



City of Norman

PUBLIC FORUM SERIES ON  
SUSTAINABLE WATER RESOURCES

OTHER WATER SUPPLY OPTIONS

# Reclaimed Water

February 4, 2010

Tracy A. Clinton, P.E.

  
Engineers...Working Wonders With Water™



norm11011pp/01

## The Water Cycle

Continuous movement of water from ocean to air and land then back to the ocean, is as old as the earth itself.

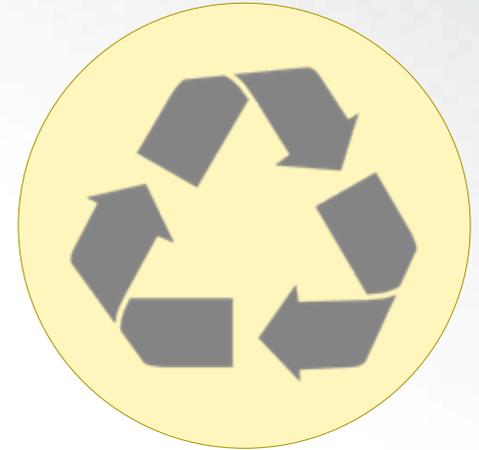
The basic underlying principle is simple: *all water is recycled.*

There is no new water.

# Synonymous terms

- Reclaimed Water
- Recycled Water
- Water Reuse

ALL =



# Why is Norman considering reclaimed water production and use?

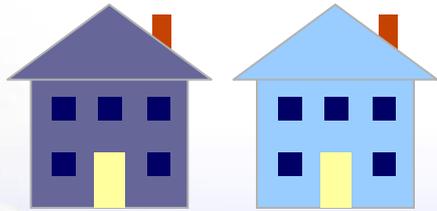
- We do not currently have enough water to support our future population needs
- It has been safely used at the OU Golf Course since 1996
- It was discussed in our Wastewater Master Plan
- Increasing other water resources, such as importing more water, could cost over \$400M
- It's a proven, safe, reliable drought-proof resource



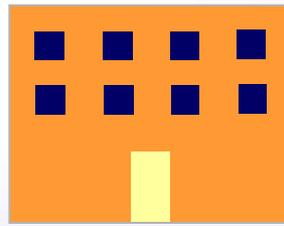
# What is reclaimed water?

- Wastewater that has undergone treatment to meet Oklahoma Department of Environmental Quality (DEQ) standards
  - Different levels of treatment are acceptable for different uses
- A sustainable, local, reliable, drought-proof water resource that can be safely reused

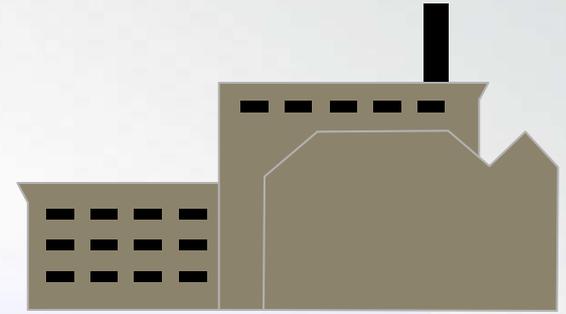
# Reclaimed water comes from...



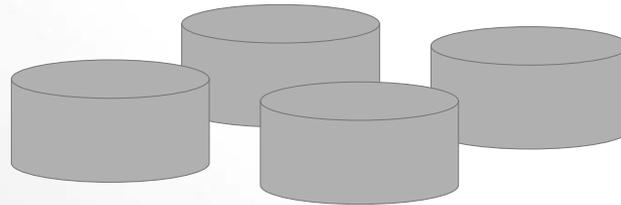
Houses



Businesses



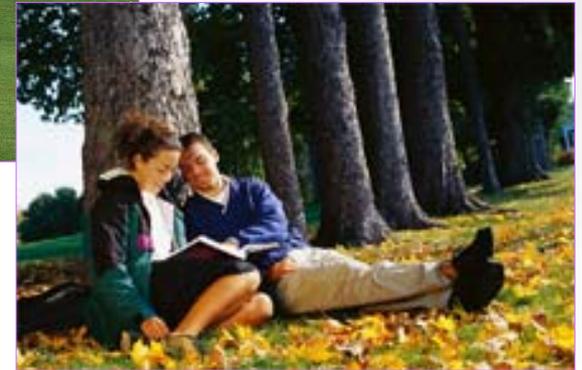
Industries



WWTP

# Traditional reclaimed water uses include irrigation of...

- Parks
- Sports fields/ complexes
- Golf courses
- Agriculture
- School/college campuses
- Residential
- Nurseries
- Cemeteries



