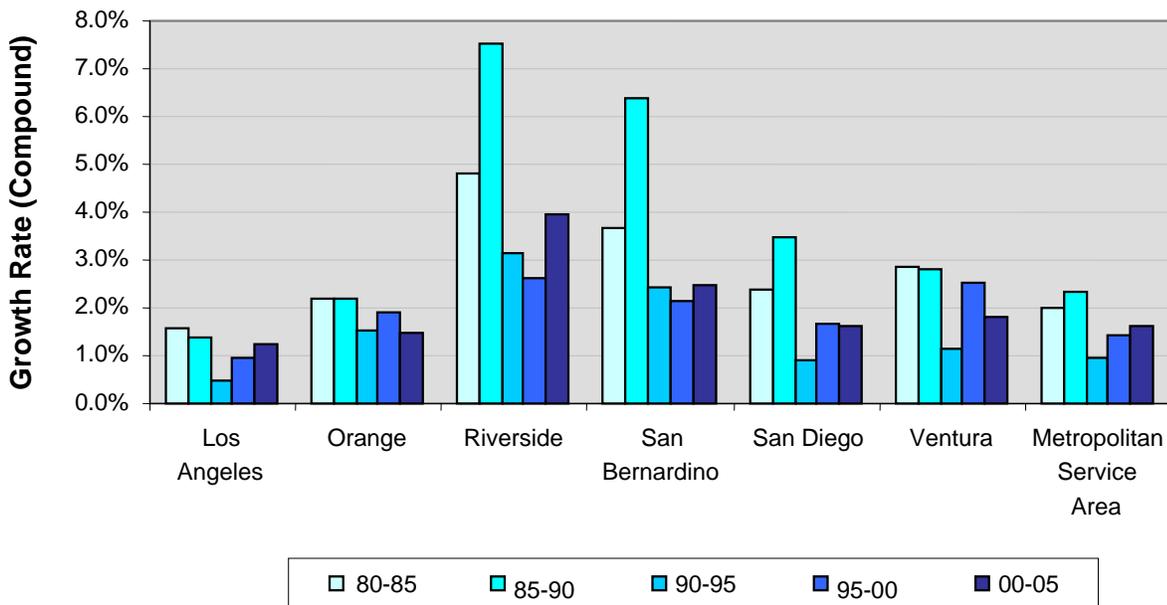
Service Area Population Growth 1970-2005



The most populated cities within Metropolitan's service area are Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana and Riverside. Between 1999 and 2003, the largest population increases occurred in the city of Los Angeles and in the service area of the San Diego County Water Authority. However, the increase in population of more than 615,000 estimated for Los Angeles County over the most recent four-year time period only represents a 1.6 percent average annual population growth rate, as shown in Figure 5. In Riverside County, the average annual population grew at a rate of 3.7 percent, making it the fastest rate of growth within Metropolitan's service area between the years 2000 and 2004.

Figure 5

Average Annual Population Growth Rates by County



Water Supplies

Historically, Metropolitan has been responsible for obtaining water for the region through its operation of the Colorado River Aqueduct and its contract with the state for State Water Project supplies. To date, Metropolitan has increased its ability to supply water, particularly in dry years, through the implementation of storage and transfer programs. Figure 6 presents historical annual regional water supplies, and Figure 7 shows Metropolitan's historical annual imported water supplies.

Figure 6
Annual Regional Water Supplies In Metropolitan's Service Area

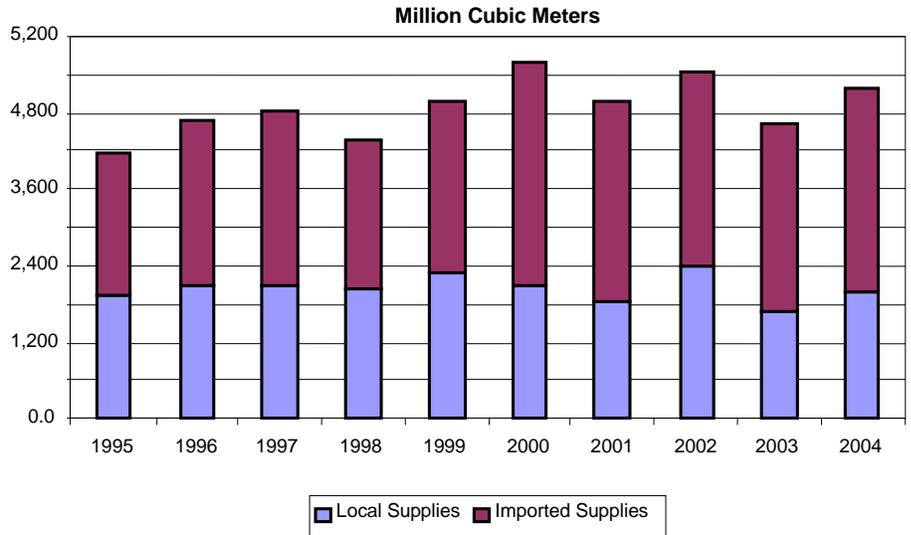
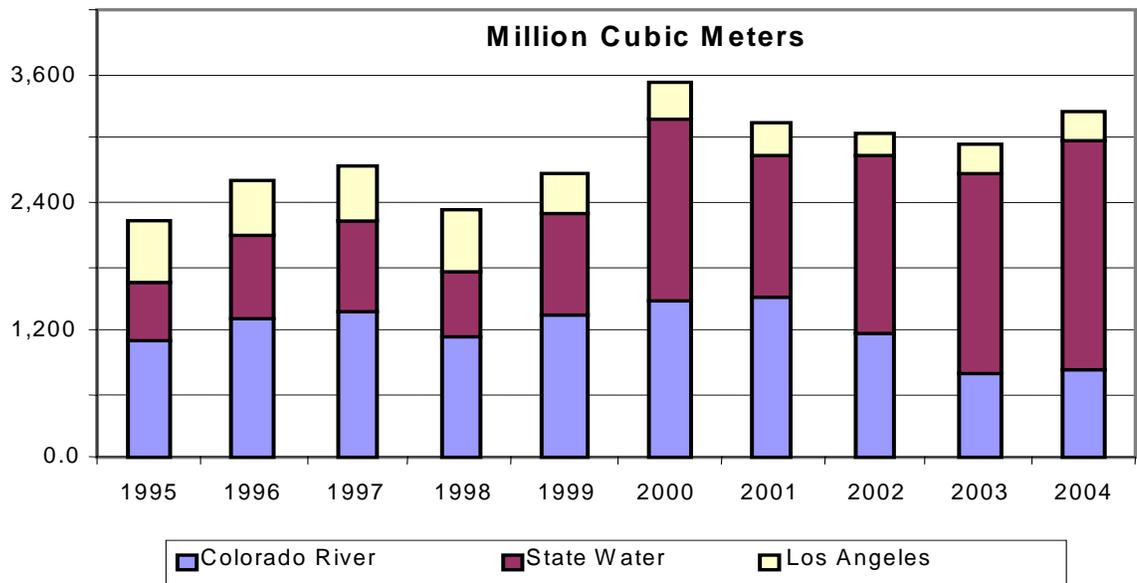


