



THE CITY OF SAN DIEGO  
PUBLIC UTILITIES  
DEPARTMENT



# Water Purification | Demonstration Project

December 2, 2010

Marsi Steirer

Long-Range Planning & Water Resources Deputy Director





# Today we will discuss...

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- San Diego's need for a local, reliable water source
- The role of the Water Purification Demonstration Project
- The process of advanced water purification
- The potential benefits of using advanced purified water

# California Water Projects



## Federal Water Projects

- Central Valley Project
- Coachella Canal
- All American Canal

## State Water Projects

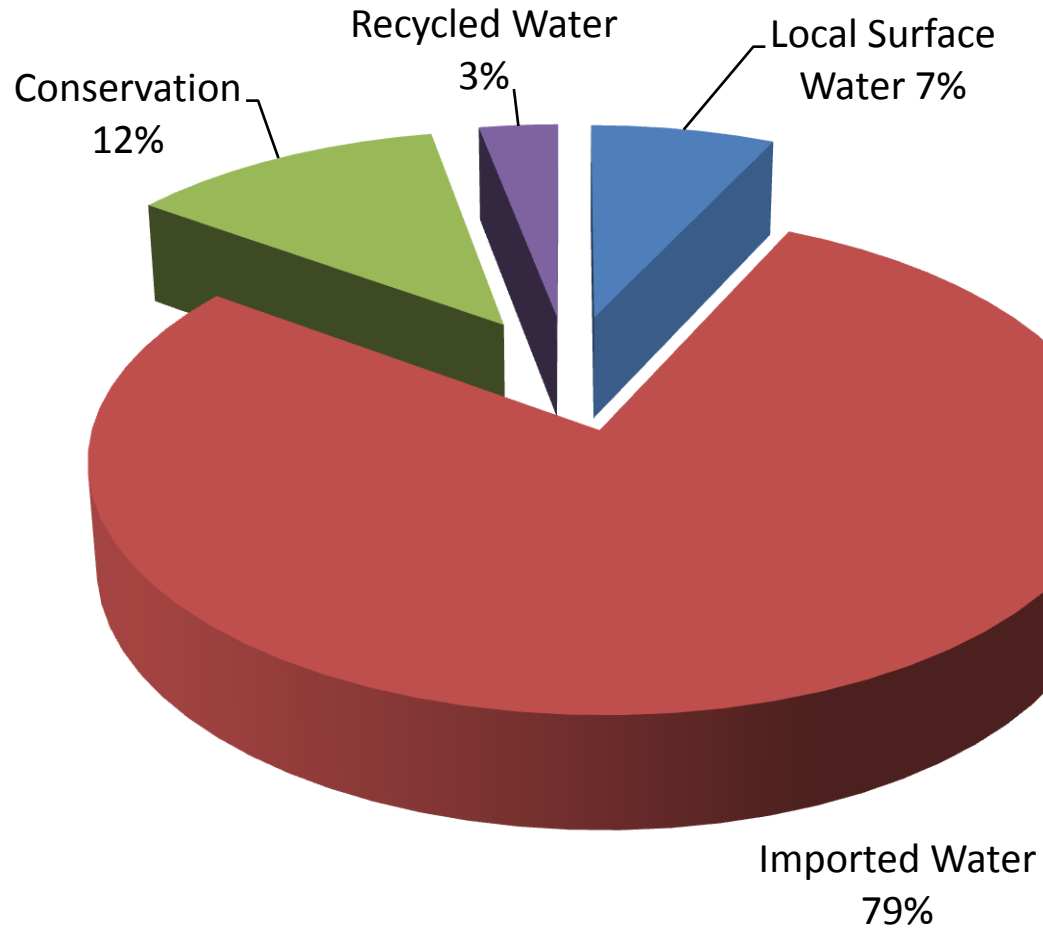
## Local Water Projects

- Mokelumne Aqueduct
- Hetch Hetchy Aqueduct
- Los Angeles Aqueduct
- Colorado River Aqueduct

## Bay-Delta



# Water Supply

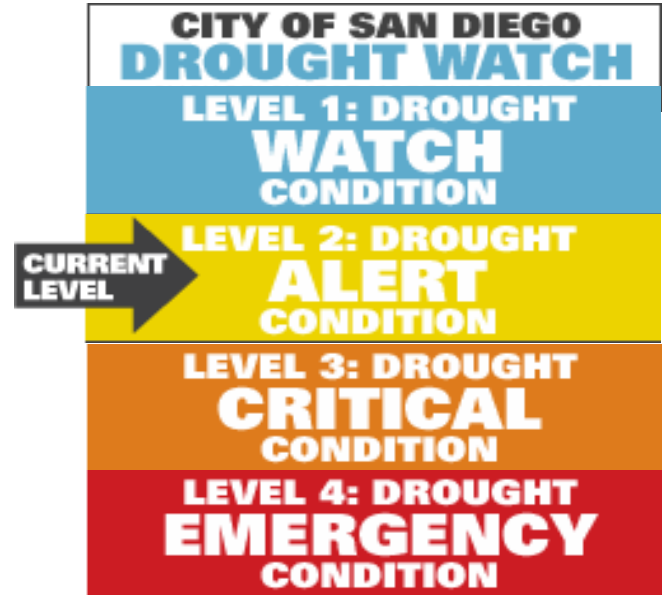


Average (2005-2010)



# Water Supply Challenges

- Sustained drought conditions
- Pumping restrictions
- Cost of water increases
- Population growth
- Earthquakes



**NO TIME TO WASTE**  
**NO WATER TO WASTE**

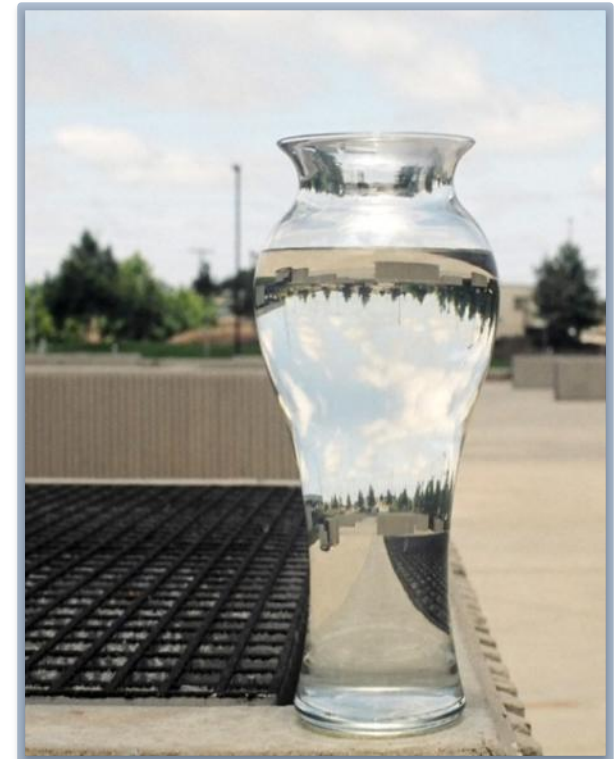




# What is being done...



- Water Conservation
- Groundwater Development
- Recycled Water
- The Water Reuse Program





# San Diego's Water Reuse Program



Water Reuse Study - (complete)



## Study Objective

To conduct an impartial, balanced, comprehensive and science-based study of all recycled water opportunities so the City of San Diego can meet current and future water supply needs.

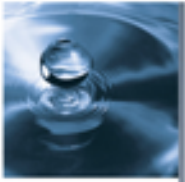
Water Purification Demonstration Project

## Project Objective

Evaluate the feasibility of using advanced treatment technology to produce water that can be sent to San Vicente Reservoir and later distributed as potable water.

Determine if the Demonstration Project provides evidence of viability for a full-scale IPR/RA project.





