

Orange County Water Sustainability: Who Cares?

SUMMARY

When you woke up this morning, used the bathroom, brushed your teeth and brewed your coffee or tea, did you have water? Yes? Think about how fortunate you are? Do you know where that water comes from and how far it must flow to be available to you? How would drought, earthquakes or terrorism impact the delivery of safe water for your use? And the cost – is it reasonable?

The Grand Jury studied the current water supply sources, quantities available and projections of future water needs, visited water storage facilities, dams, pumping stations and aqueducts, as well as examined budgets for maintenance of existing facilities and construction of new facilities.

There is no agency that is specifically responsible for water policy in Orange County; however, there are two agencies (the Municipal Water District of Orange County (MWDOC) and the Orange County Water District (OCWD)) that do work with all the water retailers in Orange County to ensure that all are heard before changes are made regarding imported water policy and the use and recharging¹ of groundwater.² This process appears to be working well as Orange County has been importing less water and groundwater is being efficiently recharged enabling water retailers to have more water available for their use. Water conservation has also played an important role in reducing the total amount of water used in Orange County.

REASON FOR STUDY

The Grand Jury is concerned that most Orange County residents are uninformed about where their water comes from and what needs to be done now to ensure that sufficient water is available in the future to avoid rationing and higher costs.

The Grand Jury initiated this study to inform the public about the sustainability of their water supply and what needs to be done in the future to keep the tap running. California Assembly Bill 685 (AB 685), as part of the State Water Code, mandates water for domestic purposes must be of the highest quality. Additionally, Section 106.3 of the State Water Code further proclaims that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.”

In addition to examining the sustainability and quality of water, the 2012 – 2013 Orange County Grand Jury also evaluated the efforts of two major water agencies in Orange County, MWDOC and OCWD. They provide and manage the water resources (imported and groundwater) for local water retailers. This study intends to provide an insight into these two major agencies.

¹ A process by which rainwater (precipitation) seeps into the groundwater system.

² The supply of fresh water found beneath the Earth’s surface (usually in aquifers), which is often used for supplying wells and springs.

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METHOD OF INVESTIGATION

The Grand Jury used the following resources for this report

Water Trips and Tours

- Inspection Trip of the State Water Project and the Sacramento-San Joaquin Delta (Oct. 26-27, 2012)
- Tour of Rancho Santa Margarita Water District including the Upper Chiquita Reservoir (Jan.4, 2013)
- Tour of MWDOC Pilot De Sal Project in Dana Point (Jan.16, 2013)
- Tour of Laguna Water District (Jan.16, 2013)
- Tour of OCWD Water Replenishment System (Jan. 29, 2013)
- Inspection Trip of the Colorado River Aqueduct³ (Feb.1-2, 2013)

Meetings and Conferences

- CalDesal, 1st Annual Desalination Conference (Oct.29, 2012)
- Public Affairs/Water Use Efficiency (WUE) Joint Workgroup (Nov.1, 2012)
- Meeting between MWDOC and the Orange County Grand Jury Members of the Environmental and Transportation Committee (Mar. 14, 2013)

Interviews

- Upper Management MWDOC (Oct. 26, 2012)
- Professor and Director of Civil and Environmental Engineering Urban Research Center, the Henry Samueli School of Engineering, University of California, Irvine (Dec. 6, 2012)
- Upper Management Rancho Santa Margarita Water District (Jan. 4, 2013)
- Principal Engineer MWDOC (Jan. 16, 2013)
- Upper Management Laguna Beach County Water District (Jan. 16, 2013)
- Communications Manager, Mesa Consolidated Water District (Jan. 23, 2013)
- Member, Board of Directors Metropolitan Water District of Southern California (MWD) (Feb.1, 2013)
- Various Directors who also represent MWDOC on MWD Board of Directors, Upper Management of MWDOC (Mar.14, 2013)

Research

- Water facts and statistics supplied by MWDOC about Member Agencies including the following: water rates, financials, sources of revenue, Orange County water sources in 2035, today's sources of water per each member water district, use of tiered rates in Orange County, water consumption

³ An Aqueduct is a canal used to carry water from a great distance.

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and population, water storage update, South Orange County Water Reliability Study Update, and South Orange Coastal Ocean Desalination Project Status Update Jan., 2013

- 2010 Urban Water Management Plan, June 2011
- System and Supply Reliability, Rancho Santa Margarita Water District
- Cadiz, Inc.com/water-project
- San Bernardino County, Sentinel, “Opposition Forms Against Sending Desert Water to Orange County”
- Orange County Water Summit Congressman, Tom McClintock, representing the 4th District, May 20, 2011
- Sierra Club of Los Angeles Chapter Water Committee, July 2011
- Lecture on the Looming Global Crisis: Water Scarcity (Sept. 29, 2012)
- Various Web Sites of Orange County Water Districts
- Orange County Coastkeeper,⁴ “Huntington Beach Desalination”
- Poseidon Resources
- “Two More Favorable Decisions Move Poseidon’s Desalination Project Forward”
- “The Role of Desalination in Meeting California’s Water Needs”, Jerry Johns, Deputy Director, California Department of Water Resources, Jun. 15, 2006
- Kahrl, William, Floods, Droughts and Lawsuits; A brief History of California Water Policy, Water, and Power
- California State Water Project Contractors’ website
- History of the California water Project website
- Various Water Articles,” LA Times”
- Various Water Articles, “Orange County Register”
- 2010-2011 Engineer’s Report on the Groundwater Conditions, Water Supply and Utilization in the Orange County Water District, February 2012

2012 – 2013 Orange County Grand Jury Questionnaire to OC Board of Supervisors

- Questionnaire response received from all supervisors

ACRONYMS

AF – Acre Foot

BDCP – Bay Delta Conservation Plan

CVP – Central Valley Project

GWRS – Ground Water Replenishment System

IRWD – Irvine Ranch Water District

MWD (MET) – Metropolitan Water District of Southern California

MWDOC – Municipal Water District of Orange County

O&M – Operation and Maintenance

⁴ A local environmental group

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OCWD – Orange County Water District
OCSD – Orange County Sanitation District
RA – Replenishment Assessment
RTS – Readiness-to-Serve
SMWD – Santa Margarita Water District
SOCOD – South Orange County Ocean Desalination Project
SWP – State Water Project
WUE – Water Use Efficiency

BACKGROUND AND FACTS

A review of the history of water in California is provided in this section for the reader to better understand the various agencies involved, how these agencies came about, and the laws by which they must abide. In dealing with Orange County water policy, there are three major agencies: MWD, MWDOC, and OCWD.

MWD imports water into Southern California. MWDOC is the wholesaler that provides imported water to the water retailers (water districts and most municipal water departments). OCWD is responsible for groundwater within Orange County.

History of Water in California

California has a very complex and diverse range of climates. Variations in rainfall are large as annual totals range from less than 25 percent to more than 200 percent of average. Consequently, water has always been a major topic of concern and debate in not only the State of California but in Orange County as well.

The Spanish settled Alta⁵ California in 1769. They divided the lands into missions, pueblos, and ranchos and established the first system of water rights. Following the U.S.-Mexican War in 1848, the Treaty of Guadalupe Hidalgo recognized all property rights established under Spanish and Mexican law. Spanish law did not give water rights to the more than 800 ranchos created before the United States acquisition of California. The ranchos or the pueblos did not significantly change California's native waterscape.⁶

What did change California's native waterscape was the 1848 discovery of gold. With the discovery of gold, thousands of immigrants changed the state's nature and the way water resources were used. California's population grew from 10,000 non-natives to 100,000 non-natives in just one year. By 1900, California's population was more than 1.5 million.

Growth in population was not the only factor that influenced how water would be used, but as the easy gold was panned and mined out, the miners found that they had to move water from the rivers to the gold. These miners diverted water from streams in

⁵ Alta means upper

⁶ Source: Kahrl, William L.: *Floods, Droughts and Lawsuits: A Brief History of California Water Policy, Water and Power*, 1982.

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the gold country and then used pressurized water to blast away hillsides. This first large-scale effort to industrialize California's water resources had huge consequences on the economy, environment and laws that govern water.

In 1855, the California Supreme Court decided whether the miners' rule of "prior appropriation"⁷ or the common law doctrine of "riparian rights"⁸ should apply to water. They decided in *Irwin v. Phillips, et al* 5 Cal. 140 (1855) to adopt the rule of "prior appropriation" as the law of the state, and over time, this became the dominant form of water rights. In other words, the principle of "first-in-time, first-in-right" decided who would receive water.⁹

The first investigation of California's water resources began in 1873. President Ulysses S. Grant commissioned an investigation by Colonel B. S. Alexander of the U.S. Army Corps of Engineers. He surveyed the Central Valley's irrigation needs and recommended development of the Sierra watersheds.

By the 1880's, the environmental and economic problems caused by gold mining were recognized. In *People v. Gold Run Ditch and Mining Company*, 66 Cal. 151 (1881), hydraulic mining was prevented in the watershed of the North Fork of the American River. At the same time, tension grew between riparian water users and appropriation water users. In 1886, *Lux v. Haggin*, 89 Cal.255 (1886) (one of the great legal cases in California history) decided that appropriative rights would continue to exist but would be inferior in priority to the rights of the riparians. This decision also held that disputes between riparians would thereafter be decided on the basis of reasonable use. This became the cornerstone of California water law. In 1887, the legislature enacted the Wright Act, which authorized the formation of irrigation districts with the power to acquire water rights, to construct water projects, to sell bonds, and impose property assessments. By the early 20th century, irrigation districts were successfully established throughout the state.

As Central Valley agriculture continued to expand, farmers turned to aquifers¹⁰ as a source of water. Conflicts between surface and groundwater users followed. The California Supreme Court handed down an opinion in *Katz v. Walkinshaw*, 141 Cal. 116 (1903), which said that "absolute ownership" of groundwater was no longer compatible with California's hydrologic and economic conditions. It also said that the overlying landowners would have first claim to the available groundwater.

By 1900, Los Angeles had exhausted its local sources of water. Mayor Eaton appointed William Mulholland to be the chief engineer of the new Los Angeles

⁷ The right of water is based on actual use and not ownership of the land.

⁸ A doctrine of State water law under which a land owner is entitled to use the water on or bordering his/her property, including the right to prevent diversion or misuse of upstream water. Riparian land is land that borders on surface water.