Figure 7
Imported Water Supplies In Metropolitan's Service Area



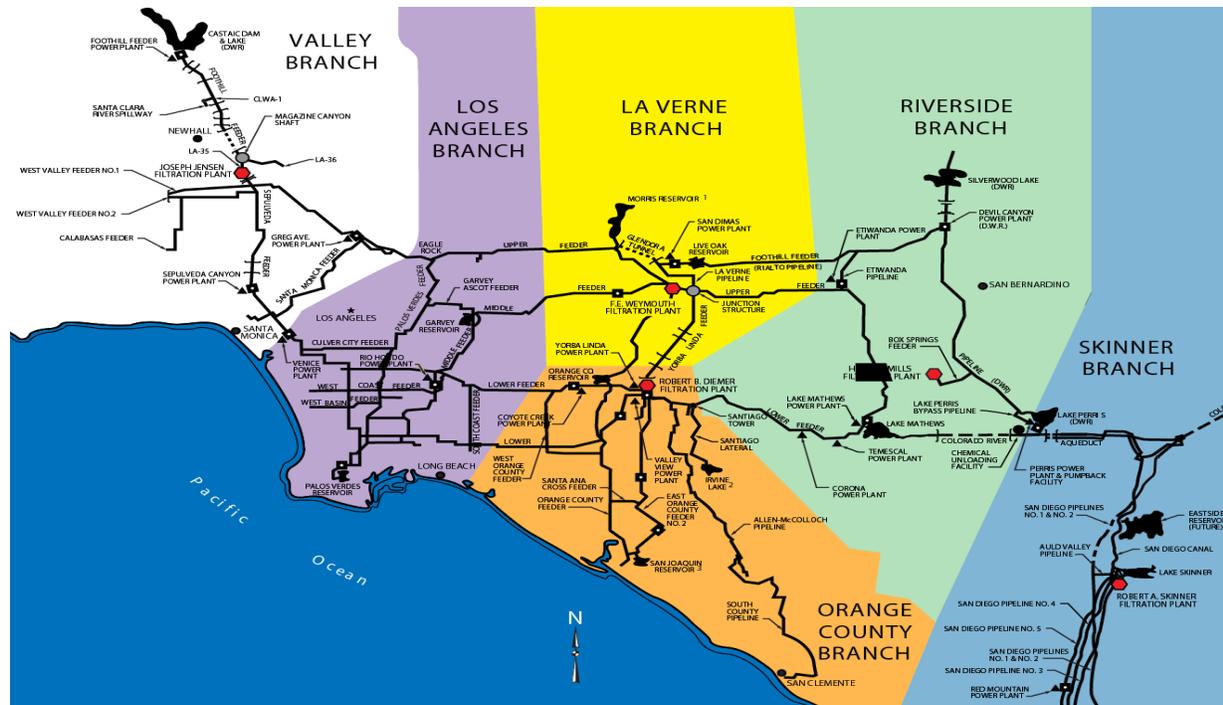
Metropolitan Water District's Distribution System

In addition to the 242-mile (389 kilometer) Colorado River Aqueduct system, Metropolitan's existing facilities include over 875 miles (1,408 kilometers) of water pipelines, tunnels, and canals; five regional

water treatment plants with a combined capacity of over 4,000 cubic feet per second (113 cubic meters per second); storage and regulating reservoirs with a combined capacity of over one million acre-feet (1,233 million cubic meters); and 15 hydroelectric power plants with a combined capacity of over 100 megawatts.

Metropolitan is divided into seven geographical operating areas. The Desert is responsible for operating and maintaining the Colorado River Aqueduct and is not shown in the Figure below. Figure 8 below shows the other six operating areas that have responsibility for operating and maintaining Metropolitan's reservoirs, supply conveyance, filtration plants and distribution system facilities within the service area.

**Figure 8
Metropolitan's Distribution System**



Water Use in the City of Los Angeles

Water use is generally categorized into the following major billing sectors: single-family residential, multi-family residential, industrial, commercial (which includes some large landscape uses), governmental (which includes some large landscape uses), and unaccounted/system losses.

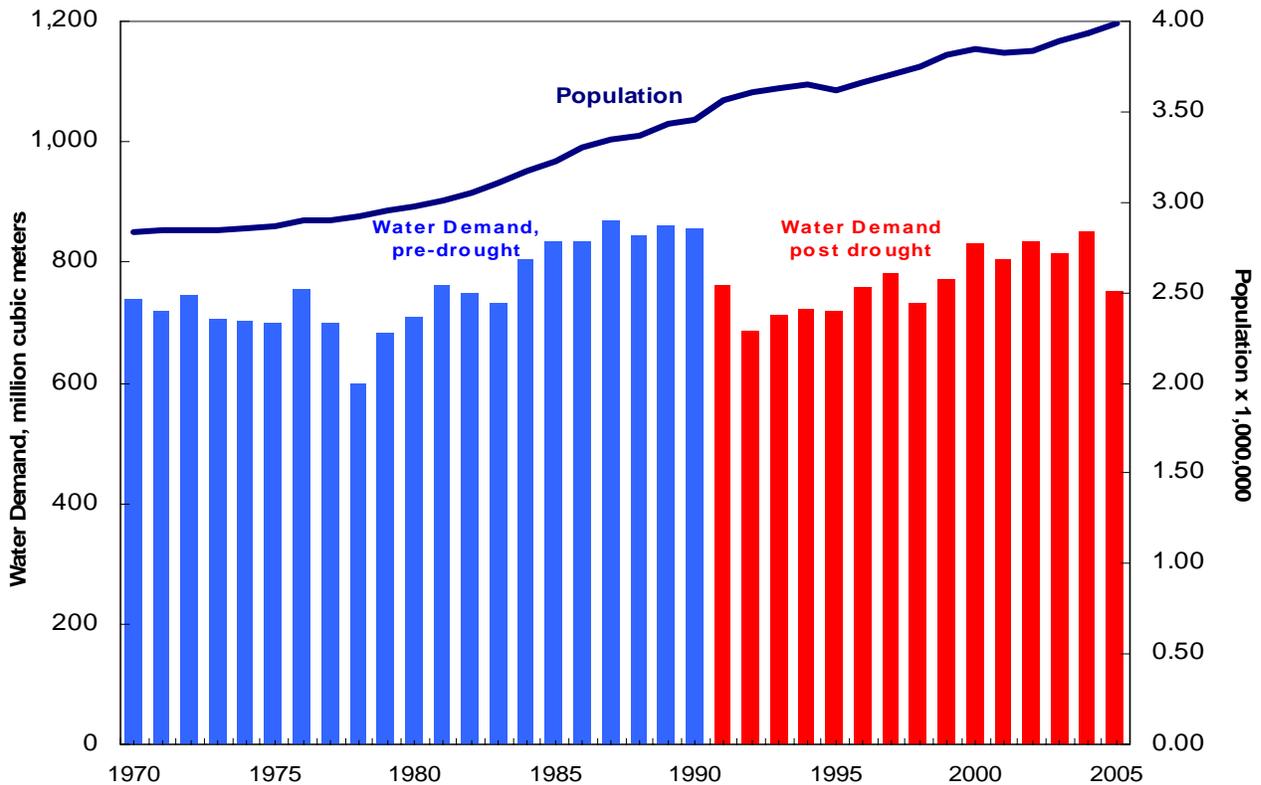
In terms of total actual use within the City, single-family and multi-family dwellings constitute the greatest demands (60 percent of the total demand). Commercial water use accounts for over 20 percent, governmental use about 7 percent, industrial use about 4 percent, and non-revenue water/system loss accounts for about 8 percent of the total water demand.

Non-revenue water is lost in the process of transporting and delivering water to customers. LADWP's efforts to minimize water loss through an aggressive infrastructure rehabilitation and maintenance program include pipeline rehabilitation, leak detection and repair, meter replacement, and cement lining programs.

While conservation has been implemented within the City, more serious and coordinated efforts to reduce water use did not begin until the last major drought that started in 1987 and ended in 1992. The drought was a wake-up call for many water-short communities in California, including Los Angeles, who along with other cities had to impose mandatory rationing of water on its customers. The six-year drought

further brought the simple reality to bear that water conservation needs to be an important part of the water management strategy in southern California. The results of LADWP's conservation program in reducing water use have been significant. Water use in the City today is the same as it was 20 years ago despite the fact that population has increased by 750,000 people within LADWP's service area, as shown in Figure 9.