# Other reclaimed water uses include...

- Impoundments
- Zoo/animal habitats
- Power plants
- Vehicle washing facilities
- Concrete mixing
- Carpet dyeing
- High tech chip manufacturing
- Paper board manufacturing
- Recharge
- Indirect potable
- Miscellaneous commercial/industrial



# A little reclaimed water history...

1918 - First regulations for reclaimed water adopted in California

1926 - First WW reclamation facility in the U.S. constructed at Grand Canyon National Park – toilet flushing, irrigation, cooling

1929 - Pomona, CA began using reclaimed water for landscape and garden irrigation

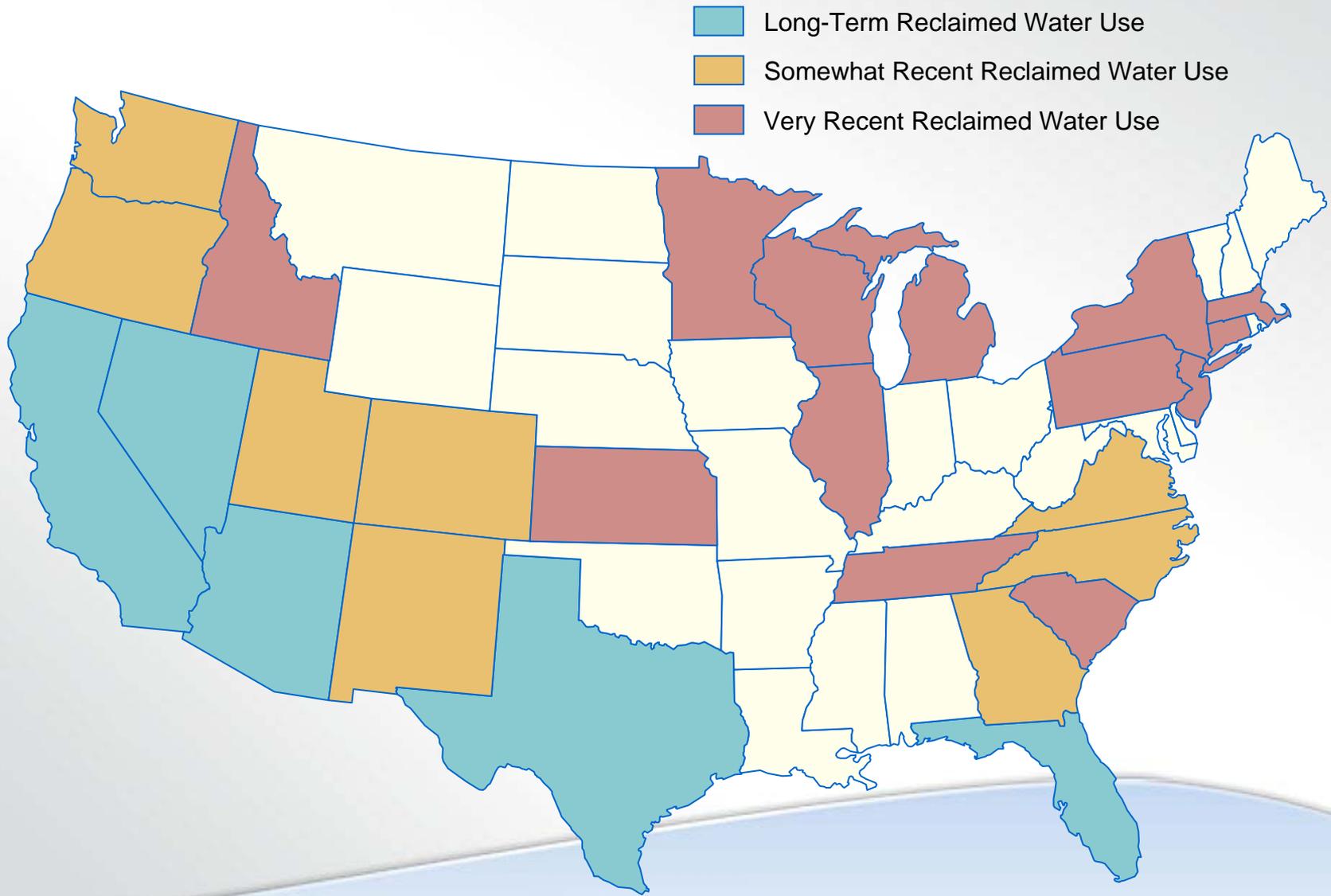
1932 - Large-scale landscape irrigation at Golden Gate Park