⁹ Source: Kahrl, William L. *Floods, droughts and lawsuits: A Brief History of California Water Policy, Water and Power*, 1982.

¹⁰ A natural underground layer of porous, water-bearing materials (sand, gravel, rock) usually capable of yielding a large amount or supply of water.

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Department of Water and Power. By 1905, he had acquired almost all riparian land and water rights in the Owens Valley, including the Reclamation Service's planned reservoir site. On November 5, 1913, the first Owens River water was pumped into the San Fernando Valley. Twenty years later, the population of Los Angeles was 1.2 million and Los Angeles needed more water. The Metropolitan Water District of Southern California (MWD) was formed by the Act of California legislature in 1927 and incorporated December 6, 1928. Today, it is made up of 26 agencies serving the 19 million people of Los Angeles, Orange, San Diego, Riverside, and San Bernardino Counties.¹¹

By 1933, Los Angeles had acquired most of the remaining private land in the Owens Valley and began pumping groundwater. The Los Angeles voters approved a bond to extend the aqueduct into the Mono Basin. Over the next four decades, the City's diversion of water ultimately set the stage for the California Supreme Court's recognition of the public trust as a fundamental limit on the exercise of water rights.

Michael Maurice O'Shaughnessy was commissioned by the mayor of San Francisco to construct a dam and divert water high in the watershed at the mouth of the Hetch Hetchy Valley. However, Hetch Hetchy Valley was part of Yosemite National Park. After much contention, led by John Muir and the Sierra Club, San Francisco prevailed and the Raker Act (1913) was passed. This allowed San Francisco's use of Hetch Hetchy Valley as a reservoir. This act planted the seeds of the environmental movement that would play a major role in California water policy during the latter decades of the 20th century and the beginning of the 21st century. Today, surface water appropriations initiated after 1914 must be authorized by a water rights permit or license.

In 1926, *Heminghaus v. Southern California Edison* 200 Cal.81 (1926), the California Supreme Court held that downstream riparians were entitled to the unimpaired flow of the San Joaquin River. This decision resulted in the 1928 amendment of the California Constitution that changed California water law in four ways:

- It declared the doctrines of reasonable and beneficial use to be the foundation of all water rights in California.
- It stipulated that the requirement of reasonable use could be asserted in all water rights disputes.
- It invested all branches of government with significant authority to implement the mandates of reasonable and beneficial use.
- It laid the legal foundation for the statewide water projects that were on the drawing boards.¹²

The Boulder Canyon Project In 1928, Congress authorized the building of Boulder Dam, a 726-foot dam at Boulder Canyon. Later the dam's name was changed

¹¹ Inspection Trip Colorado River Aqueduct, Feb.1-2, 2013,booklet "About MWD"

¹² Source: Kahr, William L.: *Floods, Droughts, and Lawsuits: A Brief History of California Water Policy*, Water and Power, 1982.

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to Hoover Dam. The dam created a 28 million acre-foot (AF)¹³ reservoir (Lake Mead). The statute provided additional political support for construction of the Imperial Dam and All-American Canal, Parker Dam, and the Colorado River Aqueduct. Arizona opposed the construction of Parker Dam. It took 50 years and a decision by the United States Supreme Court in *Arizona v. California* (1963) for the Colorado River Basin Project Act of 1968 to be approved and completion of the Central Arizona Project in 1982 to bring Arizona into compliance. The water provided by the Boulder Canyon Project's All-American Canal sustained farms in the Imperial Valley. It also fueled the rapid growth of cities within the MWD during and after World War II.

The Central Valley Project (CVP)¹⁴ Robert Marshall, a retired U.S. Geological Survey hydrologist, presented a plan for a statewide scheme of reservoirs and aqueducts to bring water from the Sacramento River to the San Joaquin Valley and divert water from the Kern River to Southern California.¹⁵ The Marshall Plan became the basis for California's preliminary plan for water in 1924 and the first State Water Plan of 1930 under the direction of State Engineer, Edward Hyatt. In 1933, the legislature authorized the Central Valley Project (CVP). Today, the CVP manages roughly 7 million AF of water annually. It is the largest water purveyor in California and is probably the most controversial. However, the 7 million AF of water was not enough for municipal and industrial users whose demands for water exceeded those of their agricultural neighbors.

State Water Project (SWP) California experienced a second economic "gold rush" after World War II ended in 1945. People flocked to California, attracted by climate, new jobs, businesses and housing developments. The increased population made it clear that local water supplies would not meet future needs. In 1945, the California legislature authorized an investigation of statewide water resources. The idea of a SWP began when the Legislature passed the State Water Resources Act. This act created the Water Resources Board. The board reported that 40% of harvestable water in California's rivers was allowed to flow unused to the Pacific Ocean. The board completed studies that culminated in the Feather River Project which was presented to the Legislature in 1951 by State Engineer, A.D. Edmonston. The water system that emerged would parallel the CVP. The capstone of this project was the 3.5 million AF Oroville Reservoir on the Feather River. Water was then pumped from the Southern Delta into the California Aqueduct.

The approval of the SWP did not come easily. There was much contention between the MWD and the San Francisco Bay area and Delta residents. Special committees met to draft a constitutional amendment that would satisfy everyone. Out of this emerged the Burns-Porter Act. Under this act the County of Origin and Watershed of Origin Acts were reaffirmed. For Southern California, it contained guarantees of

¹³ One acre-foot = 325,851 U.S. Gallons

¹⁴ Federally owned aqueduct carrying water from Northern California to regions in Los Angeles.

¹⁵ Source: Kahrl, William L.: *Floods, Droughts, and Lawsuits: A Brief History of California Water Policy, Water and Power*, 1982

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water, including contracts for firm water supplies that future legislatures could not change. It also guaranteed funds to pay for the facilities to deliver water to Southern California and funds to construct only facilities specified in the act and no others. After the legislative passage of the Burns-Porter Act and the voters' approval of the bond issue, construction started on the Project. First water deliveries began in 1970.

Existing Sources of Water in Orange County

Cities in Orange County, like most other places, were originally settled near flowing water supplies. As the cities grew and their water needs increased, water wells allowed growth to other areas further from flowing water. Orange County today relies on **imported water** from Northern California and from the Colorado River Aqueduct and **groundwater** from local wells for the majority of its potable¹⁶ water.

The majority of **imported water** in Orange County is available from the MWD through MWDOC. The majority of Orange County **groundwater** is made available and managed by the OCWD, which is a member water district of MWDOC. See Figure 1 for a relationship among MWD, MWDOC, OCWD, and Orange County local water districts and cities for imported and groundwater distribution.

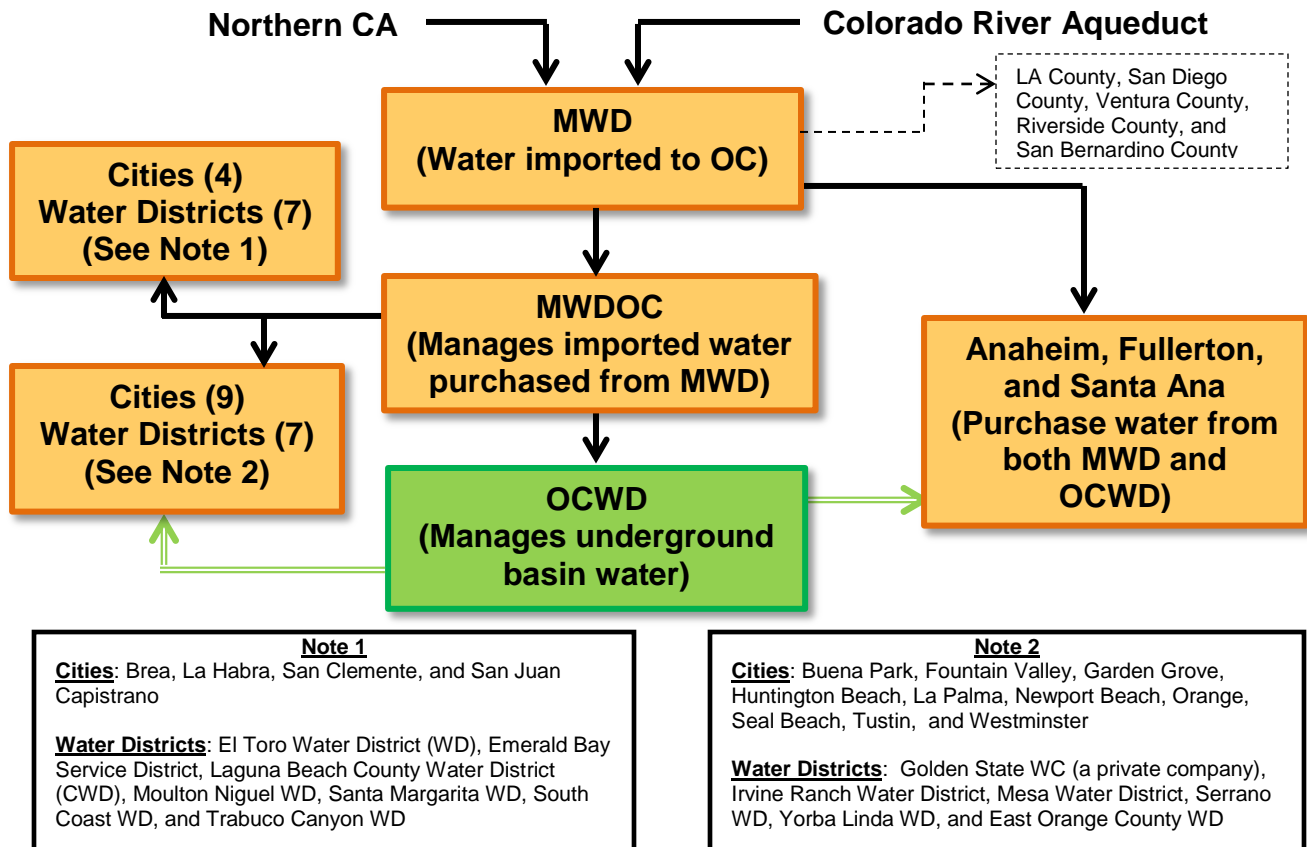


Figure 1 Relationship among MWD, MWDOC, OCWD, OC local water districts and cities

¹⁶ Water that is safe and satisfactory for drinking and cooking.

