

The Water We Drink ... and the Water We Don't

Introduction

Southern California's water supply issues are often controversial and present a variety of perspectives and solutions. More and more people have made the intellectual connection between the rainwater that is wasted as polluted runoff, and the enormous amounts of imported water required to sustain our current Southern California lifestyle. However, the practical connections are harder to forge. Separate agencies, established in a by-gone era of siloed thinking, are asked to cooperate on projects large and small and without an existing infrastructure or framework to link the costs and benefits of all the various activities.

We asked leading thinkers and decision-makers in the Southern California water debate to weigh in on how to forge these connections and move toward a sustainable water supply. Adán Ortega, Jr. and Michael Gagan provide a starting point for our discussion with their historical perspective on the evolution of water management in the region and a proposal for a new governance paradigm. Richard Nagel, General Manager of the West Basin Municipal Water District, and Stephen Maguin, General Manager of the Sanitation Districts of Los Angeles County, each respond to the Ortega-Gagan article and provide their thoughts and opinions on what is needed for a truly sustainable water future.

Success and Lost Opportunities in Water Management in Los Angeles County and the Future that May Still Be Possible

Adán Ortega, Jr. & Michael Gagan

Hidden in plain sight around Los Angeles are hundreds of symbols of our common quest for water, from an oddly fake-looking well at the Metro station in Artesia, to the Music Center's jumping fountain, and the 28-foot, seven-ton steel pitcher tipping water into Ballona Creek (Figure 1) (Hanna 2001). Each generation of people in Southern California has wrestled with acute water issues, seeking to grow food, control floods, build cities, and now, to quench the thirst and manage the waste of 15 million people. One outcome of this quest is Southern California's enormous water distribution, flood control, and sewage treatment systems – the largest in the world. With chronic drought and a changing climate, it is now our generation's turn to deal with water challenges in the form of decreasing availability of imported water, serious pollution problems, an unstable economy, and rapidly changing demographics in a region that keeps on growing.

Records of water agency actions over the last century demonstrate the sometimes brilliant, sometimes unwise choices that have been made (Gagan 2008, 2009). The disregard of the "Olmstead Report," written by Frederick Olmstead and

paid for by the Los Angeles Area Chamber of Commerce in 1930, is considered by many to be the epitome of lost opportunity in our water history. While beauty, parks, and clean and ample beaches are the most celebrated aspects of Olmstead's plan, it also anticipated deliberate management of entire watersheds. This entailed protecting people and property by managing land use near our rivers, rather than channelizing waterways in concrete, as local and federal officials ultimately decided to do.

Water development in Los Angeles evolved in an almost *ad hoc* manner, following economic development and drought. In fact, the demand for more water needed to build the metropolis of Los Angeles began to exceed the natural water

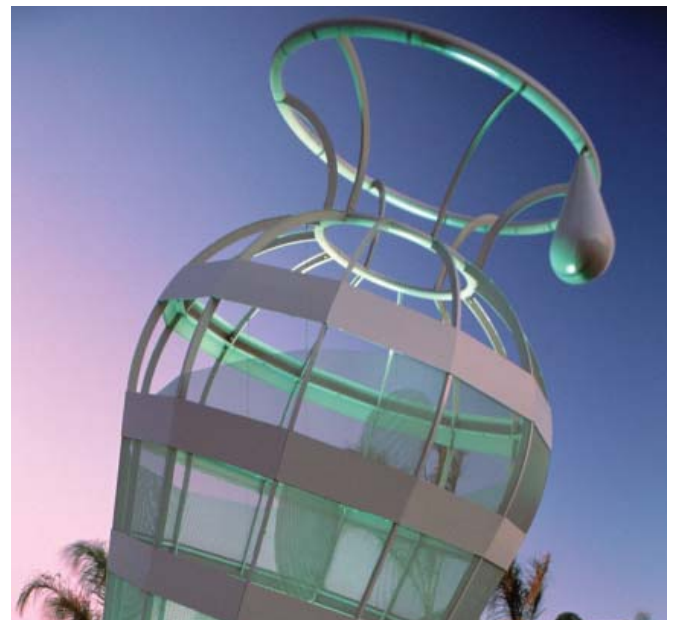


Figure 1. Cross Currents by Don Merkt, 1991



Los Angeles Aqueduct Photo: Calwest

supply in the 1860s (Mendenhall 1905). While recycled wastewater and captured storm water are beginning to be used in parts of the region, there is potential for much more and there are greater efficiencies still to be met.