1942 - Bethlehem Steel in Baltimore, MD uses secondary effluent for cooling

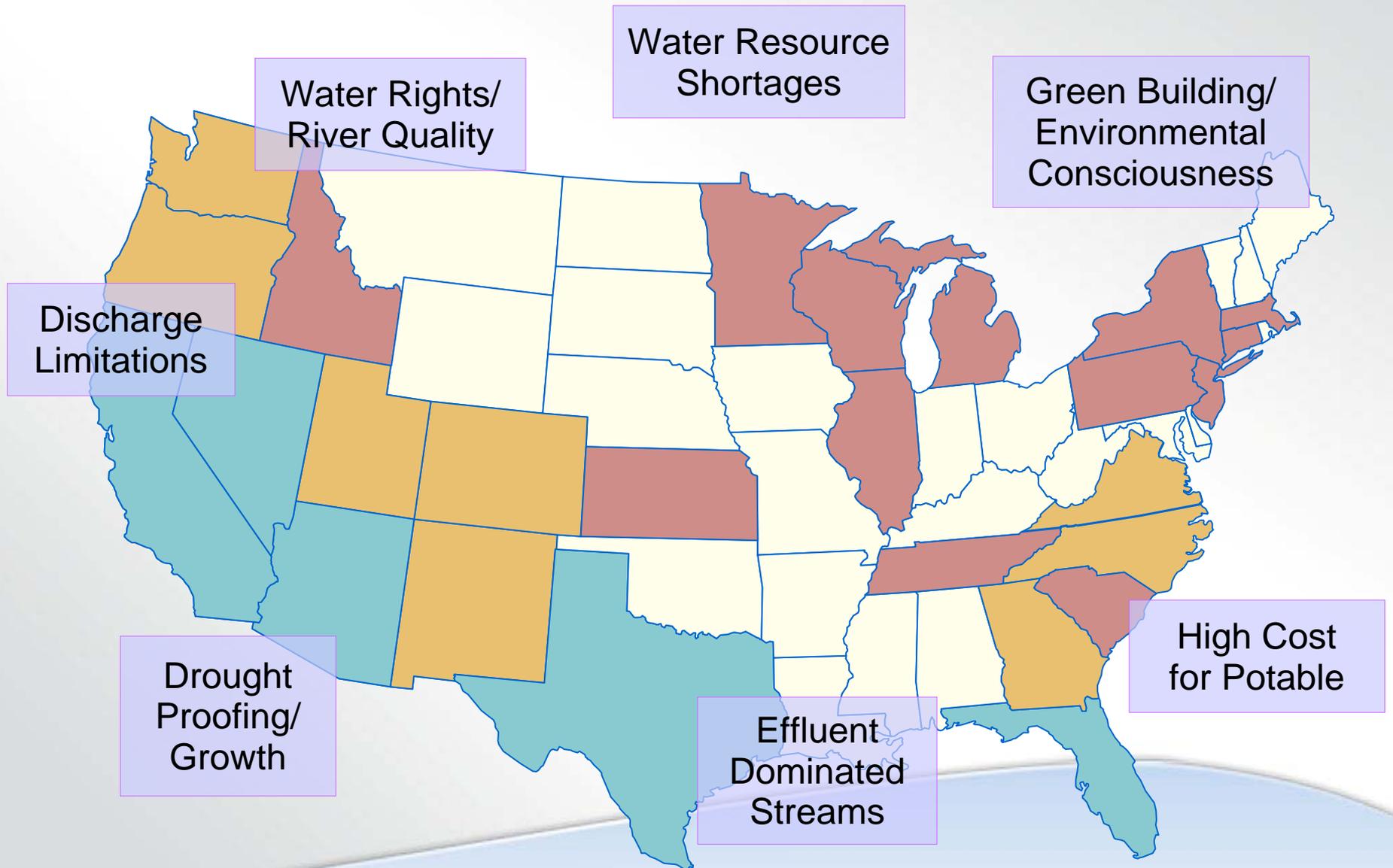
1962 - First deliberate recharge of reclaimed water into potable groundwater supply in Los Angeles area