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Metropolitan Water District of Southern California (MWD) The MWD is a regional wholesaler that delivers water to 26 member public agencies serving 19 million people living in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties. It is governed by a 37-member board of directors representing the 26 member agencies consisting of 14 cities, 11 municipal water districts and one county water authority, which collectively serve the residents and businesses of more than 300 cities and numerous unincorporated communities.

The mission of MWD is to provide its 5,200-square-mile service area with adequate and reliable supplier of high-quality water to meet present and future needs in an environmentally and economically responsible way.¹⁷

To supply Southern California with reliable and safe water, MWD owns and operates an extensive range of capital facilities including the Colorado River Aqueduct, 16 hydroelectric facilities, nine reservoirs, nearly 1,000 miles of large-scale pipes and five water treatment plants. Four of these treatment plants are among the 10 largest plants in the world. In fact, MWD is the largest distributor of treated drinking water in the United States.¹⁸

As shown in Figure 1, the MWD imports water from the Colorado River Aqueduct and Northern California (via the State Water Project) to supplement local supplies, and helps its member agencies develop increased water conservation, recycling, storage and other local resource programs.

Municipal Water District of Orange County (MWDOC) As stated previously, MWDOC was formed in 1951. It is a wholesale water supplier and resource planning agency that serves all of Orange County (except Anaheim, Fullerton, and Santa Ana) through 28 retail water agencies. Local water supplies meet nearly half of Orange County's total water demand. To meet the remaining demand, MWDOC purchases imported water – from Northern California and the Colorado River Aqueduct – through MWD and distributes it to MWDOC member agencies, which provide retail water services to the public. It plays a pivotal role by working with all of its member agencies to ensure adequate water is available for Orange County residents.

Figure 2 shows MWDOC's service area, which covers all of Orange County, with the exception of the cities of Anaheim, Fullerton, and Santa Ana.

¹⁷ Inspection trip of Colorado River Aqueduct, Feb. 1-2, 2013.

¹⁸ Inspection trip of Colorado River Aqueduct, Feb. 1-2, 2013.

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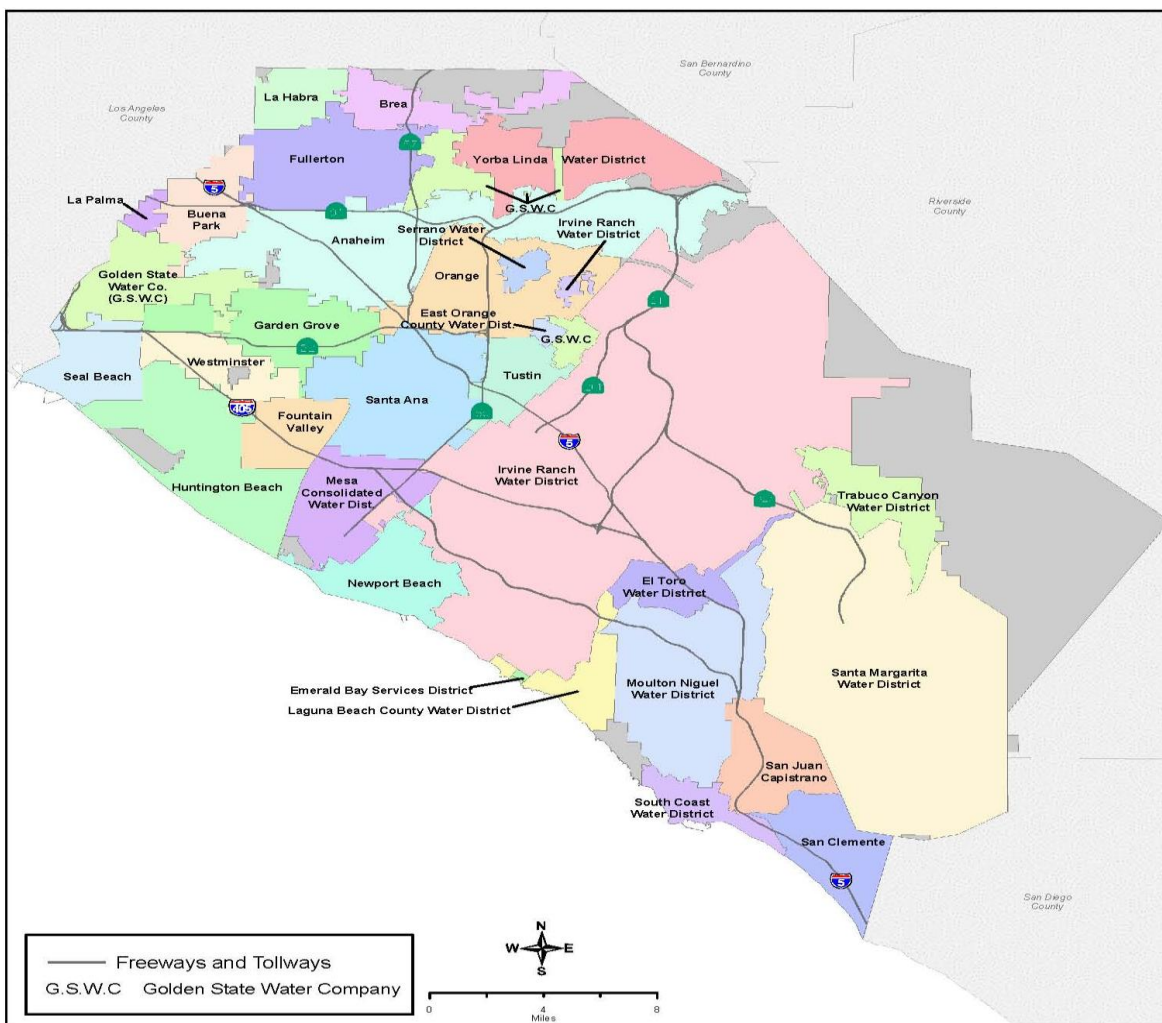


Figure 2 MWDOC Service Areas

Image Source: MWDOC Website

Orange County Water District (OCWD) The Orange County Water District had its beginning in 1933. The newly formed Orange County Water District covered more than 163,000 acres and was authorized “to represent the water users and landowners of the Coastal Plain in all litigation involving outsiders.”¹⁹ In the previous decade, water levels had dropped. Artesian wells, once common in Tustin, Irvine and Fountain Valley, had gradually disappeared. The Santa Ana River was carrying less water into Orange County due to below-average rainfall and upstream storage and operations.

In the early years of the District, above-average rainfall (1937 to 1944) created bountiful run-off²⁰ for recharge²¹ of the groundwater. The District Act did not adjudicate

¹⁹ Source: Orange County’s Groundwater Authority: Orange County Water District, Historical Information.

²⁰ The part of precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving waters.

²¹ Process by which rainwater (precipitation) seeps into the groundwater system.

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the groundwater basin,²² consequently, users could pump as much water as needed from the basin. Problems resulted because the users did pump as much water as they wanted. OCWD wanted to fulfill its mandate to protect the groundwater basin from depletion.

As OCWD entered its second decade, a drought that began in 1945 (relieved by only two wet years) lasted until 1969, bringing issues to the groundwater basin. Some wells along the coast began producing brackish water;²³ groundwater levels dropped to 15 feet and ocean water moved into the aquifers. The District then turned to the MWD to supply water for basin replenishment. The cost of importing water for replenishment of the basin water proved to be so expensive that the District was not able to complete the mission. In 1954, OCWD implemented a Replenishment Assessment to generate revenues to allow the purchase of greater amounts of imported water. The cost to purchase the amount of imported water from MWD was finally apportioned to all pumpers in the District's service area. Now OCWD had the means to reverse the trend of groundwater depletion. Between 1956 and 1964, the replenishment program outpaced the rate of extraction by a wide enough margin to bring groundwater storage to 24 feet above sea level.

OCWD has grown more extensively and rapidly than anyone could have anticipated in 1933. Now the District covers well over 200,000 acres and serves a population of more than 2.4 million. Today, less than 4 percent of water is used for agricultural purposes. With new technologies and exciting research opening doors daily and with people more aware of conservation of water, perhaps, we can look to the future with confidence. See Figure 3 for OCWD service area.

²² A groundwater reservoir defined by the entire overlying land surface and the underlying aquifers that contain water stored in the reservoir. Boundaries of successively deeper aquifers may differ and make it difficult to define the limits of the basin.

²³ Mixed fresh and salt water

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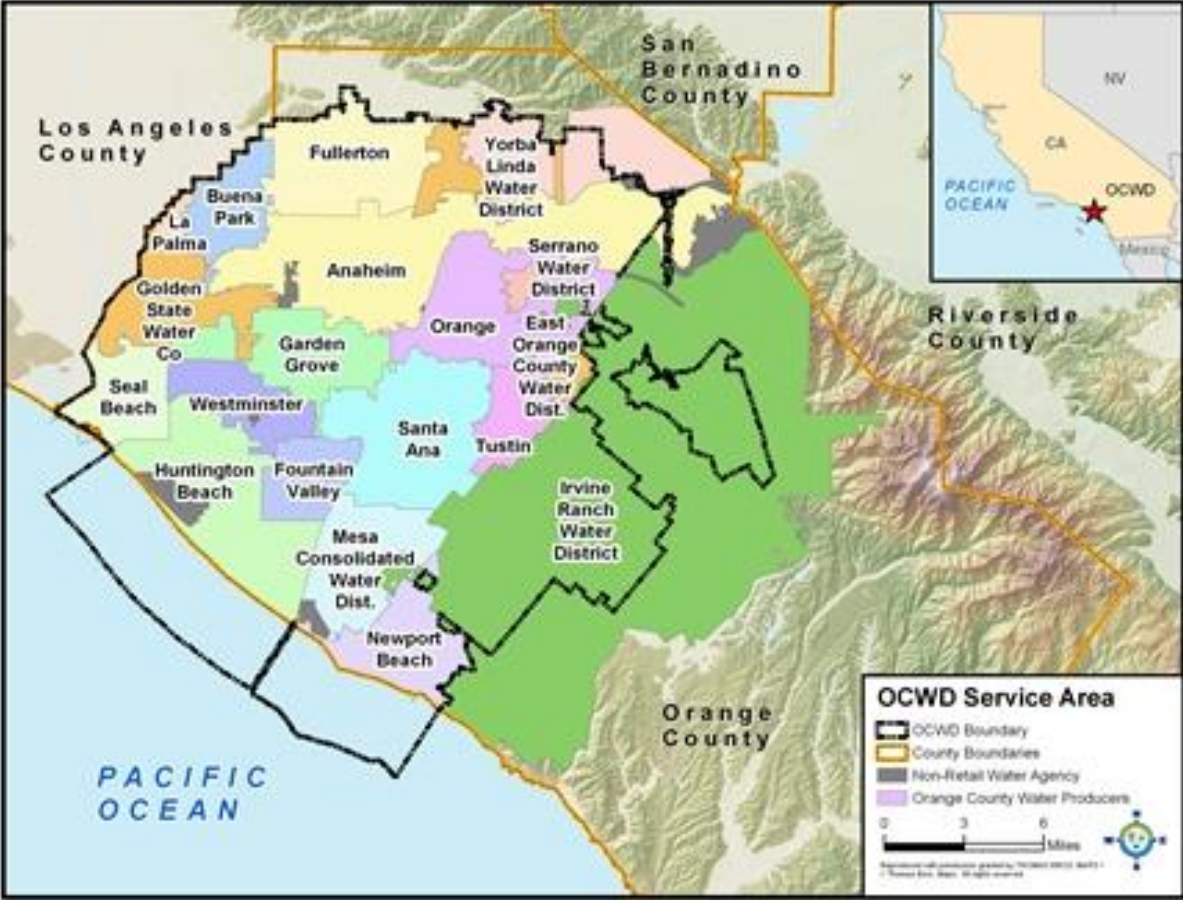