Figure 9
Water Use in Los Angeles

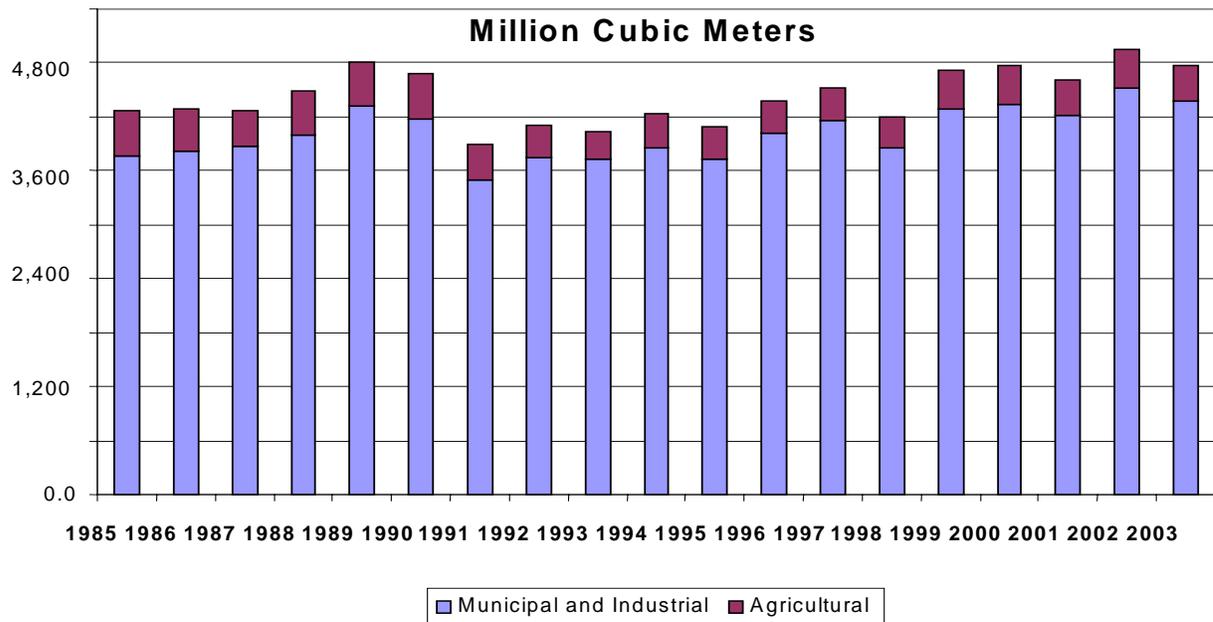


Water Use in Metropolitan Water District's Service Area

Figure 10 presents historical retail water demands on a calendar year basis in Metropolitan's service area. Since 1980, retail water demands have varied from 3.0 million acre feet (3,699 million cubic meters) in 1983 to 4 million acre feet (4,939 million cubic meters) in 1989. Due to the economic recession, drought impacts, and conservation, water use declined to 3.3 million acre feet (4,069 million cubic meters) in 1991. Demand remained below the 1989 peak level as a result of continuing effects from the recession and the drought coupled with a number of wet years and ongoing conservation efforts. In 1999, retail demands reached 3.9 million acre feet (4,808 million cubic meters), approaching the earlier peak level for the first time in the decade.

Of the 4.1 million acre feet (5,055 million cubic meters) projected to be used in 2005, 3.8 million acre feet (4,689 million cubic meters) or 92 percent are estimated to be used for municipal and industrial purposes (M&I), and 0.3 million acre feet (370 million cubic meters) or 8 percent for agricultural purposes. The relative share of M&I water use to total water use has been increasing over time as agricultural water use has declined due to urbanization and market factors, including the price of water. Agricultural water use accounted for 19 percent of total regional water demand in 1970, 14 percent in 1980, 11 percent in 1990 and 8 percent in 2003.

Figure 10
Retail Demand In Metropolitan's Service Area



Continued population growth, environmental restoration, variable hydrology, and the impacts of climate change are the primary water resource challenges that the region faces today. An important prerequisite to maintaining the ability to import water is demonstration of effective stewardship of its water supplies. Over the years, LADWP and MWDSC have forged a partnership to maximize the utility of their water supplies through conservation, thereby maintaining water supply reliability for the region.

II) INSTITUTIONAL ARRANGEMENTS

There are different levels of institutional involvement that make water conservation work in southern California. The framework for water-use efficiency for a large city like Los Angeles is cast from the decision-making of policy-makers to the involvement of community-based organizations. Within this framework, there is a high degree of coordination that takes place between agencies.

Government's Role in Conservation

Government's role in water use efficiency has been most prominent at the state and local level. While there is federal involvement, the regionalized nature of water availability is often overshadowed by issues of concern such as national security and the economy. The primary governmental entity with oversight of conservation at the state level is the California Department of Water Resources (DWR). DWR operates and maintains the State Water Project, including the California Aqueduct. DWR also provides dam safety and flood control services, assists local water districts in water management and conservation activities, promotes recreational opportunities, and plans for future statewide water needs. DWR's Office of Water Use Efficiency provides support for the stewardship of California's water resources and energy efficient use of water. This office is responsible for water use efficiency planning and coordination. DWR's Office of Water Use Efficiency:

- Provides expertise to local agencies and individuals regarding agricultural and urban water and energy conservation, reclamation and reuse of water, land and water use, and drainage management.

- Manages the California Irrigation Management Information System (CIMIS) by collecting weather data from over 120 stations and disseminating calculated reference evapotranspiration (ET_o) to assist landscape and crop managers irrigate efficiently.
- Assists in establishing mobile laboratories that conduct irrigation system evaluations.
- Carries out data analysis, demonstration projects, and research to achieve energy and water use efficiency.
- Provides loans and grants to make more efficient use of water and energy resources.

Additional information regarding DWR's Office of Water Use Efficiency can be found at: <http://www.owue.water.ca.gov/>.

Local (city) governments also play a role in implementing conservation through development of ordinances and mandates. In some instances, local city councils are responsible for approving conservation activities and/or budgets for the City's water supplier.

Conservation Mandates

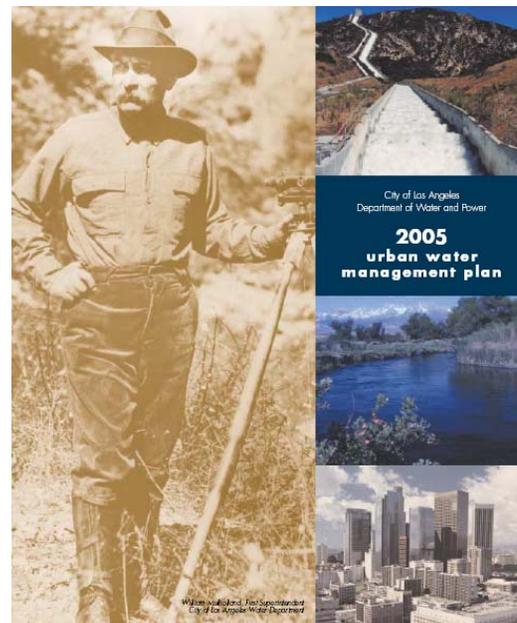
Statewide policies for water conservation are manifested through legislative proposals that are approved and become law. Policy-making typically begins with an analysis of the overall state of water resources, and ideally, is aimed at correcting or improving performance in a particular area. Conservation policies and ordinances are not limited to the state level, however, as many water-short communities have found it necessary to take additional measures to ensure that the utility of water is maximized.

The following issues exemplify the role that statewide legislation has filled in ensuring the efficient use of water in California:

Urban Water Management Planning Act

The Urban Water Management Planning Act was enacted in 1983 and mandated water suppliers to prepare a plan that outlines water use efficiency and resources management measures within their service area. The Act recognizes that water is a limited resource that is subject to increasing demands.