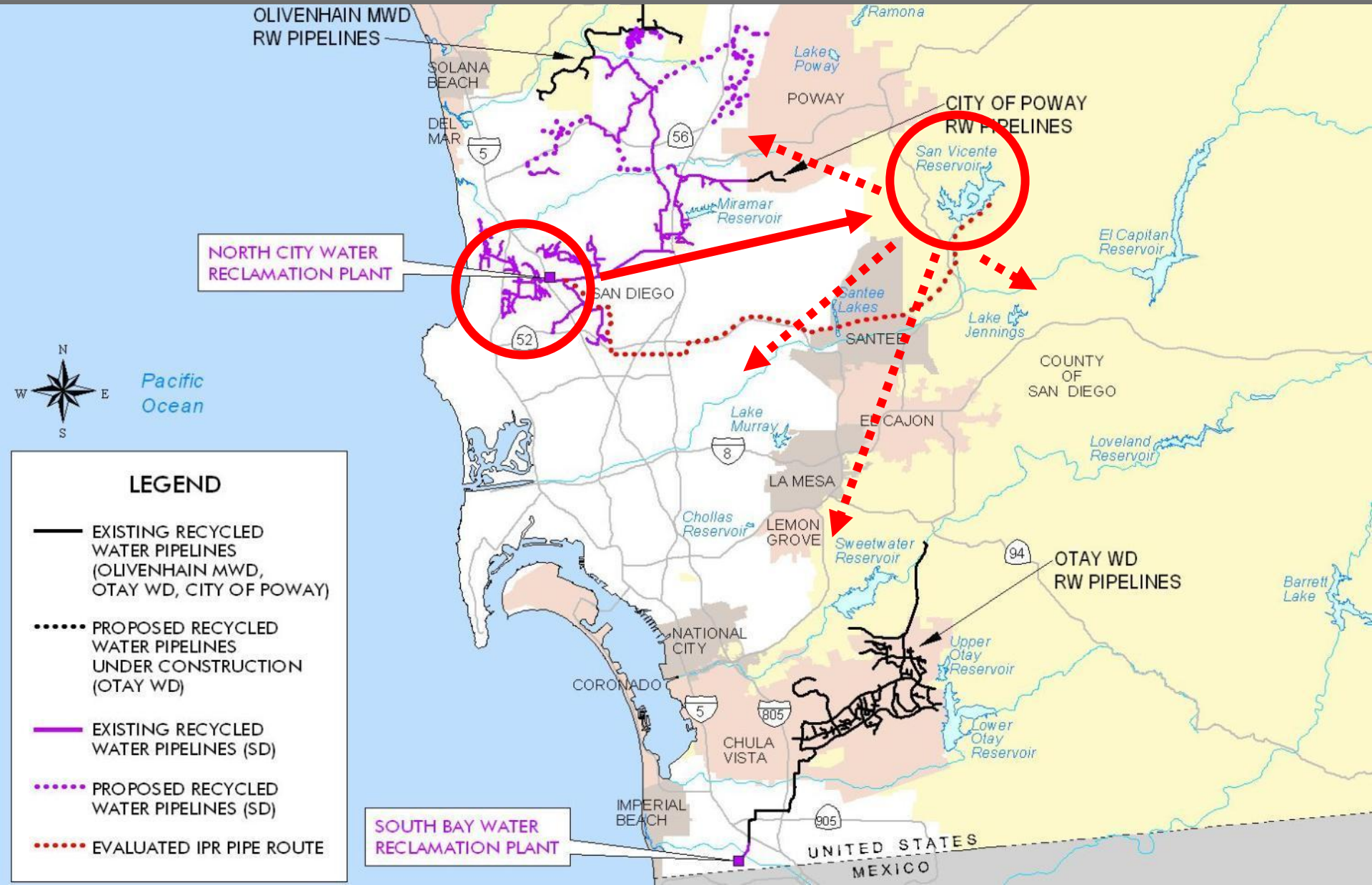
# Water Purification Demonstration Project Goals

- Design, install and operate an Advanced Water Purification Facility
- Conduct a limnology and reservoir detention study of San Vicente Reservoir
- Define the regulatory requirements for a full-scale project
- Conduct an independent energy and economic analysis
- Perform pipeline alignment study
- Conduct a public education and outreach program