Figure 3 OCWD Service Areas

Image Source: OCWD Website

For the percentages of imported and groundwater for retail suppliers’ water in Orange County, see Table 1. (Note: Table1 Information provided by MWDOC on 21 March 2013)

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Table 1
RETAIL SUPPLIERS' WATER SOURCES, FY 2011-12
Source of Water, %

Retail Water Supplier	Metropolitan Water [1]	Ground Water	Surface Water	Recycled / Non-Potable Water [2]	Total	Comments
1 Anaheim, City of	46%	54%			100%	
2 Brea, City of	33%	67%			100%	
3 Buena Park, City of	35%	65%			100%	Including C.U.P pumping
4 East Orange CWD Retail Z	38%	62%			100%	
5 El Toro WD	96%	N/A		4%	100%	
6 Emerald Bay Serv. Distr.	100%	0%			100%	
7 Fountain Valley, City of	47%	41%		12%	100%	
8 Fullerton, City of	37%	63%			100%	692.7 AF of "In-Lieu" including under MWD
9 Garden Grove, City of	32%	68%			100%	
10 Golden State WC *	37%	63%			100%	
11 Huntington Beach, City of	35%	65%			100%	
12 Irvine Ranch WD	21%	51%	4%	24%	100%	
13 La Habra, City of	21%	79%		0%	100%	
14 La Palma, City of	35%	65%			100%	
15 Laguna Beach CWD	100%	0%			100%	
16 Mesa WD	37%	58%		5%	100%	Colored water (redwood-tinted amber water) included with groundwater
17 Moulton Niguel WD	82%	N/A		18%	100%	
18 Newport Beach, City of	35%	65%		<1%	100%	
19 Orange, City of	50%	45%	5%	0%	100%	
20 San Clemente, City of	90%	2%		8%	100%	
21 San Juan Capistrano, City	46%	49%		5%	100%	
22 Santa Ana, City of	32%	68%		<1%	100%	
23 Santa Margarita WD	83%	0%		17%	100%	
24 Seal Beach, City of *	37%	63%			100%	
25 Serrano WD	N/A	59%	41%		100%	
26 South Coast WD	77%	13%		10%	100%	Includes the South Laguna service area.
27 Trabuco Canyon WD	60%	16%	2%	22%	100%	
28 Tustin, City of	37%	63%			100%	Metropolitan source includes the In-Lieu program, otherwise, it would be 22%
29 Westminster, City of	37%	63%			100%	
30 Yorba Linda WD	52%	48%			100%	

[1] Metropolitan Water District of Southern California (known as MWD) imports water to Southern California from the Colorado River Basin and from Northern California. Long-Term "In-Lieu" water deliveries that indirectly replenish aquifers are counted here as MWD water, and are not counted as Groundwater, unless indicated otherwise.

[2] Recycled municipal wastewater and/or Non-Potable surface or ground water.

C.U.P: In the Conjunctive Use Program, MWD stores water in the groundwater basin. The storage may be accomplished by "In-Lieu" deliveries.

n.r.: No response was received for this item.

* This agency did not respond with any data for this table. Previous year's information is shown.

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2012-13 Groundwater and Imported Water Production Costs for Non-Irrigation Use

The estimated cost for groundwater production for a large groundwater producing entity such as a city water department or a water district in OCWD service area is presented in Table 2.²⁴

Table 2 Estimated 2012-13 Water Production Costs

Non-Irrigation Use	Groundwater Cost (\$/AF)
Fixed Cost	
Capital Cost	56.00
Variable Cost	
Energy	64.00
Proposed Replenishment Assessment (RA)	266.00
Operation and Maintenance (O&M)	57.00
Total Cost to Producers	443.00

The total cost to produce an AF of groundwater in 2012-13 is estimated to be \$443. This is based on a survey conducted by OCWD in fall 2011 of nineteen large groundwater producers. The capital cost component (\$56 per AF) was derived using the available actual project cost data for eight production wells constructed in 2008 under the MWD Long-Term Groundwater Storage Program and adjusted using the Engineering News-Record Construction Cost Index. It is based on 2008 average cost for design and construction of a production well (excluding land cost) under the MWD Long-Term Groundwater Storage Program (cost amortized over 30 years at 5 percent interest). The energy cost (\$64 per AF) is based upon the quantity of groundwater pumped. The OCWD RA cost is the estimate of the proposed RA for 2012-13. O&M costs ranged from \$23 to \$259 per AF with a median cost of approximately \$57 per AF. Elements that influence these costs include load factors and variations in groundwater levels. Recent wells are generally deeper than those drilled decades ago. Based on the survey, the average load factor (which indicates the percent-of-use of an extraction facility) equaled 47 percent.

Imported water is supplied to OCWD's service area by MWD through MWDOC, which delivers both treated and untreated water. There are several categories of water available from MWD. The categories most applicable to this comparison are "full-service water and "In-Lieu water", and untreated water (referred to as "replenishment water"). Treated water is used directly by various groundwater producers for municipal and industrial purposes, while untreated water is used by OCWD for groundwater replenishment. Table 3 shows the estimated costs for MWD treated water category for 2012-13 water years.

²⁴ Source: 2010-2011 Engineer's Report on the Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District.

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Table 3 Estimated 2012-13 Imported Water Costs (See Note 1)

Rate and Charge Components	Treated Water Rates (\$/AF)
Firm Deliveries	Full Service Water
MWD Supply Rate (MWDOC Melded Rate)	140.00
MWD System Access Rate	223.00
MWD System Power Rate	189.00
MWD Water Stewardship Rate	41.00
MWD Treatment Surcharge	254.00
MWD Readiness-to-Serve and Capacity Charges (See Note 2)	80.00
MWDOC Surcharge	3.25
Total	930.25

Note 1: Rates are an average of calendar year 2012 and proposed calendar year 2013. Imported water costs for MWD's member agencies (i.e., Anaheim, Fullerton, and Santa Ana) are not reported here due to the variability among these agencies on water supply allocations between MWD's Tier 1 and Tier 2. (Information provided by OCWD on 25 April 2013)

Note 2: Readiness-to-serve and Capacity Charges have been converted to an approximate cost per AF, but are not normally reported in terms of unit cost.

Cost components for imported treated and untreated water are listed in Table 3. The System Access charge is for costs associated with the conveyance and distribution system, including capital and O&M costs. The Water Stewardship charge is used to support MWD's financial commitment to conservation, water recycling, groundwater recovery, and other water management programs approved by MWD. MWD uses the Capacity charge to recover its cost for use of peaking capacity within its distribution system. The Readiness-to-Serve (RTS) charge is to recover MWD's cost associated with providing standby and peak conveyance capacity and system emergency storage capacity. As of January 1, 2003, the RTS charge was discontinued for interruptible deliveries and the Capacity Charge commenced for full service and agricultural program deliveries. The Capacity Charge does not apply to replenishment water. The MWDOC surcharge applies to the MWD imported water purchased by local agencies and provides general funding for MWDOC. Anaheim, Fullerton, and Santa Ana are not charged MWDOC surcharge as these MWD member agencies purchase imported water directly from MWD.

Table 4 summarizes and presents a comparison between groundwater and imported water production costs for 2012-13 water year.

Table 4 Estimated 2012-13 Water Production Cost Comparison

Non-Irrigation Use	Groundwater Cost (\$/AF)	Imported Water Cost (\$/AF)
Fixed Cost	56.00 ¹	930.25 ³
Variable Cost	387.00 ²	0.00 ³
Total Cost to Producers	443.00	930.25

¹ Capital Cost

² Cost for energy, O&M, and RA

³ Delineation of fixed and variable costs not available

Orange County Water Sustainability: Who Cares?

Imported Water

Orange County is dependent on imported water for nearly half of its total water usage. It has two main sources of imported water. The first source the Grand Jury looked at was the State Water Project that included the California Aqueduct. This aqueduct starts on the Feather River by Stockton and brings water to Lakes Pyramid, Castaic, and finally to Lake Perris in Riverside County. The second source was the Colorado River Aqueduct which diverts water from the Colorado River at Parker Dam, Lake Havasu, to the east side of the Santa Ana Mountains.

State Water Project (SWP) The SWP is a state water management project under the supervision of the California Department of Water Resources. It spans 700 miles thus making it the world's largest publicly built and operated water and power development system. It provides water to more than 23 million people and generates an average of 6.5 million megawatts of hydroelectricity annually. It includes pumping and power plants, reservoirs, lakes and storage tanks, aqueducts, tunnels and pipelines. These facilities capture, store and convey water to 29 water agencies. Most of the water (80%) carried by the project is used for agriculture.