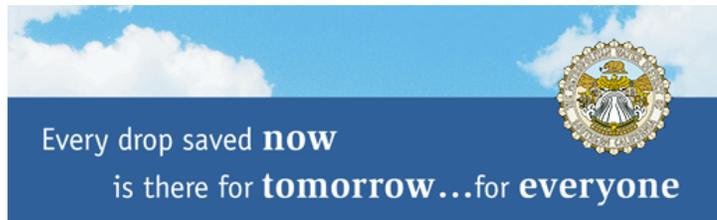
The Act is forward-looking, requiring an update every five years that outlines resource management activities over a 20-year projection. Public input must be considered prior to adoption of Water Plans. When adopted, Water Plans must be submitted to the California Department of Water Resources, the state agency responsible for the overall management of the state's water resources. Penalties for non-compliance include disqualification from state financial assistance (e.g., water grants, loans) and exclusion from participation on the drought water bank, which is administered by the state. Additional information on the Urban Water Management Planning Act can be found on the following website: <http://www.owue.water.ca.gov/urbanplan/index.cfm>. The Urban Water Management Plans of both LADWP and Metropolitan can be found on both agencies' websites at www.ladwp.com and www.mwdh2o.com, respectively.



Senate Bill 60

Signed into law September 16, 1999, and incorporated into the Metropolitan Water District Act. It is the intent of the Legislature that Metropolitan expand water conservation, water recycling, and groundwater recovery efforts. It states that

on or before February 1, 2001, and on or before each February 1 thereafter, that Metropolitan shall prepare and submit to the Legislature a report on its progress in achieving the goals of increased emphasis on cost-effective conservation, recycling, and groundwater recharge, and any recommendations for actions with regard to policy or budget matters to facilitate the achievement of those goals. The executive summary, conservation summary, scorecard (Figure 11) and a few excerpts from Metropolitan's February 2005 SB 60 report to the legislature are as follows:



EXECUTIVE SUMMARY – Metropolitan's February 2005 SB 60 Report

Despite formidable challenges, Southern California achieved water reliability in 2004 as it reaped the payoff from investments in conservation, water recycling, watershed management and several other water resource tools. Along the Colorado River, reservoirs have dropped to historically low levels, one revealing an entire town that had been submerged since the early 20th century. Yet, because of Metropolitan's diverse portfolio of resources, the Colorado River is slated to meet approximately 30% of the region's demands. What used to be provided by the Colorado River has been made up by storage supplies available as a result of continuing water conservation and strategic resource management alternatives.

Metropolitan's efforts have protected not only against drought, but also shielded its 18 million customers from a confluence of events and uncertainties that have been as unpredictable as the weather.

Consider the events of the past six years. In 1999, the pumps powering the state's water system were stilled when the Delta Smelt stayed longer than usual in the Bay-Delta. In 2002, the Colorado River basin faced its driest year on record. In 2004, climate experts were warning of a severe, one-in-500-year drought on the Colorado, while in the Bay-Delta crews labored round the clock to repair a levee break. California has faced both smaller snow packs and torrential rainstorms.

Beyond that, the world's climate may be changing for a variety of complex reasons. We hear speculation that such change will have impacts on our water supply strategies in the future. Does it mean more rain, or less? Will there be less melting snow and runoff from the Sierra Nevada Mountains? Could there be more extreme floods or prolonged droughts, and how would we manage them?

Diversity and flexible adaptability are the keys to our mission.

In 2004 the Metropolitan Water District of Southern California continued to withstand record drought conditions on the Colorado and below average precipitation in Southern California without shortages, using a successful, diversified resource portfolio that keeps our region one step ahead of dry conditions.

Metropolitan has achieved this stability by integrating a variety of strategies, while resisting calls to apply a narrow approach that relies heavily on one particular solution or another. For example, some might say increased surface storage is the magic bullet, and downplay conservation and water recycling. Others could say that Southern California should simply "write off" billions of dollars invested in the state's water system and its environmentally-sensitive storage programs, and rely instead on conservation and water recycling.

Metropolitan believes you can't do one without the other. Conservation and water recycling are crucial. Southern California is one of the leaders in reducing the state's per-capita consumption of water, keeping demands relatively flat despite growth. Because of conservation, water recycling and other innovative water management efforts, Metropolitan was able to absorb a 50 percent loss of water supplies that it has historically relied upon from the Colorado River. What has made conservation and other efforts

successful has been the fact that Metropolitan stored available imported water during wet years so that it could be called upon when the weather turned dry.

The region continues to invest in groundwater storage, water transfers and the recovery of contaminated groundwater basins, among other resource management tools. Metropolitan's current supply portfolio demonstrates its reliability; aggressive advances in conservation will help maintain reliability in the future. Southern California's simple strategy is that every drop of water saved now is there for tomorrow for everyone, including cities, farms and the environment.

For Metropolitan, placing a greater emphasis on cost-effective conservation, water recycling and groundwater programs is not something done under duress – it's a matter of common sense.

CONSERVATION SUMMARY– Metropolitan's February 2005 SB 60 Report

Conservation is not something to be done only by the "water agency" or the government when the drought alarm goes off. It is something that needs to be done by everyone regardless of drought or wet conditions. For the average resident who takes the message to heart, it means that when drought hits — or when water service is interrupted because of unforeseen events — their garden won't suffer. For businesses, it means they can continue to operate. For government it means stable tax revenues because businesses won't flee because of uncertain water supplies.



When neighborhoods, cities and regions cooperate in the effort, and when water agencies and government can make a credible, informative case to the public about the value and need for conservation, the benefits are numerous. If we can achieve conservation savings in fall and winter, it translates into water that can be stored for dry times. It permits Metropolitan to obtain water through various arrangements with agricultural partners and place that water into reserve, reducing competition for scarce resources with the environment and other farmers at critical dry times.

In 2004, conservation loomed larger than ever as the foundation for Metropolitan's reliability strategy, with additional investments totaling more than \$22 million (236 million pesos). Naturally, there were the old stand-bys, such as the tens of thousands of ultra-low-flush toilets installed in 2004. But when it comes to conservation, resting on one's laurels and relying on the same old tools is a risky strategy.



In addition to investing millions of its own dollars, Metropolitan has harnessed a variety of state and federal grants to promote the latest conservation technology and techniques across its six-county service area. For example, more than 30,000 homes are saving millions of gallons by using high-efficiency, front-loading clothes washers. High tech sprinkler timers are improving thousands of landscapes through better irrigation. More than 25,000 restaurants are saving huge amounts of energy and water by washing dishes with pre-rinse spray valves.

Yet more than ever, Metropolitan's efforts have turned outdoors, introducing a new term to the state's lexicon – California Friendly. More than 100 retailers large and small have begun offering California Friendly and native plants to their customers, who are also getting in-store lessons in waterwise landscaping. Homeowners and professional landscapers alike are getting comprehensive training on advanced, water-efficient landscaping through the Protector del Agua Program.



Thousands of homebuyers are being exposed to California Friendly landscape designs and new conservation devices, such as dual-flush toilets, through a model home partnership with the region's building industry. Others are using grant funds to create waterwise landscapes in their communities.

Thousands continue to get on-site surveys on the best way to save water indoors and out. Since 2004 began, millions of Californians have learned how not to over-water their yards, thanks to a series of whimsical advertisements. Cable television reinforced that theme with a native plants episode of Metropolitan's "Straight from the Tap" program. As 2005 begins, Metropolitan is unveiling a new public action campaign with the flexibility to adapt to changing conditions.



An average of 1,000 people a day visit the bewaterwise.com web site. At least 250,000 others are popping a CD-ROM in their computers for a look at a thousand native and low water-using plants. They can also get hotline advice from a Metropolitan-funded native plants expert in a partnership with Rancho Santa Ana Botanic Gardens.

Metropolitan kept busy updating its water curriculum for thousands of elementary school students. It also launched a World Water Forum as part of a new outreach program that attracted the region's top universities to develop and research water saving and water quality technologies.

Meanwhile, grass-roots efforts to promote conservation, California Friendly plants and other water management tools through community groups, schools, cities and other organizations received a major boost from the Community Partnering Program, which provided hundreds of thousands of dollars in grants in 2004. The California Municipal Utilities Association honored Metropolitan's Innovative Conservation Program in 2004 as an exemplary method of implementing conservation best management practices. The public relations profession rated the [bewaterwise](http://bewaterwise.com) water conservation campaign superior to the national Rock the Vote program.