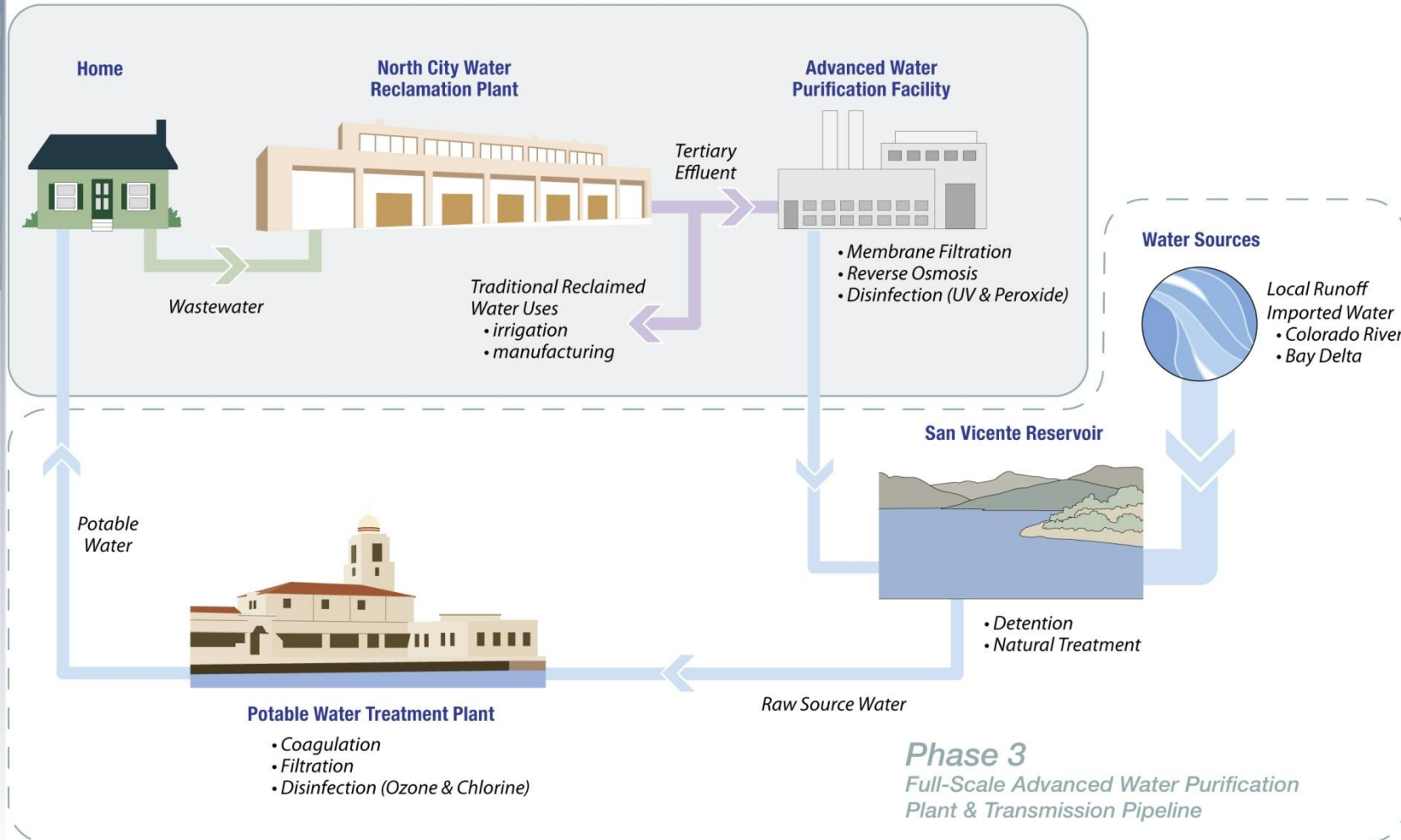
# Demonstration Project Concept



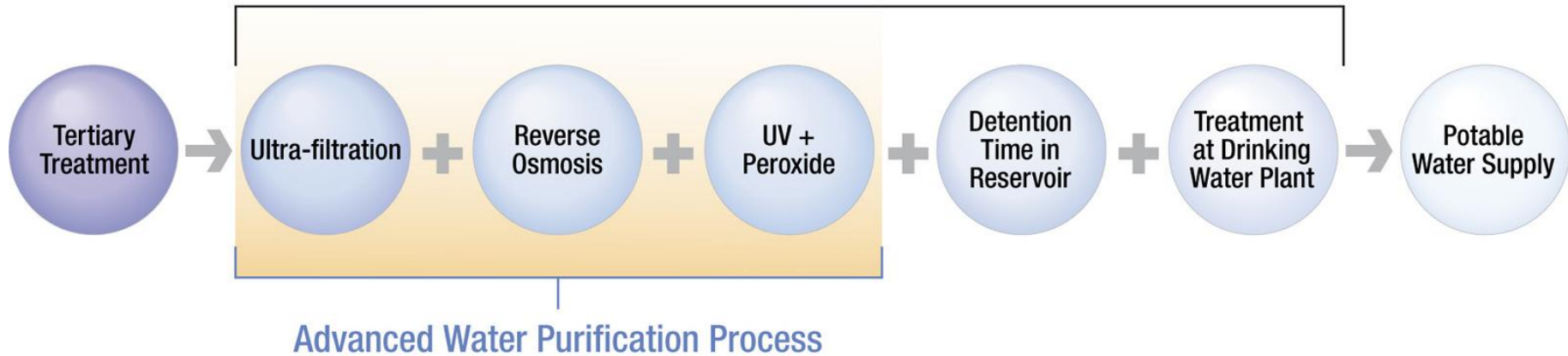


# City of San Diego's **Demonstration Project** Water Purification Demonstration Process

## *Phase 2 Demonstration-Scale Project*

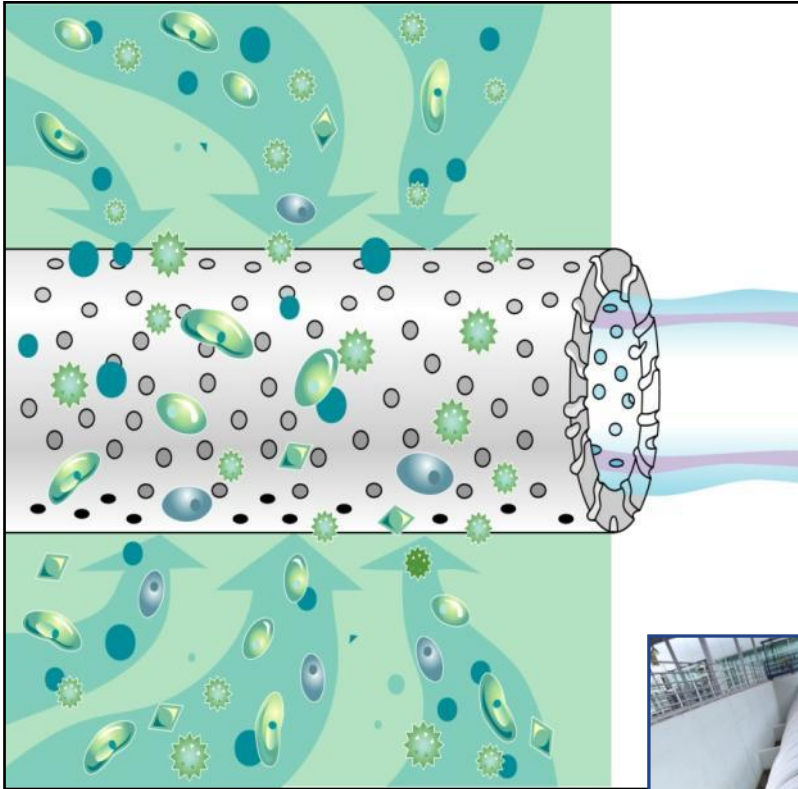


# Multiple Barrier Water Treatment Steps





# Micro-filtration: Step One



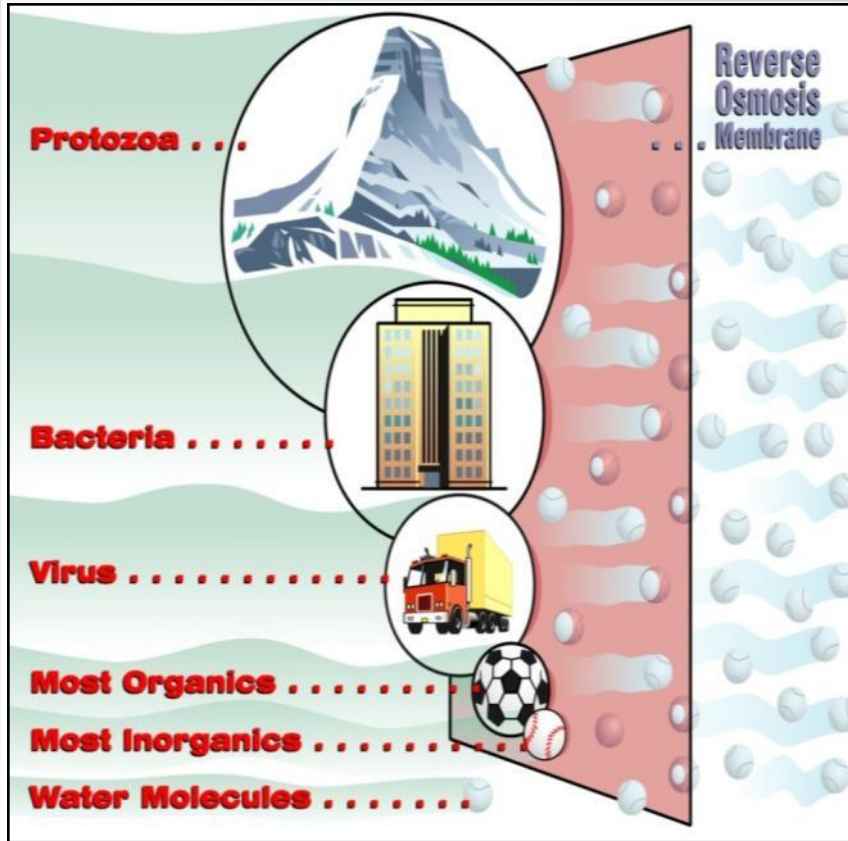
- Like a hollow straw with holes in the sides
- Used to make baby food, purify medicines, fruit juices and more
- Excellent pre-filter before reverse osmosis







# Reverse Osmosis: Step Two

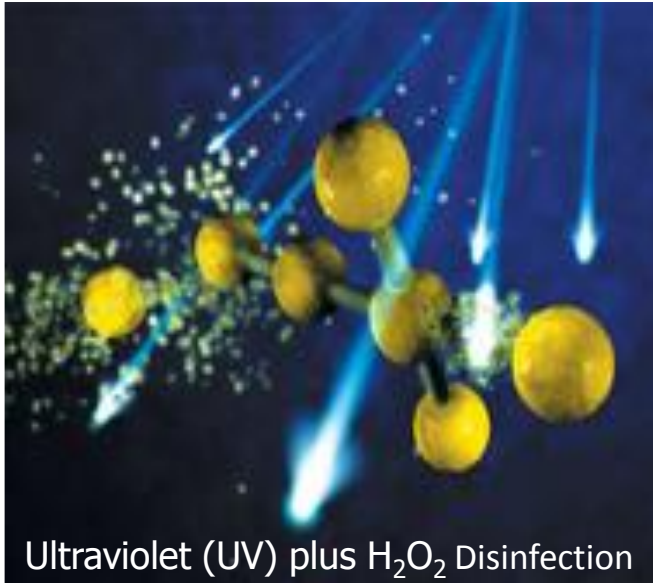


- Same technology used by bottled water companies
- Forces water under high pressure through sheets of plastic membrane
- Demineralizes and purifies water