1976 - Direct injection of reclaimed water for groundwater recharge initiated by Orange Co. Water District

# National reuse trends



# Reuse drivers



# Reclaimed water implementation considerations

- Technical
  - Match the level of treatment to the end use
- Funding/Financing
  - How to pay for the project and allocate costs and benefits
- Institutional
  - Regulations and water rights
  - Legislation/ordinances/city codes
  - Use agreements and contracts
- Public/Stakeholder outreach
  - General information to public
  - Customer information to user
  - Training information to site supervisors

# Examples of groundwater recharge projects

## Indirect Potable

- Water Replenishment Dist. and Los Angeles County Sanitation Dist., CA – 1962
- Orange County Water District, CA - 1976
- Fairfax, VA Upper Occoquan Sewage Authority - 1978
- El Paso, TX - 1985
- Dallas, TX - 1987
- West Basin Municipal Water District (LA), CA - 1995
- El Segundo - 1995
- City of Scottsdale, AZ - 1998
- Lawrenceville, GA - 2000
- Gwinnett County
- Inland Empire Utilities Agency
- Miami-Dade, FL
- North Texas Municipal Water District
- San Bernardino, CA
- Tarrant Regional Water District

## Wetlands

- Clayton County, GA -1987
- Orland Easterly Wetlands, FL -1987
- Irvine Ranch Water District, CA - 2000
- Green Cay Wetlands, FL - 2005
- Gilbert, AZ
- Tres Rios Wetlands, AZ

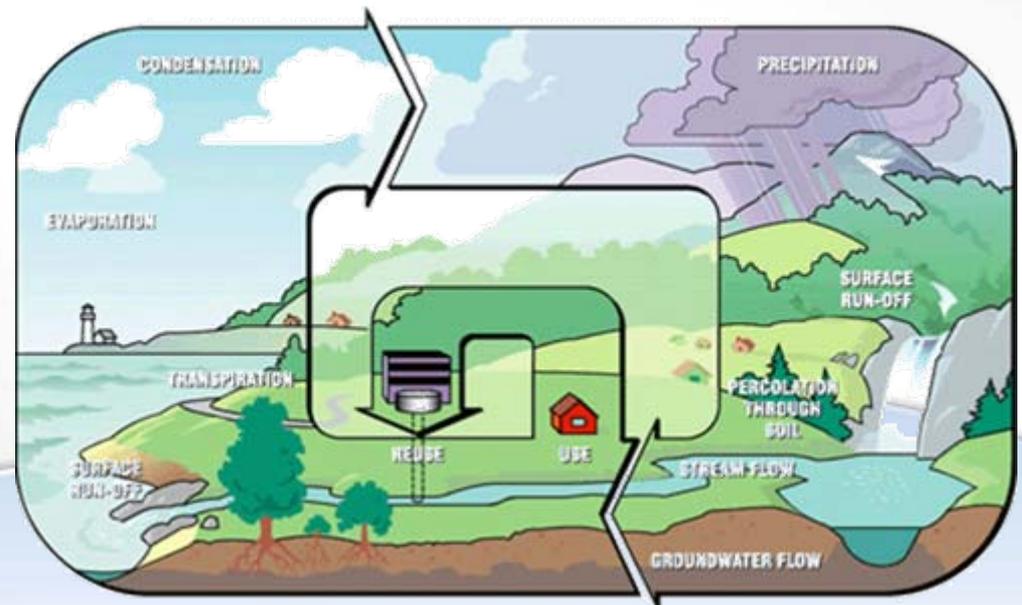
# Case Study #1: Orange County Water District, CA