And what about the future? Could more storm water that is now quickly shunted to the ocean be used instead to recharge groundwater basins? Can more "mow and blow" professionals be trained to become California friendly gardeners? Those are just two of the possibilities under investigation

Metropolitan's Guiding Policies

Metropolitan's conservation policies have their foundation in two documents. One is Metropolitan's Integrated Resources Plan. The other is the California Urban Water Conservation Council's Memorandum of Understanding Regarding Urban Water Conservation in California, to which Metropolitan is a signatory. The MOU's March 2004 amendments better define the level of support that wholesalers like Metropolitan are expected to provide their retail agencies.

Metropolitan is committed to providing effective water conservation programs and services, and has invested more than \$220 million in conservation programs and related activities within the region. This continually expanding commitment has witnessed a shift in focus to capture new innovative opportunities for saving water, such as high efficiency clothes washers.



Metropolitan's staff is pursuing a number of initiatives to make its conservation programs more effective.

- Using revised forecasts from Metropolitan's Integrated Resources Plan Update to gauge progress in meeting the regional commitment to reduce demand for water
- Developing a long-term conservation strategy in collaboration with our member agencies
- Staying active on the legislative front by finding regional solutions among disparate interests
- Identifying new partnership opportunities to leverage conservation programs

We are engaged in active programs with the home building development community, the state energy commission and retail chains such as Home Depot and Armstrong Garden Centers. We continue to explore our common interests with sanitation districts.

Metropolitan's Conservation Credits Program

The backbone of Metropolitan's conservation effort is the Conservation Credits Program initiated in 1988. Metropolitan contributes one-half the program cost --up to \$154 per acre-foot of water conserved -- to assist member agencies and the public in realizing opportunities to increase water use efficiency.

Metropolitan's Conservation Water Rate Structure

Metropolitan's new rate structure implemented in January 2003 includes a Water Stewardship Rate, which funds conservation, water recycling, groundwater recovery and other local projects through

Metropolitan’s Local Resources and Conservation Credits programs. A two-tiered water rate for imported water provides price signals to encourage water agencies to invest in cost-effective conservation, water recycling, transfers, seawater desalination and groundwater programs. In addition, the two-tiered rate structure allocates a greater share of costs to Metropolitan’s member public agencies that use more water in the future.

Metropolitan’s New Model Home Program

This pioneering effort creates incentives and design assistance for new homebuilders to install more efficient water saving devices in model homes. Each development’s model home displays will contain at least one version with dual-flush toilets, high efficiency clothes washers, native and California Friendly landscaping and state-of-the-art, self-adjusting irrigation control systems. These model homes provide an excellent opportunity to reach the home-buying public regarding voluntary improvements to new and existing homes. This program is expected to create 117 high efficiency demonstration model homes and at least 200,000 square feet of associated California Friendly landscaping.



**Figure 11
Metropolitan’s SB 60 Score card**

Metropolitan’s 2004 Achievements Scorecard		
Metropolitan-Assisted Local Resources		
<p>Active Conservation:</p> <p>101,610 AF FY 2004 Production \$22 Million FY 2004 Investment 712,527 AF Cumulative Production \$213 Million Cumulative Investment</p>	➤	<p><i>Active conservation</i> is water saved directly as a result of conservation programs funded by water agencies, and includes plumbing device retrofits, industrial process improvements, landscape efficiency improvements and water efficiency surveys. In contrast, <i>Passive Conservation</i> is water saved as a result of changes in efficiency requirements for plumbing fixtures and plumbing codes.</p>
<p>Water Recycling:</p> <p>75,000 AF FY 2004 Production \$15 Million FY 2004 Investment 680,000 AF Cumulative Production \$124 Million Cumulative Investment</p>	➤	<p>Metropolitan provides financial incentives to its member agencies for recycling projects through its <i>Local Resources Program (LRP)</i>. Metropolitan’s <i>LRP</i> began in 1982 (originally called the <i>Local Projects Program</i>).</p>
<p>Groundwater Recovery:</p> <p>43,000 AF FY 2004 Production \$8 Million FY 2004 Investment 245,000 AF Cumulative Production \$41 Million Cumulative Investment</p>	➤	<p>Metropolitan also provides financial incentives to its member agencies for groundwater recovery projects through its <i>LRP</i>. Metropolitan began helping to fund these projects in 1991.</p>
Metropolitan-Assisted Groundwater Programs		
<p>Contractual Storage:</p> <p>\$35.1 Million Cumulative Investment Through 2004 \$64.3 Million Metropolitan Funds Earmarked for Programs \$45 Million Prop. 13 Grant Funds Administered by Metropolitan</p>	➤	<p>Proposition 13 refers to the <i>Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Bond Act</i> of 2000.</p>
<p>Water Rate Incentives:</p> <p>\$319 Million Cumulative Investment Through 2004</p>	➤	<p><i>Water Rate Incentives</i> represent the discount in water rates Metropolitan provides to its member agencies to encourage groundwater storage</p>
<p>December 2004 Conjunctive Use Storage & Replenishment Delivery Storage: 203,600 AF</p>	➤	<p>AF = acre-feet. An acre-foot is equal to 325,851 gallons, or enough water to supply the needs of two typical Southland families in and outside their homes for one year.</p>

At the local level the City of Los Angeles has a governance structure that sets and implements policy to ensure water use efficiency within LADWP's service area. These policies and/or ordinances are enforced to instill a conservation mindset, while putting mechanisms in place that result in permanent reductions in water use.

LADWP was the first water utility in California to implement a tiered water rate structure. Discussed later in further detail, the ascending rate structure correlates customers' willingness to pay for water based on the amount of usage.

In 1988, the City adopted a plumbing retrofit ordinance to mandate the installation of conservation devices in all properties and to require water-efficient landscaping in new construction. The ordinance was amended in 1999, requiring the installation of ultra-low-flush (ULF) toilets and water saving showerheads in single-family and multi-family residences prior to resale. LADWP's water conservation programs have assisted customers affected by the ordinance by offering free ULF toilets and showerheads, free installation of ULF toilets and showerheads, as well as rebates for ULF toilets purchased and installed.

The plumbing retrofit ordinance also included a requirement for LADWP customers with three acres or more of turf to reduce consumption by 10 percent from 1986 levels or face a 100 percent surcharge on their water bills. To help these customers comply with the ordinance, LADWP has sponsored free training courses specifically targeting the City's large turf customers. To further assist this group, LADWP developed a guidebook, "Improving Irrigation Performance," to demonstrate ways for enhancing existing irrigation systems.

The Los Angeles City Municipal Code sets forth an Emergency Water Conservation Plan that includes provisions known as Prohibited Uses. These prohibited uses contain six wasteful water use practices that are permanently prohibited for all City of Los Angeles customers, and are intended to eliminate waste and increase public awareness of the need to conserve water. During times of shortage, education and enforcement of the following provisions will be increased:

- No hose-washing of hard surfaces such as walkways, driveways, or parking areas.
- No water shall be used to clean, fill, or maintain levels in decorative fountains unless such is part of a recirculating system.
- No restaurant, hotel, cafe, cafeteria, or other public place where food is sold shall serve drinking water to any customer unless expressly requested.
- Water leaks must be repaired in a timely manner.
- No lawn, landscape, or other turf area shall be watered between the hours of 10:00 a.m. and 5:00 p.m. from April through September, and between 11:00 a.m. and 3:00 p.m. from October through March (subject to Council approval). These restrictions do not apply to licensed nurseries, gardeners, and drip irrigation systems.
- No watering in such a manner causing excess water to run-off onto an adjoining sidewalk, driveway, street, gutter or ditch.