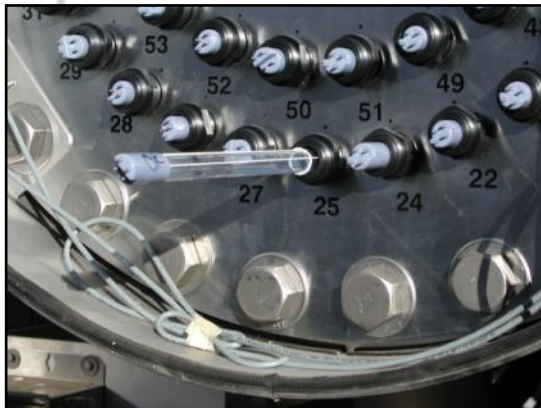


# Ultraviolet Light plus $H_2O_2$ : Step Three



Ultraviolet (UV) plus  $H_2O_2$  Disinfection

- High-intensity light and hydrogen peroxide ( $H_2O_2$ )
- Creates advanced oxidation reaction, essentially destroys anything in the water
- Multiple barrier, redundant approach





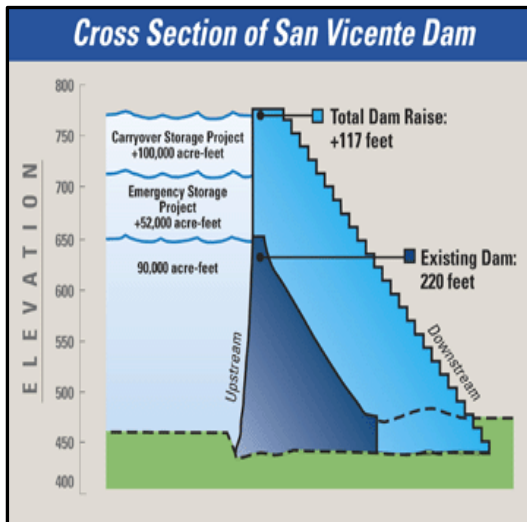
# San Vicente Limnology and Reservoir Detention Study



San Vicente Reservoir - 2004



San Vicente Reservoir - 2010



## Reservoir Enlargement

- Dam will be raised 117 feet
- Currently 90,000 acre-feet
- After dam raise 242,000 acre-feet
- Construction duration 2009 – 2012
- Refilling reservoir will take 2 to 5 years
- Construction drawdown means no access to reservoir for field tests (tracer studies)





# Independent Advisory Panel

- George Tchobanoglous, Ph.D., P.E., Civil & Environmental Engineering (*Panel Chair*), University of California, Davis
- David R. Schubert, Ph.D.  
Salk Institute for Biological Studies
- Richard J. Bull, Ph.D., Consulting Toxicologist  
Mobull Consulting
- Joseph A. Cotruvo, Ph.D., Joseph Cotruvo Associates
- James Crook, Ph.D., P.E., Water Reuse Consultant
- Richard Gersberg, Ph.D., Occupational & Environmental Health,  
Graduate School of Public Health, San Diego State University
- Sunny Jiang, Ph.D., Associate Professor, Civil and Environmental Engineering  
University of California, Irvine
- Michael A. Anderson, Ph.D. , Applied Limnology & Environmental Chemistry  
University of California, Riverside
- Audrey D. Levine, Ph.D., P.E., DEE, National Program Director, Drinking Water Research  
U.S. Environmental Protection Agency
- Michael P. Wehner, Assistant General Manager, Orange County Water District