The SWP includes the Oroville Dam, the San Luis Reservoir, and the California Aqueduct. (The aqueduct is 444-miles-long.) The water in the main stem of the California aqueduct travels south to the Edmonston Pumping Plant (the State Water Project's largest pumping plant). This pumping station lifts the water nearly 2,000 feet up and over the Tehachapi Mountains through 10 miles of tunnels. Once clearing the mountains, the aqueduct splits into East and West Branches. The West Branch travels southwest to feed Pyramid Lake and Castaic Lake in the Los Angeles Mountains. The East Branch (the main stem) continues southeast eventually filling Lake Perris (via the 28-mile-long Santa Ana Pipeline). This provides water to the MWD. On average the California Aqueduct brings a total of 6,023 AF daily to Southern California.

The Colorado River Aqueduct The Colorado River Aqueduct is 242 miles long and delivers 53,000 acre-feet of water daily to Southern California. It was constructed between 1933 and 1941 by MWD to ensure a steady supply of drinking water to Los Angeles. It now serves Southern California communities from Ventura County to San Diego County.

The aqueduct begins at Parker Dam on the Colorado River, southeast of Lake Havasu City, Arizona. It crosses the Mojave Desert and enters the Coachella Valley north of the Salton Sea. It then flows northwest along the Little San Bernardino Mountains and crosses the San Jacinto Mountains west of Palm Springs. It finally terminates at Lake Mathews in Riverside County. Another part of the Colorado Aqueduct system was recently added. The Diamond Valley Dam and Lake is located just to the south of Hemet and was completed in 1999.

Orange County Water Sustainability: Who Cares?

Today, the aqueduct consists of four reservoirs, five pumping plants, 63 miles of canals, 92 miles of tunnels, and 87 miles of buried conduit and siphons. It is operated by MWD.

Groundwater

Groundwater is used for drinking and irrigating crops. It comes from rain, snow, sleet, and hail that soak into the ground. The water moves down into the ground because of gravity, passing between particles of soil, sand, gravel, or rock until it reaches a depth where the ground is filled, or saturated, with water. The area that is filled with water is called the saturated zone²⁵ and the top of this zone is called the water table. The water table may be very near the ground's surface or it may be hundreds of feet below depending on many factors. Heavy rains or melting snow may cause the water table to rise, or heavy pumping of groundwater supplies may cause the water table to fall. The water in lakes, rivers, or oceans is called surface water. Groundwater and surface water sometimes trade places. Groundwater can move through the ground and into a lake or stream. Water in a lake can soak down into the ground and become groundwater. Groundwater is stored in the ground in materials like gravel or sand. It can also move through rock formations like sandstone or through cracks in rocks. Wells pump groundwater from the aquifer and water retailers deliver the water. See Figure 4.

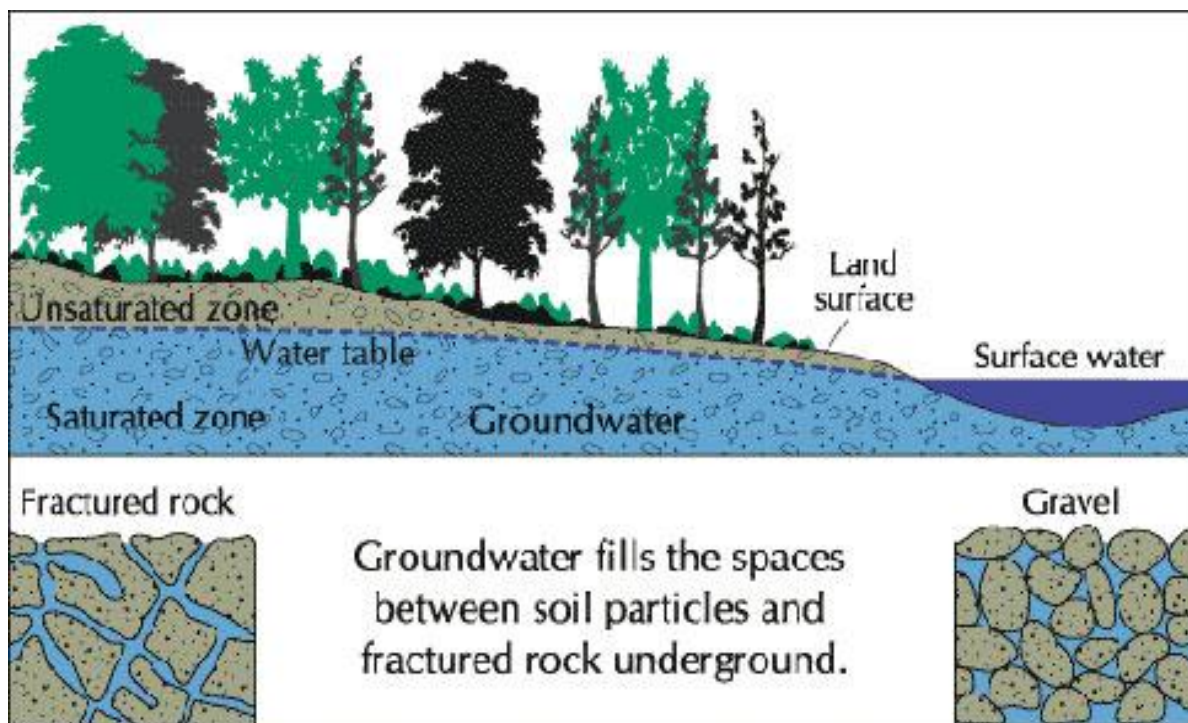


Image compliments of US Geological Survey, adapted by The Groundwater Foundation.

Figure 4 Groundwater Basic Concepts

²⁵ The area where water fills the aquifer is called the saturated zone (or saturation zone).

Orange County Water Sustainability: Who Cares?

Some communities rely on groundwater for most of its water needs. Replenishing the groundwater supply is an important part of managing this valuable natural resource because over time the water table or the depth at which groundwater can be found, may drop. The replenishment of groundwater (recharge) closes the gap between the supply of groundwater and the demand the community puts on it. There are two types of recharge: natural and artificial. *Natural recharge* occurs in streams, channels, and ponds. As water flows through streams and channels, or into ponds, water soaks into the soil and eventually makes its way to the groundwater table. Natural recharge is an important part of the hydrologic cycle. *Artificial recharge* is a man-made means of recharge. An example of artificial recharge is the use of “reclaimed municipal wastewater”²⁶ through infiltration basins²⁷ or direct injection²⁸. The biggest drawback of this artificial recharge is the health risk if there is insufficient treatment. Hence, it is essential that the water go through a certain number of pretreatment steps before the water can be introduced to the groundwater to prevent any contamination and be used for indirect potable reuse. It is noted that both these forms of recharge are not limited to reclaimed municipal wastewater.

In Orange County, the Groundwater Replenishment System (GWRS), a jointly funded project by the Orange County Water District (OCWD) and the Orange County Sanitation District (OCSD), is the world's largest wastewater purification system for indirect potable reuse. The GWRS takes highly treated wastewater from OCSD that would have previously been discharged into the Pacific Ocean and purifies it using a three-step advanced treatment process consisting of microfiltration²⁹, reverse osmosis³⁰ and ultraviolet light with hydrogen peroxide³¹. The process produces high-quality water that exceeds all state and federal drinking water standards. Operational since January 2008, this state-of-the-art water purification project can produce up to 70 million gallons (265,000 cubic meters) of high-quality water every day. This is enough water to meet the needs of nearly 600,000 residents in north and central Orange County, California. These two public agencies have worked together for more than 30 years. They are leading the way in water recycling and providing a locally-controlled, drought-proof and reliable supply of high-quality water in an environmentally sensitive and economical manner. The facility provides approximately 15% of this region's water supply. GWRS water is reliable, safe, and locally-controlled. It is also more cost-effective and energy efficient to produce GWRS water than it is to import water supplies from the Delta and Colorado River. Of considerable significance is the uninterrupted nature of the

²⁶ Reclaimed municipal wastewater is defined as any surface water that is not drinkable.

²⁷ An infiltration basin is where “recharge waters such as treated municipal wastewater percolates from spreading through the unsaturated groundwater zone”. Requires the least maintenance and is most efficient. It is used in huge open areas where animal life is not disturbed.

²⁸ Direct injection is where the treated water is put directly into the groundwater. Used where the topography of the land is not suitable for large infiltration basins.

²⁹ Water is pushed through hollow fibers that remove bacteria and protozoa. (Source: USA TODAY, March 3, 2011)

³⁰ Water is pushed through a semi-permeable membrane, removing salts and pharmaceuticals. (Source: USA TODAY, March 3, 2011)

³¹ As a precaution, water is exposed to high-intensity Ultra Violet (UV) light and hydrogen peroxide to destroy trace organics. (Source: USA TODAY, March 3, 2011)

Orange County Water Sustainability: Who Cares?

wastewater supply, providing a measure of protection from imported water supply variability and curtailments.

Water Conservation

The Grand Jury has found that for many years, Orange County water districts have promoted water conservation. If the state has several years of drought or other catastrophes which affect the conveyance of water, the water districts ask the public to conserve and use various, suggested methods to accomplish this. Some of their suggestions are as follows:

- Wash only full loads of laundry or dishes. (Saves up to 50 gallons per week)
- Fix household leaks promptly. (Saves up to 20 gallons per day)
- Take 5 minute showers. (Saves up to 8 gallons each time)
- Turn off the water when you brush your teeth. (Saves up to 2.5 gallons per minute)
- Water your lawn only 1-2 days a week. (Saves up to 840 gallons per week)
- Use a broom rather than a hose to clean your patio and driveway. (Saves up to 40 gallons per day)
- Water your plants in the early morning or at night to reduce evaporation and ineffective watering due to wind gusts.
- Cut back washing your car. Use efficient public car washes for less runoff.³²

The public, in general, is usually cooperative when water rationing is a voluntary suggestion. However, conservation may become mandatory in the future if imported supplies are interrupted for any length of time. The California Water Project has allowed the levees up north to deteriorate for over 30 years. The San Andreas Earthquake Fault can cause serious damage to this water project, as can other smaller earthquake faults throughout the state, and interrupt service to many areas north and south. Drought is a constant threat to California especially in the south. Consequently, wise use of water has been one of the mantras of Orange County water districts for many years. A memorandum of understanding was developed in 1991 by the California Urban Water Conservation Council for advancing efficient use of water. Fourteen recommendations for cost-effective best management practices were suggested for the future. They are as follows:

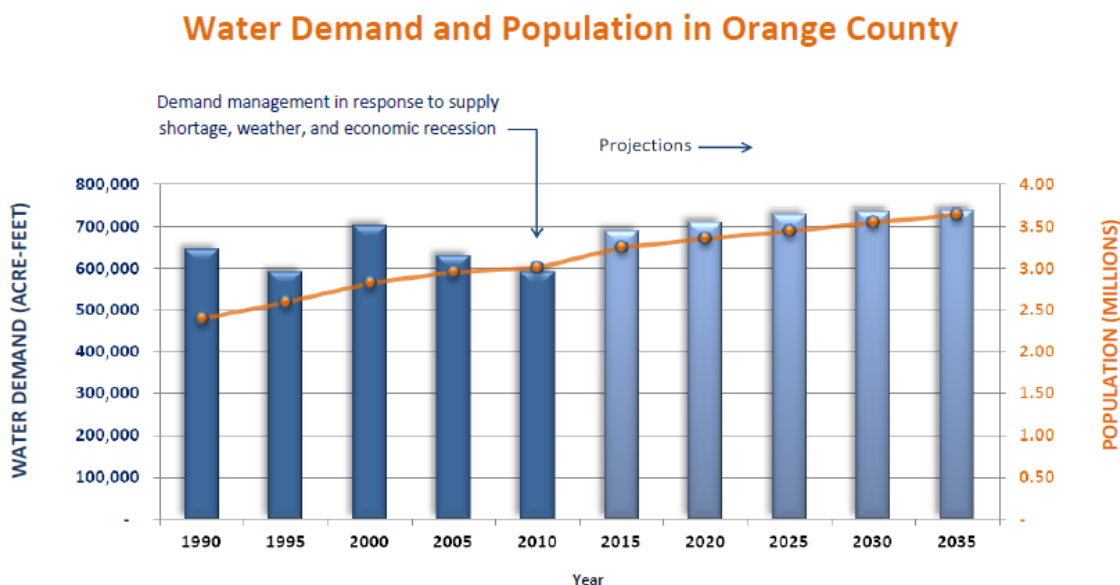
- Residential water surveys
- Residential plumbing retrofits
- System water audits, leak detection and repairs
- Metering commodity rates
- Large landscape conservation programs
- High-efficiency washing machine rebate programs
- Public information programs

³² Bewaterwise.com, Metropolitan Water District of Southern California

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- School education programs
- Commercial, institutional and industrial programs
- Wholesale agency assistance programs
- Conservation pricing, tiered pricing
- Conservation coordinator
- Water waste prohibition
- Residential ultra- low-flow toilet replacement programs³³

The public is familiar with these programs and that has decreased water usage in Orange County for many years. The use of water efficient appliances, plumbing fixtures, and shower heads are common to many households because they not only save water but save money. MWD and MWDOC have been in the forefront of promoting these conservation methods and programs with some member agencies following their lead in the 1990's and others joining in the twenty-first century. The MWDOC told the Grand Jury that despite the increase of population in Orange County and climate change throughout the county consumers are using less water and continue to do so. Urban conservation appears to be working. See Figure 5 for MWDOC water demand and population projection in Orange County information.



[1] Consumptive water demand projections include Agricultural, include recycled water, exclude water used for basin replenishment. Source: agency responses to MWDOC survey in Spring 2011.

[2] Population numbers for 2005 and 2010 have been adjusted to reflect the findings of the 2010 Census. Population projections are per the Center for Demographic Research, CSU Fullerton based on OCP-2006 data set.

Figure 5 Water Demand and Population Projection

Image Source: Orange County Water Supplier Water Rates and Financial Information (updated March 2012)

³³ "Memorandum of Understanding Regarding Urban Water Conservation in California", California Urban water Conservation Council, 1991.

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Irvine Ranch Water District (IRWD), in particular, has followed the suggestions for conservation. They instituted tiered billing in 1991 and have given rebates to both commercial and residential customers who use water-saving devices and equipment. Innovation describes the pathway this water district follows to conserve.

Educational programs are another way to advance the mantra of conservation. Again, MWDOC has been the long-time leader in this area. Through the escapades of Ricki the Rambunctious Raindrop, school children receive the message of how to conserve water and share this information with their parents. It also distributes more than 15,000 copies of the Water Education School Calendar to Orange County Schools every year.³⁴ The calendars contain drawings on water conservation by elementary and secondary students. MWDOC also has a contract with the Discovery Science Center of Orange County for implementation of their School Education Program. The message is loud and clear: conservation is good for the environment and good for the community.

Conservation does not stop with residential programs. California is an agricultural state and farming uses large amounts of water. In 2009, after three years of drought, political gridlock in Sacramento and the worst economy the state has ever seen since the Great Depression the state legislature passed a comprehensive package of water legislation not seen since SWP was built mid-20th century. In 2010, the Department of Water Resources convened the Agricultural Stakeholders Committee, composed of agricultural water agencies, production agriculture, environmental and academic representatives. The Grand Jury recognizes that the days of major agriculture are at a minimum today in Orange County. However, Orange County imported water from SWP and the Colorado River Aqueduct would be affected by this legislation. Agricultural management plans are required by Senate Bill SBX7 7 which requires all agricultural water suppliers providing water to 25,000 acres or more (excluding acreage using recycled water) to measure the volume of delivered water to customers or be out of compliance. These documents must be updated every five years. If out of compliance, the agricultural water district is ineligible to receive state water grants or loans.³⁵

The Department of Water Resources intends to review and update statewide targets for regional water; whether urban or agricultural. Therefore, this legislation becomes relative to all counties including Orange County. Efficient water usage does not stop at county lines.

Recycling

According to the Association of California Water Agencies, water recycling, also known as reclamation or reuse is a reliable, economically feasible and environmentally sensitive means to maximize California's water resources and reduce the demand on freshwater systems. Orange County already uses reclaimed water for agricultural and landscape.

³⁴ Informational Pamphlet, Municipal Water District of Orange County.

³⁵ Ibid.

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Additional use of reclaimed water depends on public acceptance. Groups opposed to the use of reclaimed water have labeled it “toilet water” which has given it use a negative connotation. Some, reclaimed water is required to be filtered to a greater purity than our present tap water.

It may also be of interest to some that Las Vegas, Nevada, has been placing reclaimed water into the Colorado River for years in accordance with their local water recycling policy which allows them to withdraw an additional gallon beyond Nevada’s base allocation for every gallon of treated Colorado River water returned to the Colorado River.

An example of a successful recycling program is the one run by the Irvine Ranch Water District (IRWD). The main purpose of the water recycling program is to maximize drinking water supplies by reducing the need to use potable water for non-potable uses. IRWD pumps about 48 percent of its water from local groundwater wells and 27 percent of its water needs are fulfilled from surface water from the Colorado River and Northern California purchased from the Metropolitan Water District of Southern California. About 21 percent of their water needs are fulfilled by recycled water. The remaining 4 percent is supplied by other sources.

IRWD uses recycled water for landscape irrigation. Eighty percent of all business and public area landscaping in the district is irrigated with recycled water (also known as purple pipe water). IRWD was able to achieve these results because of good planning during development of the City of Irvine.

While it may not be possible for most water districts to achieve the same level of recycling success as IRWD, the use of recycled water could enable many districts to reduce their use of potable water for landscape watering.

Future Sources of Additional Water

Imported Water

SWP’s East Branch Extension (13-miles of buried pipeline, three pump stations, and a 90 AF regulatory reservoir) was completed in 2003. It is expected to meet the region’s water needs for the next 40 years. SWP water will be used to recharge over drafted groundwater basins and allow more flexibility for local water.

Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is a joint State and Federal project to restore the Sacramento/San Joaquin Delta ecosystem by constructing water supply infrastructure to deliver water to 25 million Californians, 3 million acres of farmland and businesses throughout the State. Currently, the cost for this project is estimated to be 14 billion initially.

Orange County Water Sustainability: Who Cares?

A major disaster could affect water service to Southern California for up to 3 years.³⁶ The new water system would include twin tunnels designed to meet environmental standards, withstand earthquakes and sea level challenges for the next 50 years.

Groundwater

The GWRS is currently undergoing a \$142.7 million expansion project, which broke ground in Jan. 2012. The project is scheduled for completion in Feb. 2015. Currently, water districts take 68 percent of their water needs from the basin's clear groundwater. However, that is expected to rise to 75 percent by 2015 as the OCWD expands its production of purified wastewater that is added to the drinking-water aquifer.

Recently, Orange County's Mesa Water District has built a facility that removes the organic materials, making the redwood-tinted amber water clear for local customers' consumption. It uses nano-filtration membranes to clear redwood-tinted amber water, which is an untapped resource of water in the aquifer, to provide 100 percent groundwater to customers, with a 100 percent reliable "backup" import supply. (In 2010, Mesa Water District reached an unusual agreement with the OCWD. In accordance with this agreement, Mesa District was permitted to draw as much water as they could pull from the redwood-tinted portion of the aquifer, about 600 to 1,000 feet down, an untapped resource for decades. This agreement is beneficial to other entities also who draw from the aquifer as pulling up the redwood-tinted amber water keeps it from spreading into the broader aquifer and becoming a treatment problem at nearby wells.)

Conservation

The Grand Jury has learned that Water Use Efficiency (WUE) is critical to the element of water supplies as fewer water sources will be developed. The most important aspect of this is educating the consumer about the value of water not the cost. The public seems to focus on cost. The main message to the consumer is, "Price is what you pay. Value is what you get."³⁷ Therefore, conservation must continue to be a source of additional water now and in the future.

The State Legislature passed Senate Bill SBX7 7 in November 2009. Senate Bill SBX7 7 requires the Department of Water Resources, along with other state agencies, to develop a single standardized water reporting form, used by urban and agriculture agencies alike. Water suppliers must increase water use efficiency and set targets to accomplish. This bill also mandates that water agencies must reduce per capita water use by 20 percent by 2020. Agricultural suppliers have until 2013 and urban water

³⁶ Inspection Trip of the State Water Project and the Sacramento-San Joaquin Delta, Oct. 2012.

³⁷ Municipal Water District of Orange County Public Affairs Workgroup and Water Use Efficiency Workgroup Joint Meeting, Nov.1, 2012.