- The most widely recognized and highly regarded water purification program in the water industry worldwide
- Reclaimed water is used for groundwater replenishment and seawater barrier since 1976
- Water is injected into Orange County aquifers
- Water is also piped to spreading basins and allowed to percolate
- More than 50% of the area's water supply is drawn from groundwater aquifers



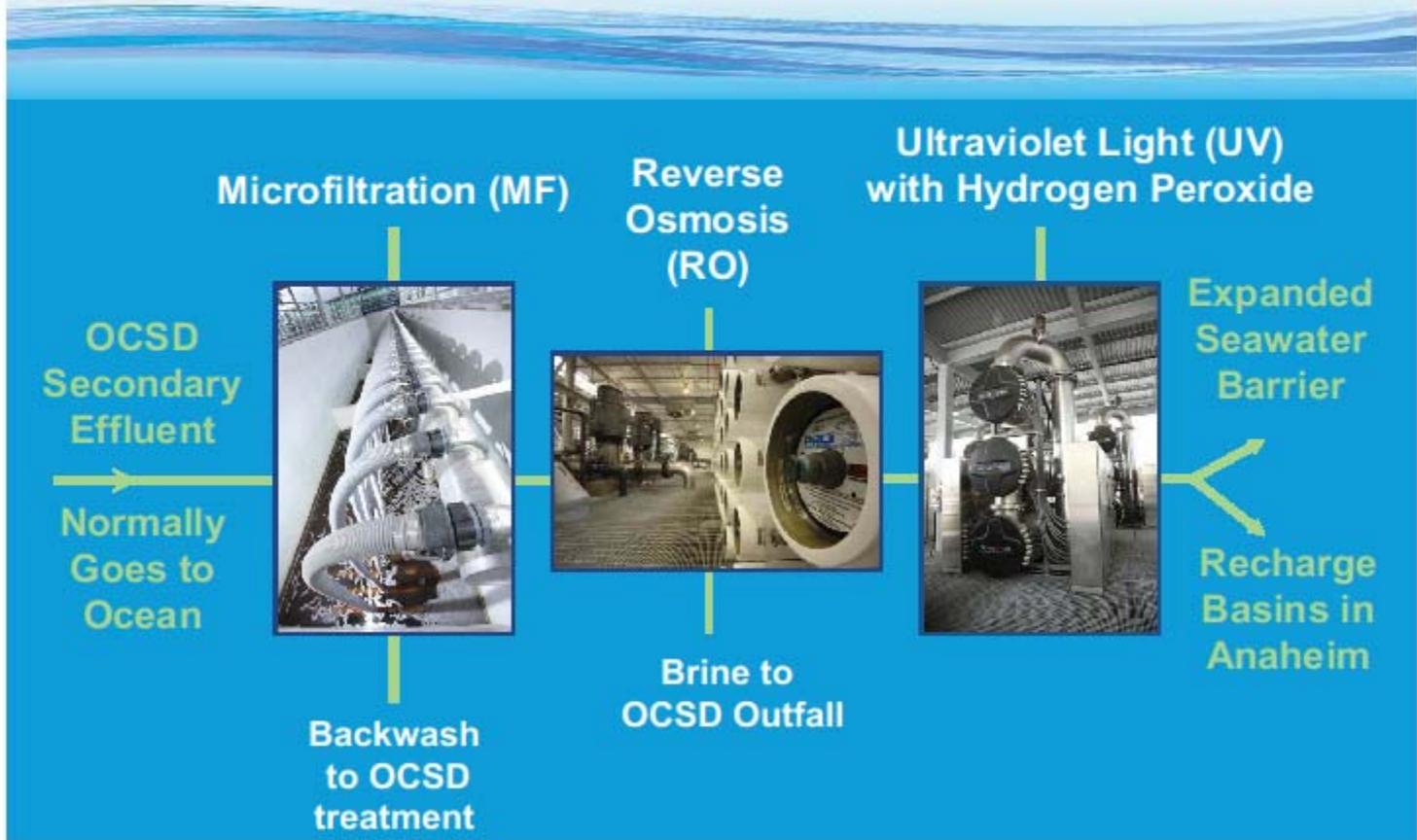
# Sources of recharge water for OCWD

- Santa Ana River - primary recharge source, natural, historical source for OC basin
- Imported water - Colorado River and State Water Project
- Local rainwater, urban runoff
- Treated recycled water





# GWR System Advanced Water Purification Process

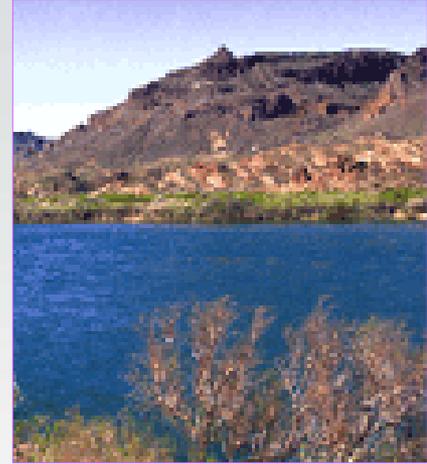


# Public outreach

- Outreach began early, over 10 years prior to start-up