# Advanced Water Purification: a proven technology



Orange County, California

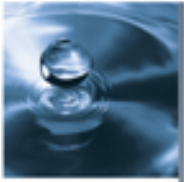
## Upper Occoquan Service Authority

*Leader in Water Reclamation and Reuse*



Fairfax County, Virginia

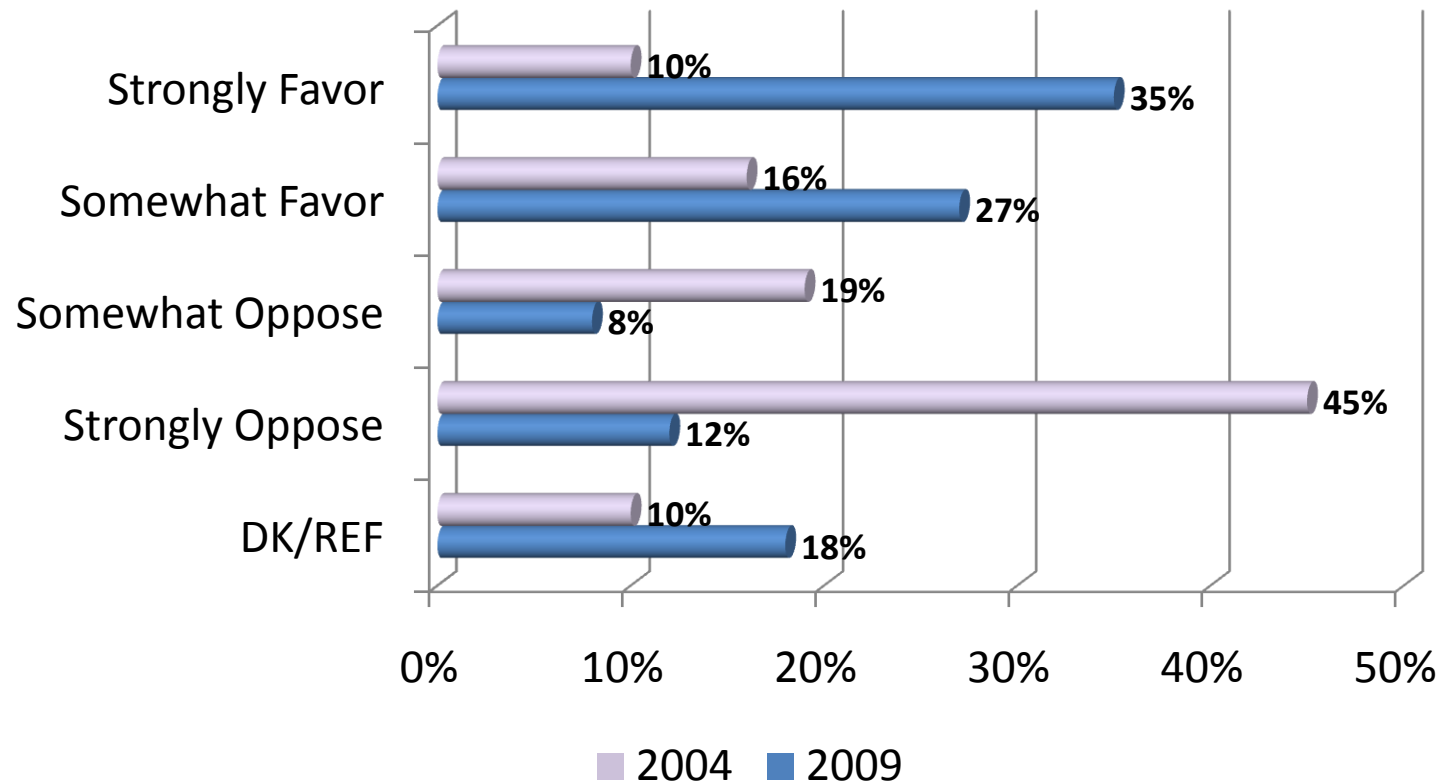




# Public Opinion Survey Results

San Diego County Water Authority Survey Comparisons

## Using Advanced Treated Recycled Water as an Addition to Drinking Water Supplies



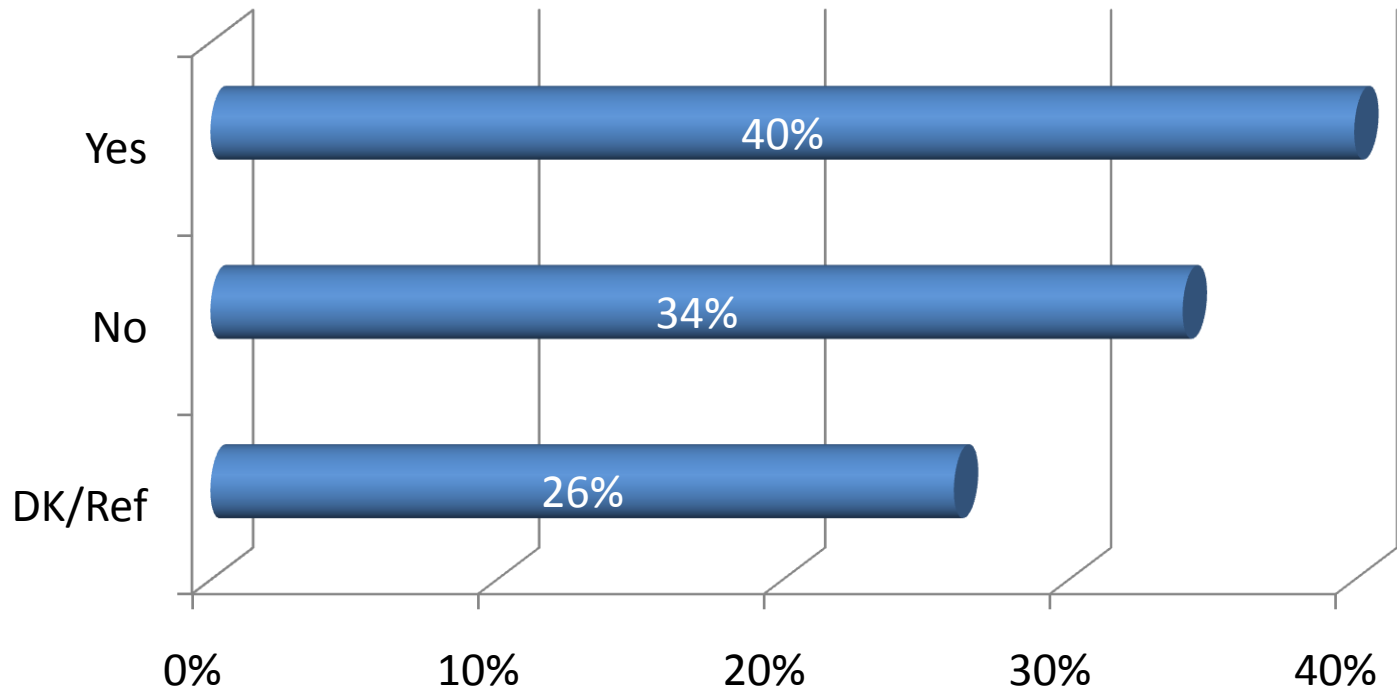


# Public Opinion Survey Results

San Diego County Water Authority Survey

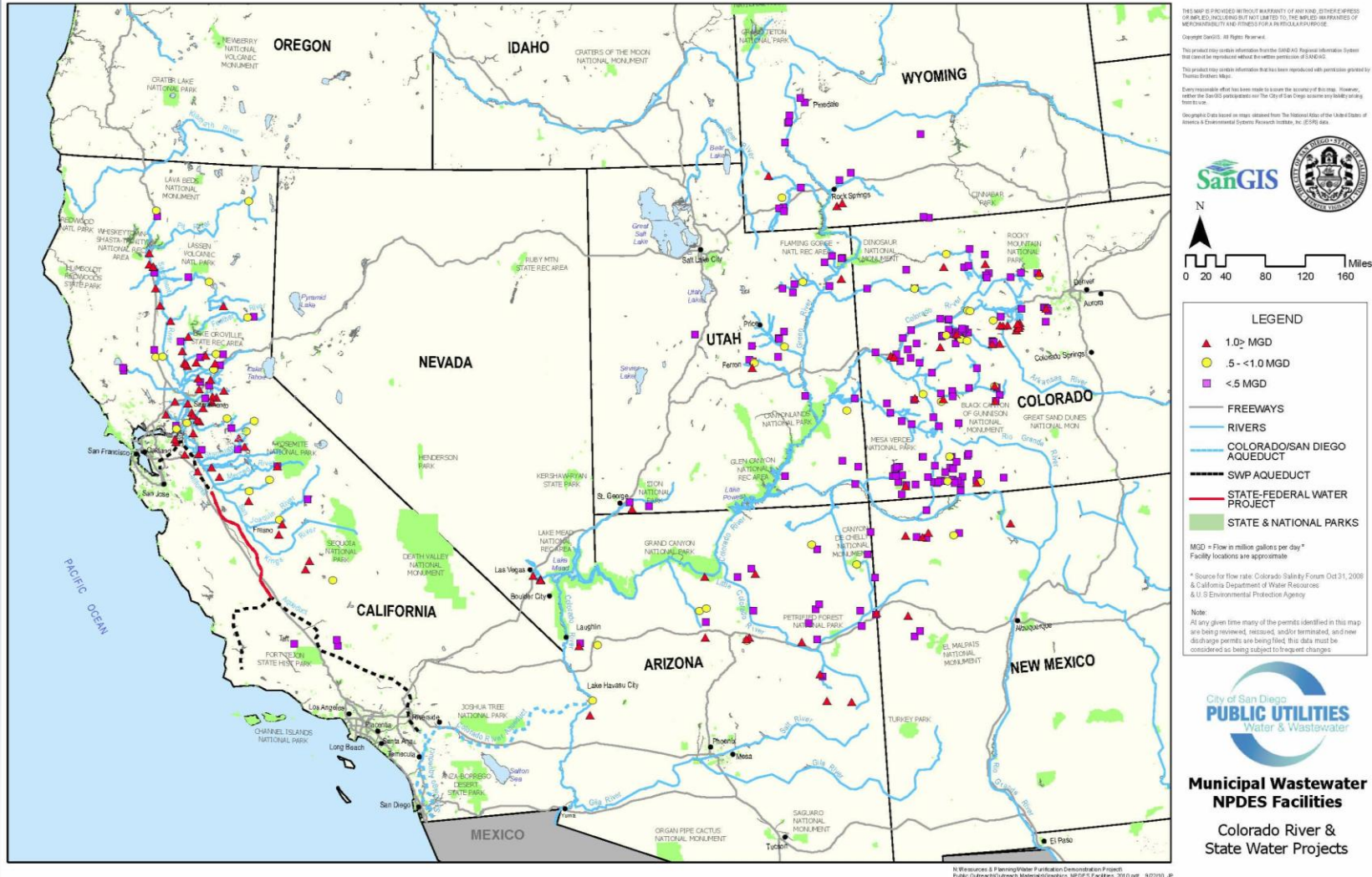
## Do You Think Our Drinking Water Already Contains Recycled Water?

**2009**





# Upstream Wastewater Discharges







# Public Outreach & Education





# Benefits of Reservoir Augmentation

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- Provide a local and sustainable supply of drinking water
- Increase utilization of recycled water
- Decrease dependence on imported water
- Use less energy than imported water
- Improve quality of reservoir water
- Have a positive impact on the environment



# Water Reliability Coalition



- BIOCOM
- Building Industry Association
- Building Owners and Managers Association
- Citizens Coordinate for Century 3
- Coastal Environmental Rights Foundation
- Endangered Habitats League
- Environmental Health Coalition
- Empower San Diego
- Friends of Infrastructure
- Industrial Environmental Association
- National Association of Industrial and Office Properties
- San Diego and Imperial Counties Labor Council
- San Diego Audubon Society
- San Diego Coastkeeper
- San Diego County Taxpayers Association
- San Diego Regional Chamber of Commerce
- San Diego Regional Economic Development Corporation
- San Diego River Parks Foundation
- Surfrider Foundation, San Diego Chapter
- Sustainability Alliance of Southern California
- Utility Consumers' Action Network



# What you should know...

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- San Diego needs to develop local, reliable sources of water.
- The Water Purification Demonstration Project is examining the use of advanced purified water.
- The purified water goes through multiple advanced treatment steps.
- No purified water will be added to the drinking water system during the Demonstration Project.