The Historical Puzzle of Water in L.A.

Water management in Los Angeles County watersheds is like a giant puzzle with pieces that do not readily fit together. There is a maze of public and private entities whose origins go back, in one instance to the pueblo era and in many others to the early days of the 20th century, to when the region established itself as the agricultural capital of California.

This has led to many institutional obstacles to cohesive water resource management in Los Angeles County. One obstacle is that most individual water entities were organized over the past 100 years for singular purposes – controlling the flow of water, acquiring and distributing it, treating the wastewater after human use, or more recently, providing clean aquatic habitats. Another obstacle is that jurisdictional boundaries are political rather than hydrologic. No single water supply entity overlies a complete groundwater basin or an entire watershed, so no one entity is able to take a true watershed management perspective.

Flood control became an urgent priority during the early 1930s, when rain events devastated parts of Los Angeles and the region. The Los Angeles River and other waterways

were contained in concrete channels designed to flush flood waters quickly and directly to the ocean. Land along the banks was paved over with roads and occupied with houses and businesses, creating immediate sources of potential pollution. The pavement also diminished overall opportunities to naturally replenish groundwater in nearby porous soils.

The need to nurture growth in the midst of dwindling local ground and surface water led the City of Los Angeles to build the Owens Aqueduct in 1913 and the Metropolitan Water District of Southern California (MWD) to build the Colorado River Aqueduct in the 1940s. Referring to these two massive works of engineering, both political and physical, Dr. Stephen P. Erie observed that, “Early on, Los Angeles dealt itself nearly all the trump cards,” when it came to water supply management (Erie and Brackman 2006).

The most notable exception to Erie’s statement is the California Aqueduct, part of the State Water Project as envisioned by Governor Edmund G. Brown during the late 1960s. Operating since the early 1970s, the State Water Project remains incomplete due to the defeat of the “peripheral canal” initiative in 1982. Now under consideration by state lawmakers once again, the peripheral canal would bypass the ecologically sensitive Bay-Delta near Sacramento, where water from the north currently flows through earthquake-vulnerable levees before reaching pumps that send it south to the Los Angeles region.

Until a legislative agreement to fund and authorize the peripheral canal is reached, the amount and availability of Northern California water to Los Angeles is threatened, especially if existing levees fail because of floods or earthquakes. There would simply be no way to get water from its source, past the Delta, and to the California Aqueduct. Until 1964, groundwater was the principal water supply in the Los Angeles and San Gabriel River watersheds. Until 2007, when it was no longer available, MWD's imported water was the major source of water for recharge in most years and provided up to 60 percent of Southern California's water (Water Replenishment District of Southern California 2009). Today, despite persistent drought and reductions in supply from the State Water Project, half of all the imported water is wasted through inefficient outdoor irrigation practices in Southern California (Laird 2005).

Sewage treatment demand generally grows with the population. Over time, treated wastewater has become available for non-drinking purposes, such as landscape irrigation, through the City of Los Angeles Bureau of Sanitation and the Sanitation Districts of Los Angeles County and their contracts with water districts. The Los Angeles Regional Water Quality Control Board assures that "tertiary treated" water from sewage treatment plants is "blended" with stormwater or imported water. With declining reliable imported water available for blending, we will be able to use less and less treated wastewater, unless we invest in more advanced treatment technologies.

Furthermore, disposing of ever more treated wastewater requires construction of new outfalls into the sea, while new data on emerging contaminants fuel public concern about the environmental impacts of such disposal in the ocean environment.

Finally, we have yet to meaningfully grapple with the impacts of climate change on our various water sources. In our current mode, each separate decision by respective layers of government is a step away from the possibility of Olmstead's vision – trading it for more *ad hoc* planning and waste.