- Researched public concerns
- Conducted face-to-face presentations
- Held meetings with community leaders
- Measured effects of outreach
- Achieved community support
- Outreach continues today, assisted by media interest



# Orange County public outreach lessons learned



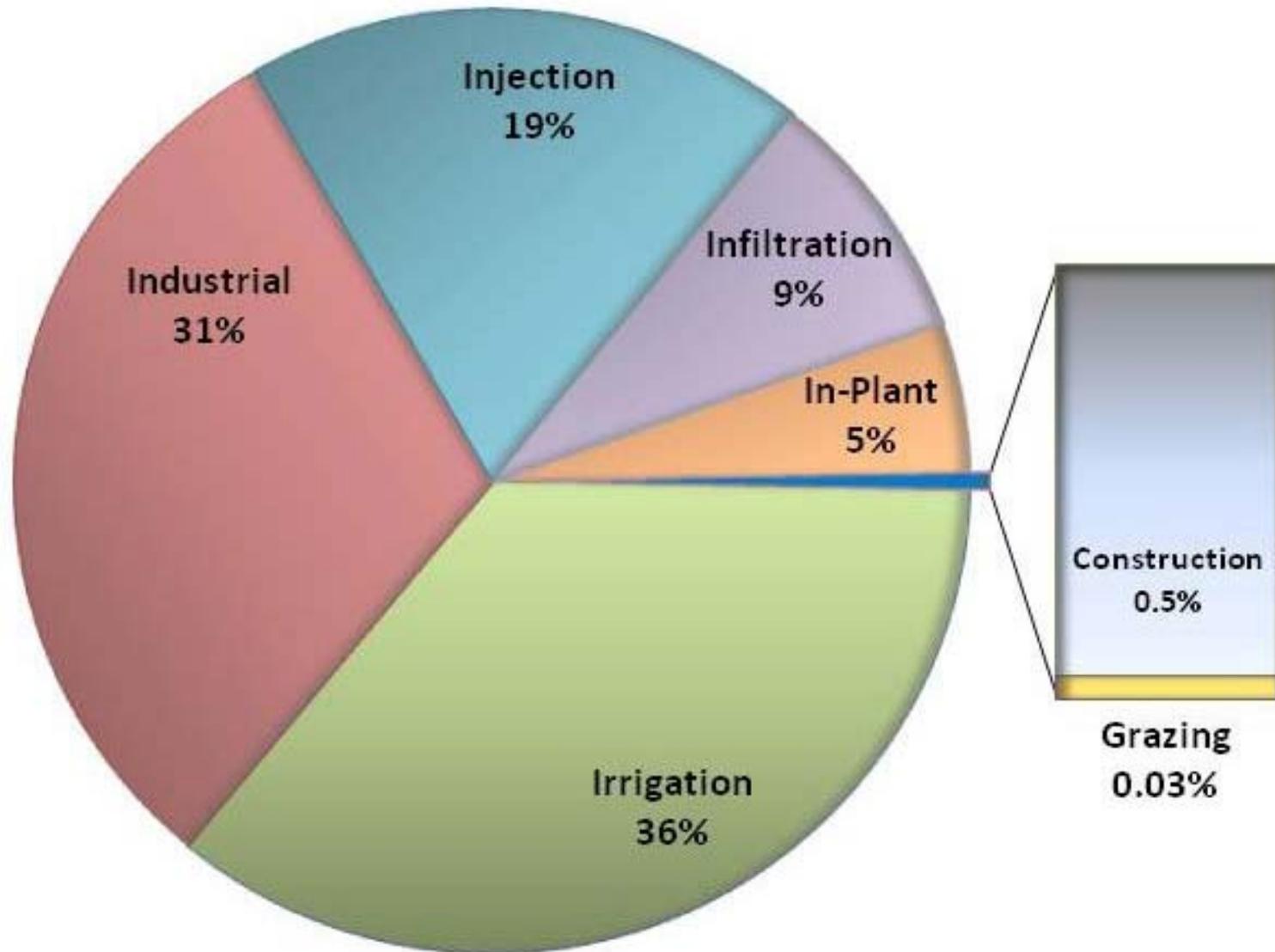
- People do not know about water supply needs
  - First must explain the need
- Messages must address health and safety
- Orange County citizens want reliability, local control, and high quality water
- Women, mothers, minorities, and elderly are key audiences
- Face-to-face presentations are best
- Avoid jargon
- Testimonials from outsiders are important – especially medical/public health
- “Reverse osmosis” elicits positive response
- Word “purified” better than reclaimed, reused, etc