# For More Information

Visit: [www.purewatersd.org](http://www.purewatersd.org)

Email: [purewatersd@sandiego.gov](mailto:purewatersd@sandiego.gov)

Call: (619) 533-7572

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## Water Purification Demonstration Project

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[General Information](#)  
[Public Involvement](#)  
[Independent Advisory Panel](#)  
• [Members](#)  
[Links & Resources](#)

**Project Objective**  
Evaluate the feasibility of using advanced treatment technology to produce water that can be sent to San Vicente Reservoir and later distributed as potable water.

**Water Purification Demonstration Project (In progress)**

As part of the City's effort to provide a local and sustainable water supply, the Water Purification Demonstration Project is examining the use of advanced water purification technology to provide safe and reliable water for San Diego's future.

The Demonstration Project is the second phase of a process evaluating ways for the City to increase its use of recycled water. The first phase was the City's 2005 Water Reuse Study that identified reservoir augmentation as the preferred option for developing recycled water sources. The Demonstration Project will determine if reservoir augmentation is a feasible option for San Diego.

Funding for the Project was derived in part from a bond measure that increased the City's water rate.

**PureWaterSD.org**

**Diagram of Demonstration Project**  
[View larger image](#)

**Water Purification Demonstration Project INFORMATION CARD**

**Please check all that apply:**

- ☐ I am interested in the Water Purification Demonstration Project as a reliable local water source.
- ☐ I would like a project representative to make a presentation to my organization.
- ☐ I would like to receive periodic updates about the Demonstration Project.
- ☐ I support the City of San Diego pursuing the Demonstration Project.

**Please send information to:**

Name: \_\_\_\_\_ Organization: \_\_\_\_\_  
Address: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
City: \_\_\_\_\_ E-mail: \_\_\_\_\_  
Phone: \_\_\_\_\_

[purewatersd@sandiego.gov](mailto:purewatersd@sandiego.gov) • (619) 533-7572 • [www.purewatersd.org](http://www.purewatersd.org)

**Fact Sheet**

## Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

The City of San Diego has limited local water sources and relies on importing approximately 85 to 90 percent of its water supply. In the past, importing water from the Colorado River and Northern California has been a low-cost, reliable option, but environmental stresses and court-ordered pumping restrictions have continued to reduce the amount of water that can be delivered to San Diego. These circumstances and the threat of further limitations on our water supplies have intensified the need for new sources of water. As part of the City's effort to provide a local and sustainable water supply, the Water Purification Demonstration Project is examining the use of advanced water purification technology to provide safe and reliable water for San Diego's future.

The Demonstration Project is the second phase of a process evaluating ways for the City to increase its use of recycled water. The first phase was the City's 2005 Water Reuse Study that identified reservoir augmentation as the preferred option for developing recycled water sources. The Demonstration Project will determine if reservoir augmentation is a feasible option for San Diego.

The project is a multi-step process that includes:

- 1. Water Reuse Study
- 2. Water Purification Demonstration Project
- 3. Full Scale Reservoir Augmentation

**FAQs**

## Water Purification Demonstration Project

The City of San Diego • Public Utilities Department

**Does San Diego need more water?**  
Water is essential to our quality of life. The City of San Diego imports approximately 85 to 90 percent of its water supply from Northern California and the Colorado River. For the past few years, California has been affected by a historic dry period and a drought on the Colorado River. In addition, legal and regulatory decisions to protect endangered species in the Sacramento-San Joaquin Delta have resulted in restrictions on the amount of water that can be imported from Northern California. Population projections predict the City will need more water in the future than it is used today. Since San Diego is at the end of the imported water pipeline, and reserves an average of 10 inches of rain each year, we need to develop all possible local water supplies to secure a reliable supply of water for present and future residents and businesses in San Diego.

**Why can't we just conserve more water?**  
Using less water through conservation should always be the first step in protecting our local water supply. The City's conservation programs have helped reduce our dependence on imported water by saving more than 33,000 acre-feet of drinking water a year, which is enough to meet the needs of around 66,000 typical families for a year. However, while conservation is important, efforts to save water need to be combined with other sustainable strategies to meet San Diego's water needs in the future.

**Doesn't the City already recycle water?**  
Yes. The City of San Diego operates two state-of-the-art water recycling facilities capable of producing close to 48 million gallons a day of recycled water for irrigation and industrial purposes. Recycled water distribution requires a separate pipeline system of purple pipes to distinguish them from drinking water pipelines. The city's recycled water distribution system continues to expand, even during rainy periods. Constructing the purple pipe distribution system is also costly, as the City is examining other ways to use more recycled water including reservoir augmentation.

**Does the City have a recycled water use plan?**  
Yes, the City has a recycled water master plan and is always looking for ways to reuse existing water supplies. In 2003 the City conducted a comprehensive, balanced, impartial and science-based Water Reuse Study of all recycled water opportunities. The study included a public participation component and concluded that Indirect Potable Reuse or Reservoir Augmentation was the preferred method of implementing the expanded use of recycled water in San Diego.

**What has been done since the 2005 Water Reuse Study?**  
The Water Reuse Study was the first phase of the City's plan to expand the use of recycled water. The second phase is now underway to examine the feasibility of reservoir augmentation through a demonstration project.

**What is Reservoir Augmentation?**  
Reservoir augmentation is a multi-step process that is being examined by the Water Purification Demonstration Project. It includes using advanced water purification processes on recycled water which can be blended with existing "raw" water supplies. The Demonstration project will treat and purify recycled water to a local reservoir. The concept of Reservoir Augmentation is to add purified recycled water to a local reservoir which can be treated to drinking water standards and distributed to the public.

City of San Diego Public Utilities Department • Long Range Planning & Water Resources Division  
600 B Street, Suite 600, San Diego, CA 92101 • (619) 533-7572 • [www.purewatersd.org](http://www.purewatersd.org)

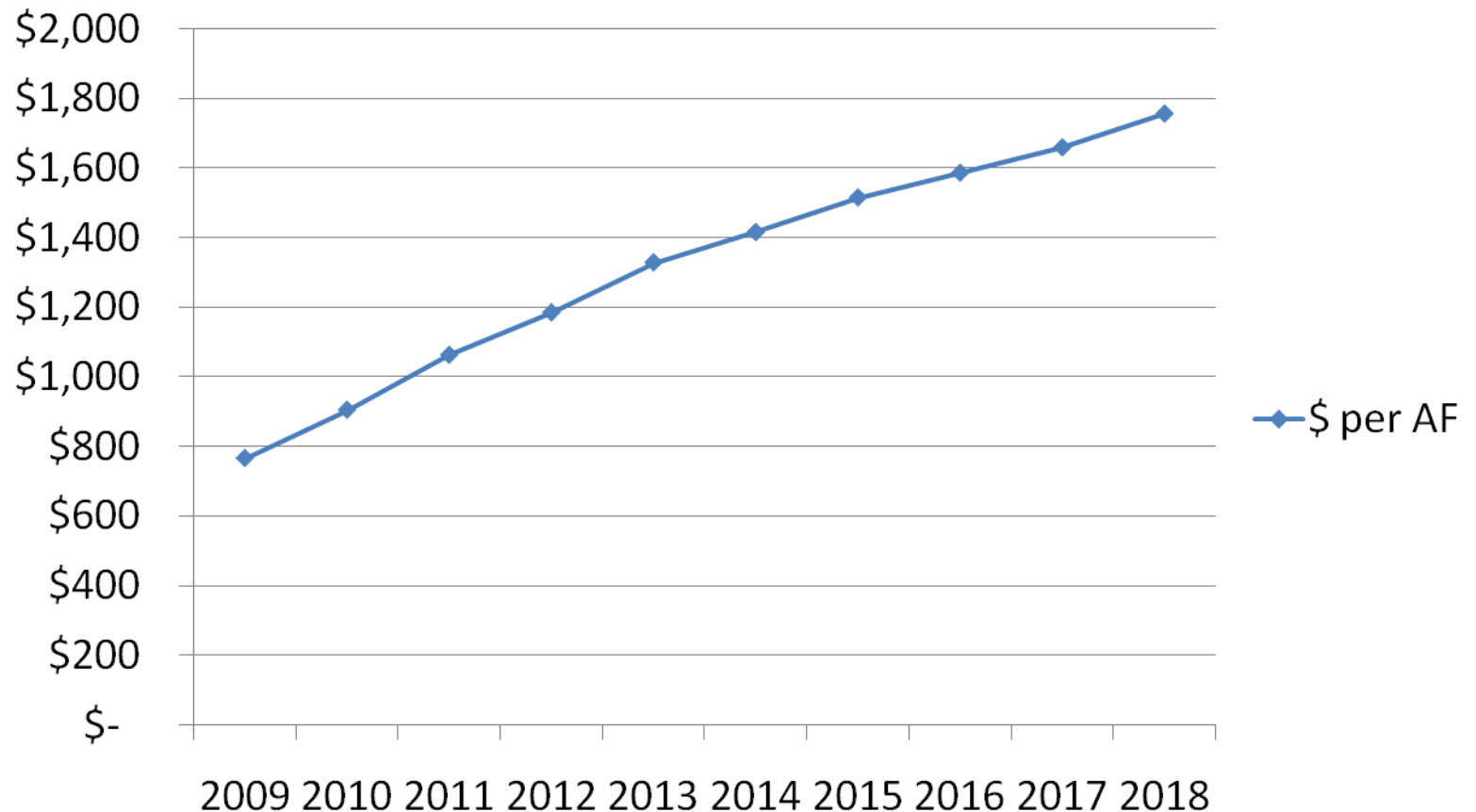
Public Information Officer: (619) 533-7572