A Historic Opportunity: Watershed Authorities

Thankfully, things are beginning to change through integrated efforts. In 2002, California State Proposition 50 attempted to introduce an integrated watershed approach to water planning and spurred the voluntary establishment of multi-agency watershed management groups throughout the state. Subsequently, another ballot measure, Proposition 84, has attracted 1,600 funding applications from 128 separate entities in Los Angeles County alone. The city of Los Angeles also launched initiatives to integrate its water

supply and wastewater agency activities in 2004; fund stormwater programs through Measure O in 2005; and revitalize the Los Angeles River through a landmark public participation process in 2007.

Today, an average of 54,000 acre-feet of storm water are captured each year in the Montebello Forebay area of the Los Angeles and San Gabriel River watersheds. Yet, the potential is an additional 260,000 acre-feet, which are currently lost to the ocean (Whitaker 2008).

Pending amendments to the Central and West Coast Basin Judgments in Los Angeles County could also result in greater motivation to store stormwater in local groundwater basins. These amendments will create a legal framework and economic incentive for storing and extracting water underground from the Los Angeles Coliseum to the Orange County line. In other words, parties who infiltrate stormwater runoff will gain more than simply avoiding fines by meeting the stormwater runoff requirements of the Los Angeles Regional Water Quality Control Board. Under the amendments, storm and other water runoff may be captured on-site, measurably infiltrated into an underlying aquifer, and subsequently extracted without payment of a replenishment assessment. The economic value of an acre-foot of such water in today's market is approximately \$600.

There is great potential to expand the amount of recycled water we use as well. The City of Los Angeles, directly or through the West Basin Municipal Water District, annually recycles 37,500 acre-feet or 9.5% of its 394,800 acre-feet of treated wastewater. It plans to recycle a modest 50,000 acre-feet more by 2019. The long-term potential is actually 282,250 acre-feet (Los Angeles Department of Water and Power 2009).

The Sanitation Districts of LA County, in partnership with the Water Replenishment District of Southern California (WRD), pioneered the regulated use of recycled water for groundwater replenishment in 1962. Today, an average of 50,000 acre-feet per year of recycled water is recharged in the Montebello Forebay area, totalling 1.5 million acre-feet since 1962. Yet studies by MWD, as well as the Upper San Gabriel Municipal Water District and the WRD, demonstrate that 130,000 acre-feet of recycled water remains untapped. There is plenty of space to store water underground as well. MWD's Draft Groundwater Assessment Report, March 2007, found 695,000 acre-feet of unused storage capacity from the San Gabriel Valley to the Los Angeles County coastline.

Finally, the Santa Monica Mountains Conservancy and the Rivers and Mountains Conservancy are purchasing land along rivers in their watersheds. Both conservancies have been encouraging the involvement of water agencies, who largely control the timing, volume, and quality of water that flows through the region's rivers. This cooperation allows facilitation and investment in integrated regional planning efforts.

Achieving water sustainability in Los Angeles may hinge on our ability to restructure water management along watershed boundaries rather than traditional political boundaries. Future local, regional, and state funds should be allocated to agencies that are empowered with science and data to understand water supply, pollution prevention, and recreation and habitat needs within their watersheds. In turn, those agencies could allocate funds to other agencies for projects that meet those needs in a system of priorities, which are determined in a systematic and open manner. Empowered watershed councils could be governed by a new generation of water leaders emerging from the broad demographic and ethnic spectrum that comprises our new mainstream.

This concept would move us toward truly watershed based management and has already been attempted elsewhere. The Santa Ana Watershed Project Authority (SAWPA), which encompasses the Santa Ana River and its entire watershed across three counties, coordinates with over a dozen water supply agencies, wastewater treatment authorities, and open space conservancies. In Minnesota, 45 "watershed districts" are responsible for everything from surface and groundwater monitoring to stormwater management, water conservation, and habitat improvement (www.mnwatershed.org).