Integrated Regional Planning

It is generally true for large undertakings that a concerted effort with others who share a common goal will produce a higher degree of success. This is an approach that has been taken in southern California not just with conservation, but with overall water resources planning. Within Los Angeles, the City works closely with MWDSC, the City's Bureau of Sanitation (wastewater agency), other regional water

providers, and various stakeholder groups to develop and implement programs that reduce overall water use. The City has also pioneered community-based job programs to assist in conservation program implementation. While significantly assisting with program implementation, these community-based organizations also provide important social and economic benefits to neighborhoods.

Integrated resources planning is a process that is being used by many water and wastewater providers to meet their future needs in the most effective way possible, and with the greatest public support. The planning process differs from traditional planning processes in that it incorporates:

- public stakeholders in an open, participatory process;
- multiple objectives such as reliability, cost, water quality, environmental stewardship, and quality of life;
- risk and uncertainty; and
- partnerships with other agencies, institutions, and non-governmental organizations.

LADWP has been actively involved in integrated resources planning since 1993, when the MWDC initiated the region's first Integrated Resources Plan (IRP). LADWP was an active member of the technical workgroup that oversaw the development of alternatives and recommendations from MWDC's IRP. In 2002, the City of Los Angeles embarked on its first IRP for wastewater, stormwater and water supply. The LADWP is a partner in this effort, working with the City's Bureau of Sanitation.

An important aspect of the integrated resources planning efforts with both MWDC and the Bureau of Sanitation is water use efficiency. With MWDC, the challenge was meeting a growing population's water supply with a limited resource. With wastewater planning, the challenge was minimizing the capital cost of upgrading infrastructure to meet increased wastewater flows due to increasing demand for water (due to increased population). Out of these processes came a range of potential water conservation options that include further conservation of stormwater runoff, cisterns, additional water recycling, as well as an expansion of traditional conservation programs.

An important part of ensuring the success of conservation programs identified in these long-term plans is the cooperation of the customers who are asked to conserve water. Over time, it has been found that the most effective way to illicit a positive response to a call for conservation is by providing incentives. Incentives come in the form of technical, financial, and hardware assistance. In southern California, incentivizing conservation is done both locally and regionally. An integrated, regional effort to conservation can be found at the following website: <http://www.bewaterwise.com>.

California Urban Water Conservation Council – Best Management Practices

The California Urban Water Conservation Council (CUWCC) was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices into the planning and management of California's water resources.

A historic Memorandum of Understanding was signed by nearly 100 urban water agencies and environmental groups in December 1991. Since then, the Council has grown to 345 members. Those signing the MOU pledge to develop and implement fourteen comprehensive conservation Best Management Practices (BMPs), as listed below.

1. Interior and exterior water audits and incentive programs for single and multi-family residential customers
2. Residential plumbing retrofit
3. Distribution system water audits, leak detection and repair



4. Metering with commodity rates for all new connections, and retrofit of existing connections
5. Large landscape water audits and incentives
6. High efficiency washing machine rebate program
7. Public information
8. School education
9. Commercial and industrial water conservation
10. Wholesale agency assistance program
11. Conservation pricing
12. Water conservation coordinator
13. Water waste prohibition
14. Residential ULF toilet replacement program

The MOU commits signatory water suppliers to develop comprehensive conservation programs using sound economic criteria and to consider water conservation on an equal footing with other water management options. The MOU established the CUWCC to monitor implementation of the BMPs, and to maintain the list of BMPs.

As two of the original MOU signatories, LADWP and MWDC have been active in the CUWCC since its inception. Instrumental in the development of the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), both agencies have been implementing the Best Management Practices listed above. Both agencies have also played a significant role in the governance and policy-making at the CUWCC, holding a seat on various decision-making committees. One of the obligations as a signatory to the MOU is to submit a BMP Retail Water Agency Report to the CUWCC. This report details progress in implementing the 14 BMPs as currently specified in the MOU. More information on the CUWCC and the BMP reports is available by accessing CUWCC's website at www.cuwcc.org.

Implementation Issues

Cost-effective water conservation programs are developed to achieve multiple goals of demand reduction, customer service, and environmental responsibility. Conservation potential is considered in determining program approach and duration. Some types of conservation programs result in savings that are more easily measured than others. Demand-side management programs, like the rebate programs for ULF toilets and high-efficiency washing machines, produce results that are measurable. Public information, education, and other general conservation awareness programs are intended to alter customers' behavioral patterns on water use, and thus are more difficult to quantify. Prior drought experiences, however, demonstrate that behavioral change is an important factor in water use reduction.

There are differences in how LADWP and MWDC implement conservation. LADWP, as a retail agency, is responsible for program implementation at the individual customer level. The City's large population and 464 square-mile (1,201 kilometers) service area adds another degree of logistic complexity. As a wholesaler of water, MWDC addresses conservation directly with its 26 public member agencies. This is done through financial incentives that supplement the member agencies efforts within their service area. One constant activity between MWD and its member agencies is public education. Through workshops, radio and newspapers ads, bill inserts, and other means, the importance and means to help conserve water are communicated to customers throughout southern California.

LADWP and MWDC both have staff dedicated to implementation of the agencies' water conservation programs. Among their responsibilities are policy recommendation, customer service, interagency coordination and communication, program performance monitoring and analysis, and day-to-day program implementation. As with other water system programs, the budget for conservation programs is set based on anticipated goals by the agency, and the ability of the rate structure to support projected expenditures.

III) SOCIAL, ECONOMIC, AND ENVIRONMENTAL ISSUES

Water conservation is among the most socially, economically, and environmentally friendly water resource management options to implement in southern California. As discussed earlier, 85 percent of the City's water supply is imported. Over time, the Owens River watershed, Northern California's Sacramento/San Joaquin River delta, and the Colorado River have been impacted by water diversions.

While efforts and progress have been made to restore and maintain a healthy environment in these watersheds, the practical options for water users has been to reduce the use of these resources, and balance the need between human consumption and the environment. Conservation is also a viable option for extending supply and minimizing the need to build costly new infrastructure. Generally, the public places a high value in protecting the environment while developing water resources at the lowest cost.

Public Outreach and Education

Public information, education and other general conservation awareness programs are intended to alter customers' behavioral patterns on water use. Behavioral change in water use is an important factor in reducing water consumption during drought periods.

As discussed in the next section, awareness/support measures can be active or passive. LADWP promotes a balanced conservation program to reach out and educate its customers. Heightening awareness of the scarcity of water and the need to conserve while emphasizing the monetary benefits of reducing water use is a message that has proven to be practical and credible to many customers.

Community-Based Organizations

LADWP has been assisted by community-based organizations (CBOs) to reach the milestone of more than 1.24 million toilet installations to date. CBOs have been integral to LADWP's success, reaching into the communities they serve to convey the conservation message and directly undertake conservation activities. Benefits of this approach accrue to community participants through reduced water bills, to the CBOs through employment opportunities and revenues earned, and to the City through significant water savings achieved. The program produces estimated water savings of more than 25.4 million cubic meters per year.

Financing Mechanisms

Conservation is the cornerstone of LADWP's water demand management activities and ongoing investments will be made in viable programs. This commitment is subject to funding availability and LADWP's ability to implement such programs. Outside resources for funding are sought to complement the City's resources. A stronger commitment is also being made to acquire outside grant funding for City conservation projects.

The City's funding sources for conservation are as follows:

- Water Rate Adjustment - An adjustment factor to fund both water conservation and recycling projects is part of the City's water rate structure. This adjustment pays for both programs and adds 25 cents (approximately 2.7 pesos) per month to the total bill for typical customers.
- MWDSC Conservation Credits Program - MWDSC offers rebates to member agencies that promote water conservation through the installation of specified conservation measures. The rebates equal \$154 per acre-foot (1.35M pesos per million cubic meters) of water saved, or half the project cost.

- Outside Agency Co-Funding - Other agencies realizing benefits from conservation programs are solicited for co-funding of program costs.
- Grant Funding - LADWP actively seeks grant funding from the State of California and the federal government.