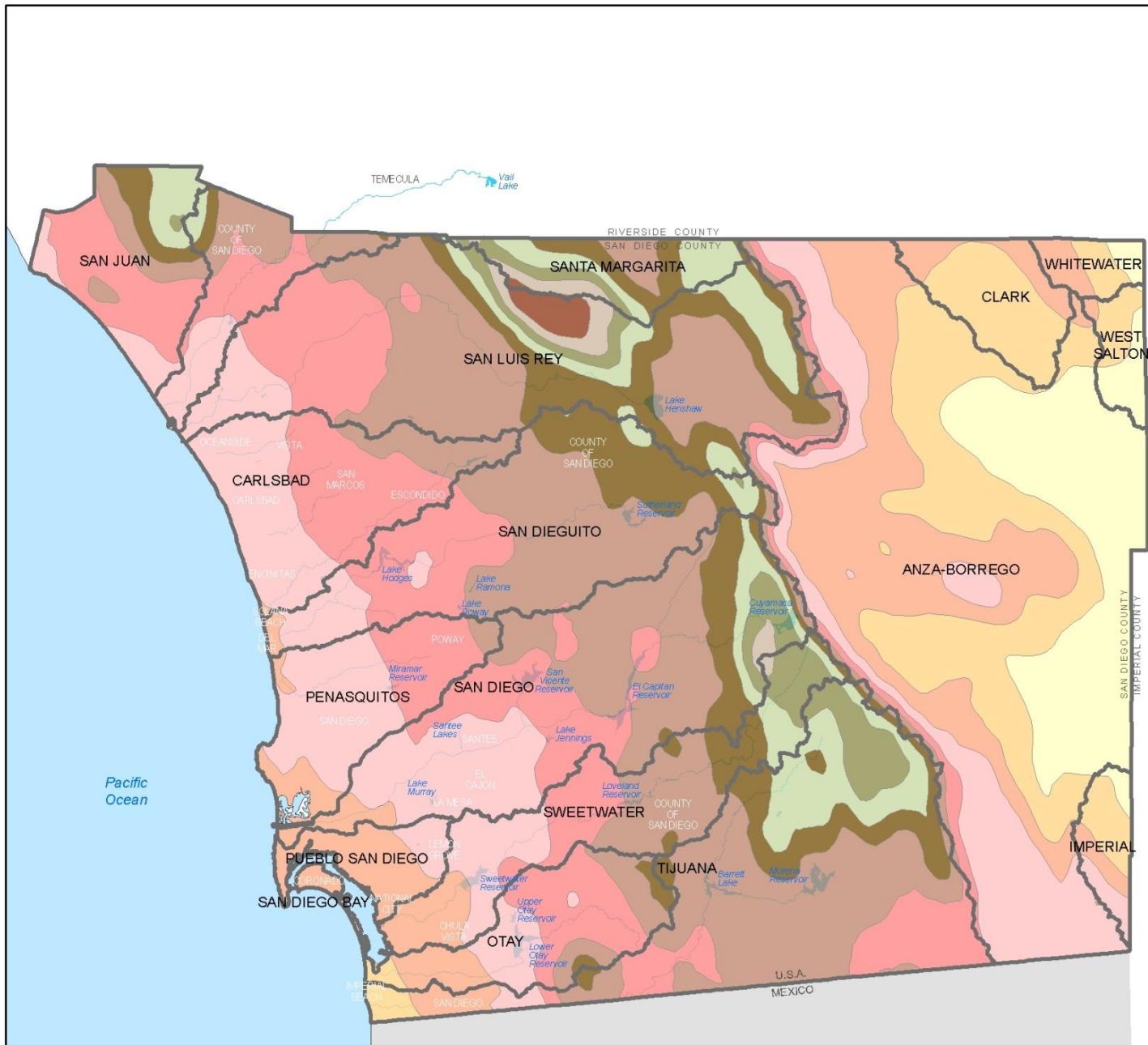




# SDCWA's Projected Rate Increases

**"All-In" \$ per AF of Treated Water**



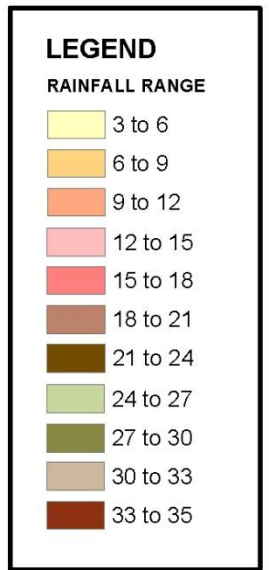
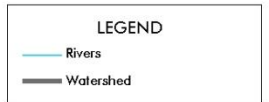
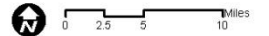