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suppliers have until 2016 to meet these requirements. If these requirements are not met, water suppliers will not be eligible for state loans or grants.³⁸

Under this legislation, retail suppliers are able to form regional alliances to comply with the State mandate. The benefits of an alliance are that MWDOC does all the monitoring and reporting; the alliance helps with compliance. The agencies reap the benefits of water use efficiency, and there is no risk to the involved agencies. All this encourages further cooperation among the retail water agencies of Orange County.³⁹

Since the Grand Jury Report of 2007-2008, the water districts of Orange County have done much to teach the public to conserve water both inside the home and out. Some of the Water Use Efficiency (WUE) Programs include the following:

- Rotating Nozzles Rebate Program (continuing today)
- Turf Removal Program (continuing today)
- Synthetic Turf Rebate

Other WUE Programs that have been in effect throughout the 1990's and into the 21st century are as follows:

- High Efficiency Washer Program
- Smart Timer Program-Irrigation Timers
- Plumbing Fixture Rebate Program
- Landscape Certification
- Industrial Process Water Use Reduction Program
- High Efficiency Toilet Program
- Ultra-Low Flush-Toilet Program
- Home Water Surveys
- Showerhead Replacements

Some other possible new grant-funded WUE programs are as follows:

- Home Certification Program
- Public Spaces Program
- Spray to Drip Research Program
- Water Smart Industrial Program
- Weather-based irrigation controller
- Smart Timer Rebate Program⁴⁰

³⁸ MWDOC meeting with the Orange County Grand Jury Environmental and Transportation Committee (Mar. 14, 2013)

³⁹ MWDOC, Overview of Water Issues, p2, February 21, 2013

⁴⁰ Municipal Water District of Orange County, Public Affairs Workgroup and Water Use Efficiency Workgroup, Joint Meeting (November 1, 2012).

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The Orange County water retailers as a whole have established very informative web sites that share information about conservation methods inside and outside residential buildings. Open house dates at water facilities are posted on the web site so the customer has the opportunity to attend conservation workshops and receive water conserving devices such as water saving hose nozzles or drought-resistant plants. Water retailers provide to customers phone numbers for a water survey which aids in conservation on their property. Many of the Orange County water districts told the Grand Jury that water use efficiency has been accomplished in residential buildings.

One method of conservation that The Grand Jury 2007-2008 recommended in their report was to: "Develop a tiered-pricing structure with the first tier based on individual customers, water allocation priced at a commodity rate, and subsequent tiers priced significantly higher to encourage conservation. The pricing shall be structured in a manner that will preclude the necessity of price increases as a result of reduced water use."⁴¹

Since the 2007-2008 Grand Jury Report and before some water agencies instituted budget based tiered-rate some rate payers were provided a water budget for their property. This allows a reasonable amount of water usage inside and outside each month. If more water is used the customer is charged at a higher rate. This sends the message that using less water is an economically and environmentally sound practice. The less a rate payer wastes more water is available for everyone else. Unfortunately, many water districts have not decided to use tiered-rate pricing like other utilities such as electric and natural gas companies. Currently, the only water districts using tiered-rates are as follows:⁴²

- El Toro Water District
- Emerald Bay Service District
- Irvine Ranch Water District
- Laguna Beach County Water district
- Moulton Niguel Water District
- Trabuco Canyon Water District (seasonal rates⁴³)
- City of San Clemente (seasonal rates⁴⁴)

The municipal (city) water districts with tiered-billing are the following:

- City of Brea
- City of Buena Park
- City of La Palma (effective 2013)
- City of San Juan Capistrano

⁴¹ 2007-2008 Orange County Grand Jury Report, "Water Budgets, Not Water Rationing, Recommendation R-2b.

⁴² Memo, Budget Based Tiered Rates, Municipal Water District of Orange County, (November 7, 2012)

⁴³ Water is more expensive in the summer.

⁴⁴ Ibid

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In 2012 one water district told the Grand Jury that tiered-rates were data intensive and that smaller districts did not have enough customers to employ this method of billing. However, the Grand Jury noted that Laguna Beach County Water District uses tiered-rates, and they have a small customer base. Tiered-rates are one of the best practices in the search for new methods of conservation.

Much conservation of water has been accomplished in Orange County since the Grand Jury Report of 2007-2008. However, with the threat of climate change and periods of long drought, conservation of water continues to be an important method of water sustainability.

Recycling

In 2008, the 2007 – 2008 Orange County Grand Jury wrote a report on water that stated more than half of Orange County's water, 53 per cent, was imported by the MWD, which in turn sold it to the MWDOC and three cities.⁴⁵ Today, approximately 50 per cent of the water used throughout Orange County is imported.⁴⁶ This means efforts to conserve and recycle water are having an impact.

MWDOC's 2010 Regional Urban Water Management Plan of June 2011 provided many areas where recycled water could be used in the future. The Grand Jury is concerned that some water districts have not met prior estimates for recycling, and is therefore skeptical of the predictions contained in the report. However, MWDOC is encouraged to continue supporting the use of recycled water as a positive alternative for some present potable water uses.

Cadiz Water Project

Founded in 1983, Cadiz Inc. is a renewable resources company based in Los Angeles. This company began accruing land in the Cadiz Valley of eastern San Bernardino County. NASA funded a project in this area that integrated satellite imagery with geological, geophysical, and geochemical survey methods to help in the selection and evaluation of this land. Thus, the Cadiz Water Project was born. NASA found a reliable, natural underground aquifer system that could be used for recharging water and producing high quality drinking water for areas that needed it. A bonus was the large area of underground storage for surplus water.⁴⁷

In 1984, the first production wells were installed on the property to determine the viability of this system. These wells yielded a high-quality of groundwater and Cadiz Incorporated decided to purchase more of this land which doubled the size of the Cadiz property. Now this company owns 45,000 acres of which 34,000 acres are located in

⁴⁵ 2007 – 2008 Orange County Grand Jury, Water Budgets, Not Water Rationing

⁴⁶ <http://www.Metropolitan Water District.com/about/resources>

⁴⁷ Cadizinc.com/history

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the Cadiz Valley.⁴⁸ Since 1989, they have grown agricultural crops quite successfully there.

In 1998, Cadiz Inc. decided to establish a water supply and storage project on the site. Originally the design was to store surplus Colorado River water there. This water and groundwater would then be returned to the MWD as needed. The storage capacity is over one million acre feet.

By 2008 Cadiz Inc. began to design a project that would recover the water that was lost to evaporation and send it to customers in need of reliable supplies. They changed the pipeline route to avoid federal land. A 99-year lease was negotiated with Arizona and California Railroad Company to use a section of the railroad's right-of-way, and a pipeline was constructed to connect to the Colorado Aqueduct.

In 2012, Santa Margarita Water District (SMWD) became the lead agency promoting the project as a new source of drinking water for their customers. SMWD proceeded through the various environmental impact studies to respond to any complaints or problems before the project was approved. MWD ultimately rejected the original project. If this project had been approved, there would have been an average 50,000 AF (1.6 billion gallons) of water for participating water providers.⁴⁹ One million AF of underground storage would have been available to conserve or bank imported water; thereby, cutting the cost. If implemented, drought would not have continued to be a large problem because of the stored water space in this aquifer. The expected costs of delivered treated water from the Cadiz Project have been estimated to be \$1,100 to \$1,500 an AF. Unfortunately, past and present litigation against Cadiz has prevented the project from moving forward. Also MWD did not want Cadiz using the Colorado River Aqueduct for conveyance. Because of past litigation, the relationship between MWD and Cadiz has been tolerant at best.

Originally, Cadiz did an analysis of the water and found chromium. This however, was not chromium 6 which is a carcinogen. Treatment of this particular chromium is now considered a minor issue.

One of the loudest activists to decry the Cadiz Project is a former archeologist of the Bureau of Land Management assigned to the California Desert District.⁵⁰ This archeologist contends that this project will not help the desert residents, but take water from San Bernardino County to be used by Orange County. This individual also pointed out that hearings about this project are held in areas much too far from the desert area preventing citizens from attending. Rancho Santa Margarita is 217 miles from Cadiz and meetings on this project are held there on occasion.

⁴⁸ Ibid.

⁴⁹ Ibid.

⁵⁰ San Bernardino County Sentinel, "Opposition Forms Against Sending Desert Water to Orange County," Feb. 26, 2012.

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Federal opposition to this water project comes from a California senator. The Grand Jury noted that the senator has taken the position that Cadiz will never become a reality. In the eyes of the federal government, environmental concerns and finances seem to be the major reasons not to proceed with this project.

Ultimately, Cadiz remains a controversial issue as a future source of water. Regardless of differences; however, it is a future source of water that should not be ignored.

Desalination

The domestic use of seawater has been the dream of many coastal communities located in areas where potable water is not readily available. Until recently, that dream seemed unrealistic for the residents of Orange County; however, several Southern California projects may soon make that dream a reality. The two main stumbling blocks for most desalination projects are environmental and financial. The environmental concerns are the impact of seawater extraction and what to do with the salt that is produced. The financial concern has to do with the cost of the water produced because present desalination technology requires large amounts of electrical power to produce potable water. The three most publicized projects are in Carlsbad, Huntington Beach, and Dana Point.

Carlsbad Project The Carlsbad project is a private development by Poseidon Resources Corp. The San Diego Water Authority approved a Water Purchase Agreement with Poseidon Resources Corp. in November 2012. The water authority states the plant will produce 50 million gallons a day starting in 2016. By 2020, it will generate enough water to meet 10 percent of the San Diego County's water needs.⁵¹ This will be the first large-scale desalination plant on the West Coast and the largest of its kind in the Western Hemisphere. Poseidon and the water authority are financing the \$954 million Carlsbad project with \$781 million in tax-exempt construction bonds. The balance is coming from investors who anticipate a return of about 13 per cent.

Poseidon chose the Carlsbad location, next to the Encina Power Station, so it could draw from the power plant's cooling water discharge – thus avoiding the environmental harm of operating its own ocean intake.⁵² While using the power plant's cooling water discharge appeared to be a good idea, it did not take into account the California Energy Commission's approval on May 31, 2012 to build a new natural gas power plant at that location which would entail destruction of the existing power station and removal of the water discharge system.⁵³ The price of the water produced will be a challenge because present figures suggest that water will cost about twice what water from other sources cost.

⁵¹ Los Angeles Times, February 18, 2013, Is desalt a drop in bucket?

⁵² Los Angeles Times, February 18, 2013, Is desalt a drop in bucket?