Incentives to Increase Participation

Conservation programs were developed and launched during the drought of 1987 through 1992. In 1990, the ULF Toilet Rebate Program was initiated, followed two years later by the ULF Toilet Distribution Program. In 2003, a well-received free installation service component was added to the ULF Toilet Distribution Program that includes free water-saving showerheads, faucet aerators and replacement toilet flapper valves. These programs have proven to be very popular and successful, used as a model by water agencies nationwide.

Water Rate Structure

LADWP's water rate structure is 100% commodity-based, with tiers to promote conservation. In 1993, Los Angeles restructured its water rates to provide customers with a clear financial signal to use water more efficiently. It was the first time in LADWP's history that an ascending tiered rate structure was used. This conservation-based rate structure remains in use and applies a lower first tier rate for water used within a specified allotment, and a higher second tier rate for every billing unit (2.83 cubic meters) that exceeds the first tier allotment. The second tier rate reflects the "marginal cost," or the projected cost for additional water that would be required to meet these needs. A unique feature of the rate structure is that the first tier allotment considers factors that influence individual residential customer's water use patterns (i.e. lot size, climate zone, and family size).

The goals of LADWP's two-tiered water rate structure are to:

- Use price as a signal to encourage the efficient use of water;
- Provide basic water needs at an affordable price;
- Provide equity among customers;
- Use price to stabilize water use during a shortage; and
- Generate adequate revenue for maintaining and upgrading the water system.

In a period where increasing demands and reductions in water supply are becoming more commonplace, a rate structure that provides appropriate signals to encourage efficient water use has become a necessity for many areas, including Los Angeles.

The substantial investments required for water quality improvements, security, and supply development have significantly raised the cost of delivering water. As rates increase, water agencies have noticed a change in use patterns. Because there is a known correlation between price and use, agencies use water rates to encourage conservation activities and to postpone the need to construct new facilities or purchase even larger quantities of imported water.

To further emphasize the conservation message, water charges are based solely on water used. This eliminates the inclusion of fixed charges. There are automatic adjustments triggered when a water shortage exists. These adjustments are based on the actual water use patterns that occurred during the 1991 period of mandatory water rationing. The purpose of these adjustments is to use price to encourage additional conservation and to provide LADWP with the revenue necessary to operate the system efficiently during a shortage.

Conservation and Environmental Sensitivity

One significant conservation achievement is the effect it has on preserving and enhancing the environment. In southern California, conservation is a necessary part of preserving the reliability of the

region's imported water supply. Whether it is higher streamflows needed to sustain fish or shallow-flooding of dust-prone areas to improve air quality, the environmental need for water has for years been balanced against the need to quench people's thirst. Conservation and environmental stewardship are synonymous in southern California's water landscape.

The following chart demonstrates how much water is being committed to the environment in the Owens Valley and Mono Basin.

Table 3

**LOS ANGELES AQUEDUCT SYSTEM
WATER USED FOR ENVIRONMENTAL RESTORATION**

Category	Los Angeles Aqueduct Deliveries		Environmental Water Commitment
	Historical Average	Restricted Average	
all values shown in million cubic meters			
Mono Basin - Mono Lake	567	482	85
Owens Valley Environmental & Mitigation Programs	482	456	26
Owens Valley Groundwater Agreement	456	419	37
Owens Lake Dust Mitigation Project	419	351	68
Lower Owens River Project	351	308	43
Total LAA water supplies committed for environmental uses			259

IV) WATER CONSERVATION PROGRAMS



Conservation programs can be grouped into five categories: awareness/support, residential, commercial/industrial/institutional, landscape, and system maintenance measures. LADWP's programs include traditional demand-side management measures, as well as infrastructure improvement programs that contribute to water waste reductions. Combined with LADWP's conservation pricing structure, these programs increase the water system's reliability and efficiency.

Awareness/Support Measures

Awareness/support measures can be active or passive. Active components include full metering of water use, assessment of volumetric sewer charges, and a conservation rate structure. Passive components typically include providing educational materials for schools, community and customer presentations, maintaining a conservation hotline, and a wide range of information distributed through customer bills, advertising in public venues, LADWP's website, and direct mail. Passive awareness/support measures provide the foundation for the conservation movement to build upon by raising water use awareness, water conservation program visibility, and encouraging community involvement.

Another aspect of awareness/support is that of advocacy. LADWP has been instrumental in the development of more stringent standards (Supplementary Purchase Specification) for ULF toilets used within the City and by other water agencies. LADWP also assisted in the adoption of higher residential

clothes washer efficiency standards by the California Energy Commission. Recognizing the importance of this activity, LADWP actively participates in advocating local and statewide conservation research and planning.

Residential Category

In 1990, the ULF Toilet Rebate Program was initiated, followed two years later by the ULF Toilet Distribution Program. In 2003, a well-received free installation service component was added to the ULF Toilet Distribution Program that includes free water-saving showerheads, faucet aerators and replacement toilet flapper valves. These programs have proven to be very popular, and with estimated water savings of more than 25.4 million cubic meters per year, are the most successful of their kind in the country. Water savings are delivered from these toilets over time at a cost of \$315 per acre-foot (2.76M pesos per million cubic meters).

The High Efficiency Washer Rebate Program was initiated in 1998 and promotes the purchase and installation of high efficiency models that save both water and energy. As of 2005, more than 32,000 machines have been purchased and installed through the program. The program's minimum efficiency requirements for rebate eligibility were increased January 1, 2004, resulting in the promotion of higher efficiency models. New State efficiency standards for clothes washers are due to become effective on January 1, 2007. This program is a good example of interagency coordination, with initial co-funding provided by the City's Department of Public Works Bureau of Sanitation (responsible for wastewater treatment), and by the Southern California Gas Company. Ongoing co-funding for the program is provided by MWDSC.



Since an amendment to the City's existing plumbing retrofit ordinance on January 1, 1999, all residential properties (single-family and multi-family) sold within the City must have ULF toilets and low-flow showerheads installed prior to the close of escrow. This progressive requirement is implemented with the help of local real estate professionals and is strongly supported by LADWP's toilet replacement programs. LADWP has explored the expansion of the City's Retrofit on Resale Ordinance to include nonresidential properties. However, such changes were determined to be infeasible due to concerns over the applicability of certain provisions of the Americans with Disabilities Act whereby the replacement of a toilet could trigger requirements for costly accessibility improvements.

Water-saving showerheads are still available to LADWP customers, free of charge, upon request. These devices supplement the over 1.5 million water conservation retrofit kits that were distributed throughout Los Angeles during the last drought. The kits included one-gallon toilet displacement bags, low-flow showerheads, and toilet leak detection tablets.



As part of past programs promoting residential water conservation measures, students conducted home water surveys through a resource efficiency education program implemented by LADWP in Los Angeles area high schools. While water conservation curricula is still a component of the education program, local CBOs now visit many Los Angeles residences throughout the year, assessing water conservation opportunities in the home and installing applicable measures to immediately capture water savings.

LADWP has conducted a toilet flapper valve replacement pilot program. Although long-term water savings from ULF toilets are predicated on timely replacement of leaking toilet flapper valves with appropriate replacement units, findings from the pilot program indicate a small incidence of leaking flapper valves in toilets rebated or distributed by LADWP. However, toilet leak testing and flapper valve replacement



was added to the ULF Toilet Distribution Program's installation service component for toilets not replaced through the program.

Finally, a pilot program examining the effectiveness of weather sensitive irrigation controllers (right) in residential applications is presently underway. Information obtained from this pilot and others conducted in southern California will guide development of a long-term program supporting this technology.

Commercial/Industrial/Institutional (CII) Category

This category represents some of the largest volume water users in LADWP's customer base, and represents a great deal of conservation potential. LADWP, in partnership with MWDC, has implemented a commercial rebate program designed specifically for customers in the CII category. In addition, water use efficiency solutions are being developed for specific business sectors. Efforts are also underway to better promote the financial incentives available that make water conservation retrofits more cost effective for business and industry. LADWP takes full advantage of regional programs offered by MWDC for the CII sector.