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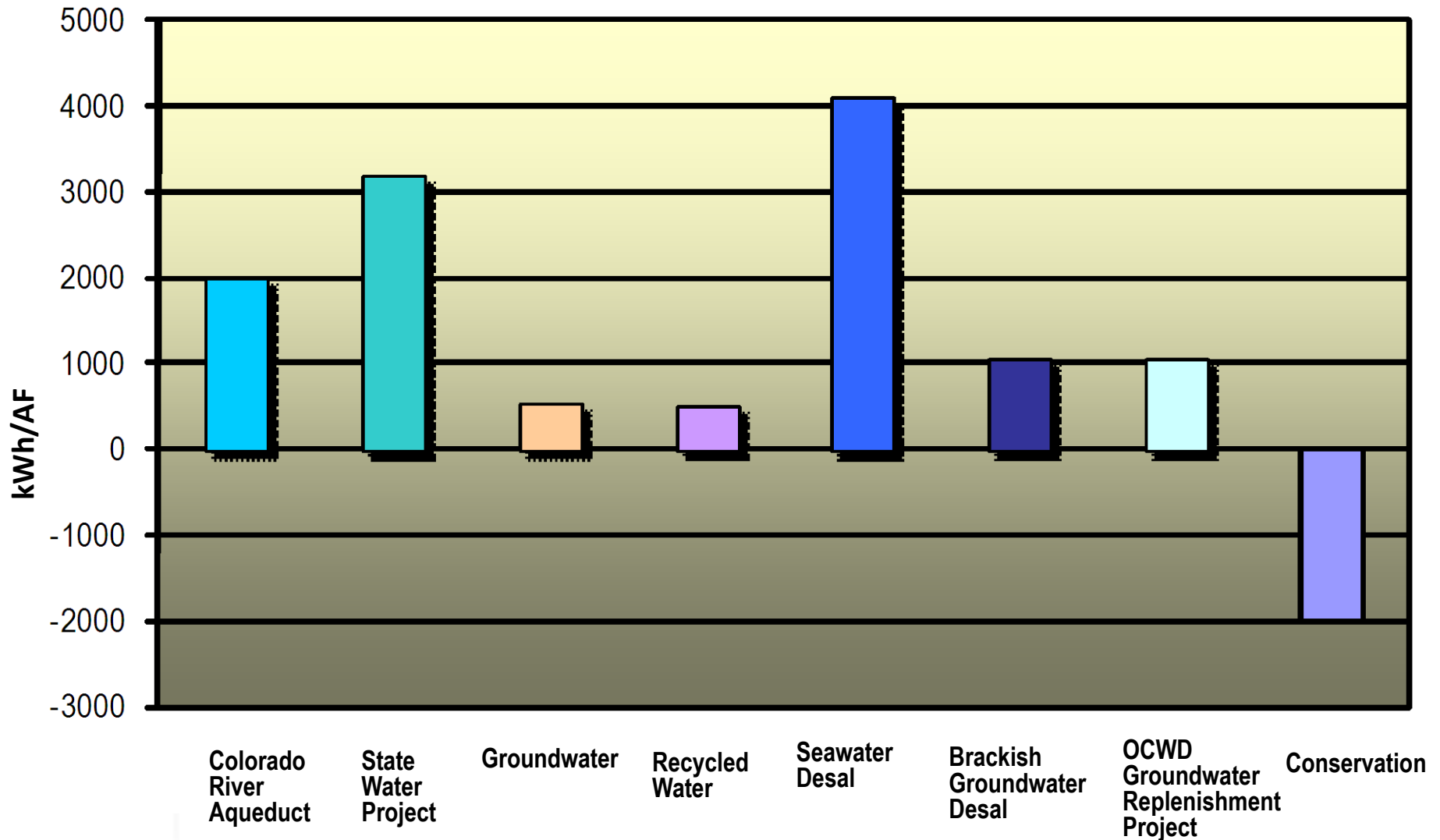
Long Range Planning & Water Resources Division

## San Diego County Watershed and Rainfall





# Carbon Footprint by Water Source



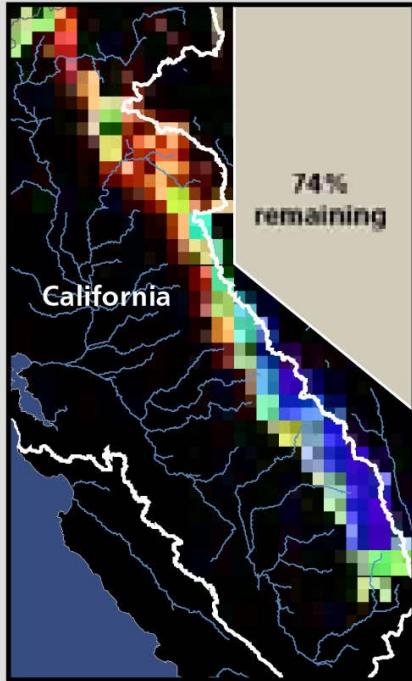


# Diminishing Sierra Snowpack

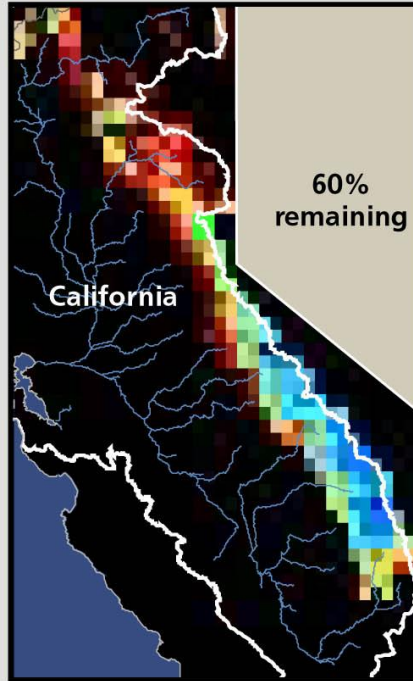
% Remaining, Relative to 1961-1990

2020–2049

Lower Emissions

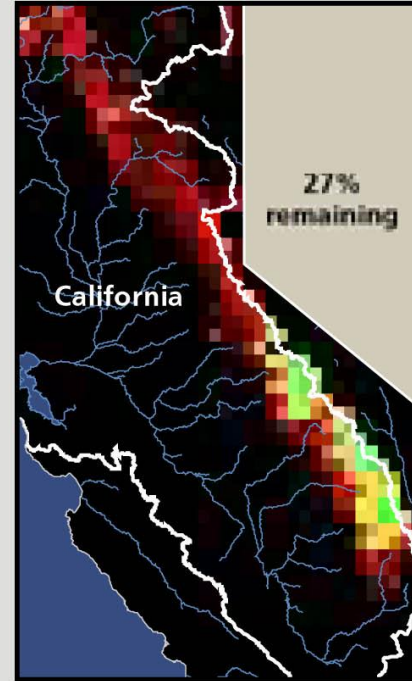


Higher Emissions

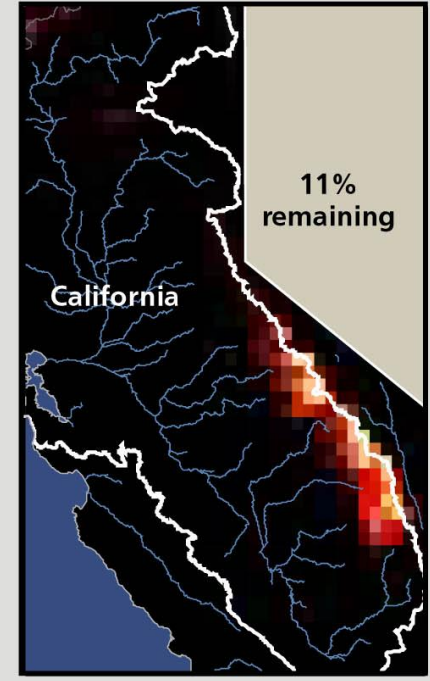


2070–2099

Lower Emissions

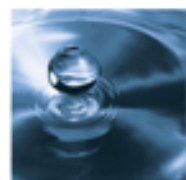


Higher Emissions



Remaining Snowpack (%)





## Change in water use by agency Fiscal year 2009 to 2010

No.	Agency	2009	2010	Percentage change
<b>Acre-feet</b>				
1.	Ramona	7,810	6,120	-21.6%
2.	Poway	13,680	11,440	-16.4%
3.	Rincon Del Diablo	7,470	6,280	-15.9%
4.	Lakeside	4,810	4,050	-15.8%
5.	Rainbow	26,420	22,360	-15.4%
6.	Santa Fe	13,430	11,390	-15.2%
7.	Valley Center	34,780	29,520	-15.1%
8.	Camp Pendleton	9,730	8,280	-14.9%
9.	Oliverhain	23,460	19,990	-14.8%
10.	Padre Dam	14,660	12,510	-14.7%
11.	Vallecitos	19,050	16,470	-13.5%
12.	Vista	21,960	19,230	-12.4%
13.	Fallbrook	15,210	13,320	-12.4%
14.	Carlsbad	19,620	17,230	-12.2%
15.	Helix	37,660	33,210	-11.8%
16.	San Diego	218,940	193,470	-11.6%
17.	Otay	34,970	31,190	-10.8%
18.	Oceanside	32,050	28,610	-10.7%
19.	Escondido	27,370	24,440	-10.7%
20.	San Dieguito	7,240	6,550	-9.5%
21.	Sweetwater	22,690	20,790	-8.4%
22.	Del Mar	1,200	1,130	-5.8%
23.	Yuima	3,380	3,300	-2.4%
Total		617,590	540,880	-12.4%

Excludes  
recycled  
water



# Conservation's Impact on San Diego's Water Use 1980 – 2009