According to Christopher Lant, author of *Watershed Governance in the United States: The Challenges Ahead* (Lant 2003):

This shift in management challenges also requires an institutional transformation. If our institutions are to solve these new problems, they must move... to a system of state-facilitated, locally-led watershed management. In the absence of such strong institutions with decision making authority, watersheds become politically passive actors...

A new era of leadership and talent in water resources proceeds with the vision that appropriate management of water in the Los Angeles region will improve our quality of life. As our common quest for water continues, the transformation of the symbols of our past into the living and dynamic spaces within our watersheds is the best monument our generation can leave the next. Look around, the answers are hidden in plain sight beneath concrete, debris, and inertia.

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Adán Ortega, Jr., is a public affairs consultant with Rose & Kindel, serves as Chairman of the California State Board of Food and Agriculture's Water Committee and is a principal at Water Conservation Partners Inc.

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The Future of Water in Southern California is an Array of Locally Controlled, Reliable, Diverse, and Environmentally Sensitive Water Projects

Richard Nagel

I write this article not as the General Manager of West Basin Municipal Water District, but as a water professional with over 20 years of service in the exciting Southern California water industry. The views expressed are mine and not necessarily those of West Basin.

The mission of every Southern California water agency is to provide high-quality and reliable water in an ever-changing and very complex environment. Unfortunately, the situation is complicated by the fact that we have all the characteristics of an area that will have future water problems – an arid region, little local water supplies, reoccurring droughts, dependence on water from outside our political boundaries, and strong competition for existing supplies. This is why any dedicated water manager works long hours, weekends, and when needed, holidays to keep the water flowing here. Today, in this challenging water environment we face in-

creasing populations, the current and future droughts, regulatory restrictions, and new environmental needs that the water industry has never faced in its entire history. William Mulholland would be turning over in his grave.

Since the last major drought in the late 1980s and early 1990s, Southern California water agencies have focused on the development of local, diverse supplies. West Basin Municipal Water District (West Basin) started down that road in the early 1990s with the development of the Edward C. Little Water Recycling Facility (Figure 1) that has since been expanded four times and whose production will double again in the future. The movement to locally-controlled, reliable supplies is needed to make up for continued loss of imported water. Even when the complex and emotionally charged Bay-Delta situation is resolved years from now, the amount of water delivered to Southern California will be more predictable, but will not increase to meet growing



Figure 1. Edward C. Little Water Recycling Facility, *Photo: West Basin*

needs.

Local water sources will have to meet the water needs of our ever increasing populations and to stave off water rationing. Those new or expanded sources will include: all types of water recycling, including indirect and direct potable drinking water use (yes, sewer to tap); expanded water efficiency; groundwater storage; groundwater cleanup; brackish and stormwater cleanup; and ocean water desalination. West Basin will look at all of these new supplies to meet its current and future water needs once institutional, political, financial, and public acceptance hurdles have been cleared. West Basin is now embracing “responsible” ocean water desalination, which means that West Basin will go to great lengths to protect the ocean (Figure 2). West Basin has been protecting the ocean since the 1990s with its award winning water recycling, conservation, and public education programs. Trying to conserve water to make up for having less and raising rates to compensate is not a sustainable strategy. There is a pressing need for “wet” water supplies that can be put into