The Commercial Rebate Program was launched in 2001 to provide menu-based rebates for water conserving measures applicable to many types of CII facilities. The list of measures includes ULF toilets and urinals, high efficiency coin operated clothes washers and cooling tower conductivity controllers. The program design provides for ease of participation, and has been well-received by LADWP customers. As of 2005, rebates have been provided for more than 15,500 ULF toilets and 5,600 high efficiency clothes washers through the Commercial Rebate Program.

The Technical Assistance Program (TAP) was created in 1992 to provide incentives for retrofitting water-intensive equipment. Separate from the Commercial Rebate Program, the TAP encourages site-specific projects and incentives are based on a project's water savings. The estimated unit cost for TAP overall is about \$315 per acre-foot saved (2.76M pesos per million cubic meters)

Cooling towers (right) which represents a significant water conservation opportunity are eligible for TAP funding. Through a cooling tower controller upgrade and enhanced water treatment, a typical cooling tower project can save one million gallons (3,785 cubic meters) of water annually.



Another promising technology funded through TAP is an x-ray processor recirculation system (left). A single recirculation system can save one million gallons (3,785 cubic meters) of water annually, and a typical hospital may have as many as 15 processors. As a result of grant funding from the State of California, 250 x-ray processor recirculation systems will be installed free of charge in medical facilities in Los Angeles.

Landscape Category

Recognizing that a substantial amount of water is used outdoors for irrigation, LADWP continues to invest in landscape irrigation efficiency programs and projects. In 1988, the City passed a plumbing retrofit ordinance that included a requirement for LADWP customers with three acres or more of turf to reduce consumption by 10 percent from 1986 levels or face a 100 percent surcharge on their water bills. To help these



customers comply with the ordinance, LADWP has sponsored free training courses specifically targeting the City's large turf customers. To further assist this group, LADWP developed a guidebook, "Improving Irrigation Performance" to demonstrate ways for enhancing existing irrigation systems.

LADWP has also sponsored conservation and garden expos to highlight various aspects of efficient outdoor water use and planting practices, and emphasizing native, drought-tolerant plants. Funding was



provided for three demonstration gardens to showcase the use of drought-tolerant plants and flowers, including the landmark Lummis Home in Highland Park. Lawn watering guides were mailed to all single-family and duplex residences. Planting guides for native and drought-tolerant plants are also available upon request. Additionally, to demonstrate the beauty and appeal of a water-conserving landscape, LADWP's John Ferraro Building facility (left) has a drought-tolerant garden that is open to visitors year-round.

The City's Landscape Ordinance (No. 170,978) became effective in May 1996 and includes requirements for water management and irrigation specifications, planting techniques, plant materials, and source reduction of waste. The City adopted this ordinance to comply with the California Water Conservation in Landscaping Act (California Assembly Bill 325).

LADWP contributed to the work of the state's Landscape Task Force (established through California Assembly Bill 2717), serving as co-chair of the Economics Workgroup. Among the recommendations approved by the Task Force are incentives and disincentives for landscape water use, and water budget based rates as well as other effective rate structures. The work of the Task Force offers significant potential for further landscape water use efficiency statewide.

Landscape irrigation improvement projects are currently funded through the TAP, with incentives calculated on the basis of a project's water savings. LADWP staff includes certified landscape auditors who can provide large landscape audits upon request.

LADWP is also investigating new programs using data obtained through pilot program efforts. A recent pilot program was conducted to determine the effectiveness of weather sensitive irrigation controllers in large landscape applications. This technology was shown to save, on average, one acre-foot of water per acre controlled per year. On the basis of the pilot program results, financial incentives will be made available to LADWP customers for the purchase and installation of weather sensitive irrigation controllers in 2005. Additional efforts are being undertaken to make available a landscape irrigation education program for homeowner associations and other large landscape customers. This program would focus on common green areas in multi-unit complexes to improve irrigation efficiency, including irrigation system maintenance and repair, and plant selection.

There is also potential for the use of non-potable water for irrigation, which can help extend the utility of the City's traditional water supplies. Through increased stormwater capture, groundwater recharge with captured storm and irrigation runoff, and recycled water, imported surface water and local groundwater used for landscape irrigation can be conserved.

Innovative ways to conserve water for landscape use has also been implemented within the City through the work of outside advocacy groups. One such group, TreePeople, has partnered with various City departments, including LADWP, through programs such as Cool Schools and the Open Charter Stormwater Project.

The Open Charter Elementary School Stormwater Project is one of several stormwater management systems that TreePeople has established in Los Angeles over the past six years that include: a 250,000 gallon (946 cubic meter) underground cistern in Coldwater Canyon Park, a retrofitted home in South Los Angeles, a 7,600 square-foot (706 square-meter) infiltration field at an elementary school and, with the Los Angeles County Department of Public Works, a 2,700 acre (10.9 million square meters) watershed retrofit within the City. These activities create the foundation that will lead to further landscape water conservation to preserve the City's limited water supplies.

System Maintenance Category

Maintaining system infrastructure reduces water waste and allows for greater water accountability. Infrastructure maintenance is a high priority for LADWP. On-going programs such as pipeline replacement, pipeline corrosion control, and cement lining not only preserve the operational integrity of City water facilities, but also reduce unaccounted water losses.

In 1940, LADWP started a cement-mortar lining program for its older pipelines. At one-third the cost of replacement, pipes are rehabilitated through cleaning and lining with cement mortar which reduces water loss, prevents corrosion build up and improves water flows and water quality. By 2005, it is anticipated that all but several miles of LADWP's 7,200-mile pipeline distribution system will be lined.

LADWP has made significant progress in replacing and/or retrofitting water meters through its meter replacement program that started in 1988. As water meters age, they typically begin reading less than 100% of their intended accuracy. The meter replacement program has been valuable in maximizing the accuracy of the approximately 700,000 meters within the City.

V) CONCLUSION

In a water-short community such as southern California, water conservation is a way of life. The City of Los Angeles and the Metropolitan Water District of Southern California have taken on leadership roles, recognizing that the reliability and affordability of their water supplies rely on their prudent use.

To date, the combination of hardware-based demand reduction programs, education, and the use of price signals to encourage efficient water use has to date successfully maintained Los Angeles' water use to approximately the same levels seen in the mid-1980s. This achievement is made even more significant since the City's population has increased by over 750,000 people over that period.

While conservation can be implemented at different levels, an important consideration in program implementation is identification of areas of conservation opportunities and the ability to support the conservation program with the existing rate structure. LADWP has focused on cost-effective measures that result in significant water use reductions within its service area. For more costly programs, financial assistance from outside organizations that have responsibility over water use efficiency is important.

Whenever possible, conservation program implementation should be coordinated and integrated with other water agencies that share the same goal of saving water. For a large area, coordination will provide benefits in the form of efficiency of program implementation, social and economic benefits to the region, and the added leverage of securing needed outside funding through a collective effort.

The success of any water use efficiency program depends on the level of participation by customers. For voluntary measures, financial, hardware, and technical assistance incentives will suffice. For measures that must be implemented, local ordinances with enforcement are needed. An important aspect of heightening awareness to conserve water is through public outreach and education. This form of passive conservation has been shown to significantly reduce water use during extreme water shortage in the southern California region. Public education is also an economical means to promote conservation within the service area.

MWDSC has been instrumental in ensuring a continued effort in water use reduction within its service area. This is critical because water use projections in southern California incorporates a substantial amount of conservation savings over time that, if not realized, can potentially lead to water resource issues in the long-term. MWD's financial incentive for its member agencies to implement conservation is an important component of a sustained regional conservation effort in southern California.

Conservation has filled a critical role in the evolution of the City of Los Angeles from a tiny pueblo to a global economic center today. LADWP, in cooperation with MWDSC and other agencies, are committed to water use efficiency as a means to ensure a reliable and sustainable future supply of water.