⁵³ California Energy Commission, News Release, May 31, 2012

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Huntington Beach Project The Huntington Beach project is also a private development by Poseidon Resources Corp. It would consist of the construction and operation of a 50 million gallon per day seawater desalination facility within the City of Huntington Beach. The proposed desalination project would consist of a seawater intake system, pretreatment facilities, a seawater desalination facility utilizing reverse osmosis technology, post-treatment facilities, product water storage, chemical storage, electrical substation, on and off site pump stations, and 48 to 54 inch diameter product water transmission pipelines in Huntington Beach and Costa Mesa.⁵⁴

Like the Carlsbad project, this project would also use seawater from a neighboring power plant to eliminate the need for its own seawater intake system; however, a state policy adopted in 2010 will phase out the use of seawater to cool coastal power plants.⁵⁵ That policy could end seawater cooling at the Huntington Beach plant as early as 2020. That policy does not apply to stand-alone desalination plants.⁵⁶

The cost of the produced water is also a challenge to this project. Another challenge is the need to cross a neighboring city to deliver the water to potential customers in South County. Groups within Costa Mesa have raised concerns about the construction of a major pipeline through their city.

Dana Point Project The official name of the Dana Point project is Doheny DeSal, and it is located in South Orange County. It is much smaller in scope than the two Poseidon projects discussed above. This project will not use an existing seawater intake to obtain the water required to supply the facility. It uses subsurface slant-well technology to tap beneath San Juan Creek and under the ocean floor to draw feed water.⁵⁷ Since the use of this technology will utilize a natural filtering process it should reduce costs by eliminating the need for costly pretreatment facilities and open-water intake systems.

This project is in pilot testing. Three phases of the pilot project have been completed. A final analysis of the results is required before future implementation can be evaluated. Cost may also be a major obstacle for implementation.

Is desalination in Orange County's future? The Grand Jury reviewed various documents and articles to evaluate desalination as a potential future water source. The final determination is that while it may present some challenges in the area of environmental concerns and the cost of water, it must be included in any discussion of future water sources for Orange County.

⁵⁴ <http://www.huntingtonbeachca.gov/government/departments/major/poseidon.cfm>

⁵⁵ Los Angeles Times, Proposed desalination facility in Huntington Beach wins permit, February 10, 2012

⁵⁶ Los Angeles Times, Proposed desalination facility in Huntington Beach wins permit, February 10, 2012

⁵⁷ MDWOC Briefing Paper

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Orange County's Water Policy

As stated at the beginning of this study, Orange County does not have an agency that is responsible for water policy in the County. It does have several major agencies that coordinate the desires of the water retailers to ensure Orange County has a viable water policy that warrants sustainability. The following is the role of the various agencies:

MWDOC was formed in 1951 and consolidated with Coastal Municipal Water District in 2001, which provided wholesale imported water supplies to water agencies and cities serving the coastal areas of Orange County from Newport Beach south to San Clemente. MWDOC's primary responsibility is to ensure that the present and future water needs of its members are met through system and supply reliability. It represents its members at regional, state and federal levels by advocating for development and protection of water supplies, as well as planning and coordinating the water needs for its service area. The District also maintains an award winning water use efficiency program and coordinates countywide water/wastewater emergency preparedness and response efforts.

OCWD was formed in 1933 by a special act of the California State Legislature to protect Orange County's rights to water in the Santa Ana River. OCWD's primary responsibility is managing the vast groundwater basin under northern and central Orange County that supplies water to more than 19 cities and water agencies serving more than 2.3 million Orange County residents. Since 1933, OCWD has replenished and maintained the groundwater basin at safe levels while more than doubling the basins' annual yield. This important source of water provides local groundwater producers with a reliable supply of high-quality water.

OCWD primarily recharges the basin with water from the Santa Ana River and, to a lesser extent, with imported water purchased from the Metropolitan Water District of Southern California. OCWD currently holds rights to all Santa Ana River flows reaching Prado Dam. Water enters the groundwater basin via settling or percolation ponds in the cities of Anaheim and Orange. Behind Prado Dam (constructed and owned by the U. S. Army Corps of Engineers for flood prevention), it also owns 2,400 acres in Riverside County, which the District uses for water conservation and water quality improvement enhancement.

OCWD monitors the groundwater taken out each year to ensure that the basin is not overdrawn, refills the basin, and carries out an assessment program to pay for operating expenses and the cost of imported replenishment water. The groundwater basin holds millions of AF of water, and provides more than half of all water used within the District. Protection, safety and enhancement of groundwater are OCWD's highest priorities. OCWD is leading the way in purification of wastewater for reuse to provide a reliable, new, drought-proof high quality source of water.

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Orange County's Present Water Policy Determination Process

Presently, there is no agency or body that is responsible for setting the water policy for Orange County. Each water retailer, whether water district or city water department, determines what is in the best interest of their rate payers; that includes plans for the future and pricing. The agency that has assumed the responsibility of working with the water retailers to facilitate planning is MWDOC. Through coordination meetings at various levels, determination is made on what can be done to maintain the sustainability of water for the entire county.

The present water policy process does not lead to a formal planning document. However, it does lead to a set of various options that are under consideration by the various stakeholders.

Whether this process is the best way to deal with water sustainability is not a matter for this study. However, the process must be working well as Orange County is doing a good job of building infrastructure that has allowed it to use less imported water and utilize more local resources.

MWDOC is addressing the options in the prior section, and it does appear that coordination is bringing about cooperation between the diverse water interests in the county.

Should the County of Orange Be Involved in Setting Water Policy?

The 2012 – 2013 Orange County Grand Jury requested the opinion of the Orange County Board of Supervisors regarding the present water policy process and whether that function should come under their jurisdiction. The Board members had a diverse opinion. Generally, they believe that the present process is working well. Some thought it may be best to centralize authority with the Board of Supervisors.

The Grand Jury believes that adding another layer of bureaucracy would not improve the water policy making process. The subject matter is very technical in nature, which is why leaving it in the hands of existing water agencies makes more sense.

FINDINGS

In accordance with California Penal Code Sections §933 and §933.05, the 2012-2013 Grand Jury requires responses from each agency affected by the findings presented in this section. The responses are to be submitted to the Presiding Judge of the Superior Court.

Based on the study, the 2012-2013 Orange County Grand Jury has arrived at eight principal findings, as follows:

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- F1 There is no central authority responsible for water policy in Orange County.
- F2 MWDOC and OCWD in conjunction with the local water districts and city water departments are doing a comprehensive job of coordinating water planning.
- F3 Water use efficiency has helped ease the use of imported water.
- F4 Desalination is a possible future source of water.
- F5 The Groundwater Replenishment process is having a favorable impact on relieving the dependency on imported water.
- F6 Only a few water districts in Orange County use tiered pricing for water conservation.
- F7 Cadiz, while a controversial water supply and storage project, is a possible future source of water.
- F8 Bay Delta Project is critical to ensure the continual flow of imported water into Orange County.

RECOMMENDATIONS

California Penal Code Sections §933 and §933.05 require governing bodies and elected officials to which a report is directed to respond to findings and recommendations. Responses are requested from departments and local agencies and their non-elected department heads.

In accordance with *California Penal Code Sections §933 and §933.05*, the 2012-2013 Grand Jury requires responses from each agency affected by the recommendations presented in this section. The responses are to be submitted to the Presiding Judge of the Superior Court.

Based on the study, the 2012-2013 Orange County Grand Jury makes the following seven recommendations:

- R1 MWDOC and OCWD should continue their role in coordinating water planning. (F1, F2)
- R2 MWDOC shall find additional ways of promoting water use efficiency. (F3)
- R3 Desalination must be included in any discussion of future water sources for Orange County. (F4)
- R4 The Groundwater Replenishment project shall continue looking for additional ways in which its water can be used. (F5)

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- R5 MWDOC shall continue providing data to the water districts and city water departments encouraging tiered pricing to assist with water conservation. (F6)
- R6 Water districts in South Orange County shall consider the Cadiz Project in any discussion on sustainability of water in the southern part of the county. (F7)
- R7 All the Orange County Water Districts shall support legislation for the Bay Delta Conservation Plan to ensure sustainability of imported water to Orange County. (F8)

REQUIRED RESPONSES

The California Penal Code §933 requires any public agency which the Grand Jury has reviewed, and about which it has issued a final report, to comment to the Presiding Judge of the Superior Court on the findings and recommendations pertaining to matters under the control of the agency. Such comment shall be made *no later than 90 days* after the Grand Jury publishes its report (filed with the Clerk of the Court); except that in the case of a report containing findings and recommendations pertaining to a department or agency headed by an elected County Official (e.g., District Attorney, Sherriff, etc.), such comment shall be made *within 60 days* to the Presiding Judge with an information copy sent to the Board of Supervisors.

Furthermore, the *California Penal Code* Section §933.05 (a), (b), and (c) details, as follows, the manner in which such comment(s) are to be made:

- (a) As to each Grand Jury finding, the responding person or entity shall indicate one of the following:
 - (1) The respondent agrees with the finding.
 - (2) The respondent disagrees wholly or partially with the finding, in which case the response shall specify the portion of the finding that is disputed and shall include an explanation of the reasons therefore.
- (b) As to each grand jury recommendation, the responding person or entity shall report one of the following actions:
 - (1) The recommendation has been implemented, with a summary regarding the implemented action.
 - (2) The recommendation has not yet been implemented, but will be implemented in the future, with a timeframe for implementation.
 - (3) The recommendation requires further analysis, with an explanation and the scope and parameters of an analysis or study, and a timeframe for the matter to be prepared for discussion by the officer or head of the agency or

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department being investigated or reviewed, including the governing body of the public agency when applicable. This timeframe shall not exceed six months from the date of publication of the grand jury report.

- (4) The recommendation will not be implemented because it is not warranted or is not reasonable, with an explanation therefore.

REQUESTED RESPONSES

Responses to **Findings F1, 2, 3, 4, 6, 7, 8** are required from the Board of Directors of the Municipal Water District of Orange County.

Responses to **Findings F1, 3, 5, 8** are required from the Board of Directors of the Orange County Water District.

Responses to **Recommendations R1, 2, 3, 4, 6, 7**, are required from the Board of Directors of the Municipal Water District of Orange County.

Responses to **Recommendations R1, 3, 5, 7** are required from the Board of the Orange County Water District.