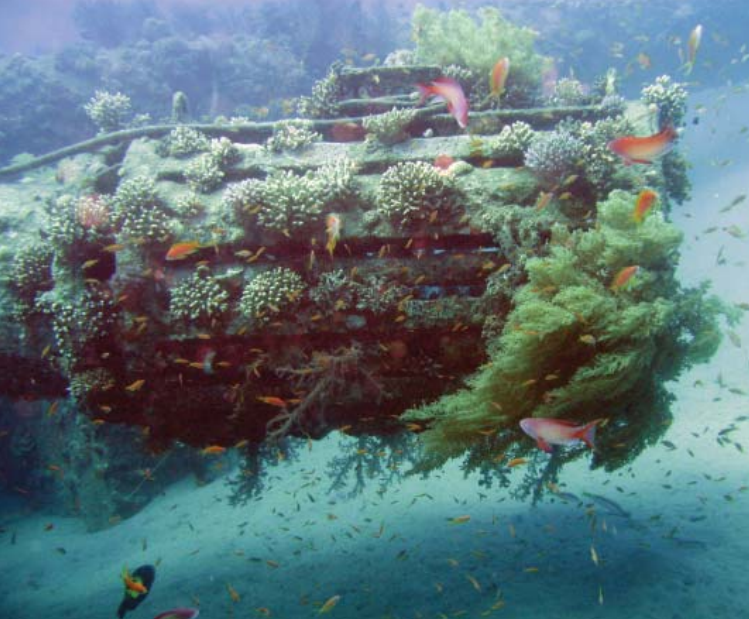


Figure 2. Desalination Intake Pipe, *Photo Silke Baron*

pipes now. Ocean-water desalination fills that need, and in the future, when the health regulations and public opinion are in place, desalination will be augmented with direct potable use of sewer water.

A recent survey (July 2009) showed that voters now view a safe and adequate supply of water as the second most important issue to them, barely behind the economy. In fact, public opinion showed voters are willing to invest in water reliability, surpassing the critical issues of public education, transportation, and public safety. Why? Metropolitan Water District's, Association of California Water Agencies', and local water agencies' public awareness campaigns, as well as new city ordinances and water rationing, have created this new paradigm and captured the public's attention.

California is the economic powerhouse and food basket of the nation and is still the most populous state in the nation because of its history of massive water development projects. Today, the historical water industry is dead or dying. We are now in an era of environmentalism and regional water projects. The future of water in Southern California is an array of locally-controlled, reliable, diverse and environmentally sensitive water projects. West Basin will be leading the way into a new water industry paradigm with its Water Reliability 2020 program, which will double its water recycling, double its water conservation, expand its public education, and add 10% of its future water supply from the ocean.

Richard Nagel has worked in the Southern California water industry for over 20 years and is currently the General Manager of the West Basin Municipal Water District.

Water Recycling Can Finally Grow to Maturity with Concerted Effort by Stakeholders and Educated Public

Stephen Maguin

“The Board of Engineers recommends that the Board of Supervisors take the following action: Approve the feasibility of the reclamation of usable water from the spent and waste waters flowing in the sewerage system of the County Sanitation Districts of Los Angeles County, and adopt a policy looking toward such reclamation.”

From the Report Upon the Reclamation of Water From Sewage And Industrial Wastes in Los Angeles County, California, April 1949.

So began an astute report prepared sixty years ago by the Sanitation Districts' Chief Engineer, the County Engineer & Surveyor, and the Chief Engineer of the Los Angeles County Flood Control District. This report laid the groundwork for a regional wastewater system designed to recycle water from sewage. It contained the fundamental framework that is still relevant today as we plan for the next generation of water recycling projects and set the groundwork for interagency collaboration to bring together the available resources and specialized expertise. Importantly, this report was initiated long before the need became as acute as it is today. Even more importantly, the Sanitation Districts acted on that original planning document. A regional system was designed to implement the basic concept of directing the less salty wastewater to a system of upstream water reclamation plants, while sending the saltier wastewater to a large treatment plant in Carson, which discharges to the major “salt sink” for this arid region – the Pacific Ocean.

Though not highly publicized, these local agencies have long worked together on both local and regional scales to serve the water needs of the region's burgeoning population. An excellent example of this regional cooperation, as noted by Ortega and Gagan (Page 5), is the Montebello Forebay groundwater recharge project. Almost 50 years ago, the Los Angeles County Flood Control District, the Water Replenishment District of Southern California, and the Sanitation Districts began working together to replenish groundwater supplies using locally captured stormwater,



Figure 1. Aerial View of Rio Hondo Spreading Grounds, Montebello, CA, *Photo: Sanitation Districts of Los Angeles County*

recycled water, and imported water (Figure 1). In addition to the 1.5 million acre-feet of recycled water that have supplemented our groundwater supplies as a result of this project, the Sanitation Districts also work with dozens of cities and water agencies to supply over 570 sites with recycled water for municipal and industrial uses.

The question facing us today is how we move beyond our past accomplishments to bring to fruition the next generation of water recycling projects that will reuse even more wastewater. The answer lies not in another layer of government, such as creation of “super-watershed councils” empowered to make all water-related decisions in each watershed. Rather, we must continue to build partnerships between existing institutions that recognize our collective strengths. In recent years, the Greater Los Angeles Integrated Regional Water Management Planning Group has come together to identify and encourage regional cooperation and collaboration on multi-benefit projects. This group, as well as others in the Los Angeles region, continues to foster new alliances as well as build bridges across the traditional “silos” within which Los Angeles County’s public infrastructure agencies are often accused of operating.

Without a doubt, the current drought and constraints on imported water supplies pose major challenges for the region, but these pressures on existing water supplies are also

creating opportunities. To address the dwindling availability of our water supplies, the feasibility of several new large-scale, inter-agency recycled water projects is currently being explored. The San Gabriel Valley and Upper San Gabriel Valley Municipal Water Districts, Water Replenishment District, and Sanitation Districts are working towards an integrated, regional recycled water project known as the Groundwater Reliability Improvement Program (GRIP). This project is intended to replace nearly 50,000 acre-feet per year of imported water with advanced-treated recycled water, to recharge the Central and Main San Gabriel Groundwater Basins. The Sanitation Districts, in partnership with the Metropolitan Water District, have also begun investigating the feasibility of a much larger project involving advanced treatment of a major portion of the wastewater that is currently discharged to the ocean. These projects represent a potentially substantial new supply of clean, safe drinking water that will provide the region with increased independence from our increasingly unreliable imported water sources.

Because the scale of new recycled water supply development being contemplated far exceeds the potential irrigation and industrial demand in the region (in addition to the high cost of building extensive purple pipe distribution systems), future recycled water use in Los Angeles County must necessarily involve more potable reuse projects. Potable reuse projects

are regulated by the Regional Water Quality Control Board and the California Department of Public Health, but formal regulations have not yet been promulgated. To streamline the already lengthy process of developing new recycled water projects, the California Department of Public Health must move forward to promulgate final groundwater recharge regulations, as well as begin rapid development of regulations for other types of potable reuse projects. The State and Regional Water Boards must provide a regulatory framework that permits the discharge of the brine, which results from advanced treatment of recycled water for potable reuse, to the ocean through existing outfalls without the need for further treatment or blending.



Figure 2. Reverse Osmosis Membranes at the Leo J. Vander Lans Water Treatment Facility, Long Beach, CA, *Photo: Water Replenishment District of Southern California*

Moreover, the biggest barrier to achieving our goals is not the lack of suitable institutions, but the need for large amounts of capital investment to be brought to bear at the same time that the region's decades-old water, wastewater, and flood management infrastructure all require major investments. To be sure, the comparative cost and scarcity of other sources of water are key drivers for new interest in development of local water resources, such as stormwater and recycled water. Nonetheless, even with those drivers, state and federal assistance with capital costs is imperative to encourage the timely development of this new green infrastructure.

As alluded to by Ortega and Gagan, the next generation of recycled water projects will require new investments in advanced treatment technologies or hundreds of miles of additional purple pipe distribution systems throughout the Los Angeles Basin. As we reach not for the “low-hanging fruit,” but for the much more difficult projects, it will be far more expensive to build this infrastructure (Figure 2). Key to this endeavor is an increase in funding and prioritization of these types of water recycling projects in any new state water bonds and federal funding programs. Also, the region's local agencies must work together cooperatively, as opposed to competing against each other for funding. This would garner an increased share of state and federal funds that is more commensurate with the size of our population than recent years' allocations for the Los Angeles region have reflected.

In addition to creating a more predictable regulatory framework and obtaining supplemental funding, the final major challenge that must be faced is whether the public is ready to accept potable reuse of recycled water on an unprecedented scale. With California's population continuing to grow and climate change likely to reduce Southern California's available drinking water supplies even more than current constraints, in reality there may be little choice. I am confident that, with concerted efforts by a wide array of stakeholders and the support of an educated public, water recycling can finally grow to maturity and fulfill a substantial portion of the future water needs of this region.

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