# Case Study #2: El Paso Water Utilities, TX



- Provides water and wastewater service to about 700,000
- Hueco Bolson aquifer provides about 40% of the municipal water needs of El Paso and 100% of Fort Bliss, TX and Ciudad Juarez, Mexico
- 1963 – EPWU supplies reclaimed water to golf course for irrigation
- 1985 – Fred Hervey Water Reclamation Plant was built for aquifer recharge
  - First full-scale plant in the U.S. to treat wastewater to potable standards
- 1987 – Northwest Wastewater Treatment Plant is built with reclaimed water supply in mind
- 1991 – Bustamante Wastewater Treatment Plant is built. A reclaimed water supply system is added in 1998
- Treats 8 mgd of wastewater to drinking water standards for injection

# El Paso – FY 2008-09 reclaimed water production



# El Paso – Marketing strategy

- New Strategies implemented with new projects
  - Sites identified based on landscape area
  - A preliminary *site suitability assessment* is performed
- Identify sites with favorable site conditions
- Contact potential customers
- Provide cost savings analysis based on last 2 years of consumption
  - Provide cost estimate of upfront expenses
  - Request letter of commitment from Customer



# El Paso – Benefits to using reclaimed water



- Saves potable water
- No restrictions on its use during drought
- Less expensive than potable water
- Reduces peak demands on potable water system
- Prevents waste of potable water on non essential uses
- It is less expensive than potable water
- Provides nutrient value to irrigated soils at no added cost

# Case Study #3: Clayton County, GA - Land application system and wetlands

- Provides water to more than 260,000 people
- 1982 – land application system placed in service
- 1995 – Wetlands Center opens
- 2004 – First phase of treatment wetlands were introduced
- 2006 – Second phase of wetlands added
- Flow previously sent to the land applications system is now diverted to constructed wetland cells for additional purification
- Water from wetlands eventually drains to storage reservoirs in the area for drinking water supply
- CCWA Integrated water reclamation, water production, and catchment management to provide a sustainable process which provides protection for its water
- Less than half the cost of producing purified water with more conventional methods



# Clayton County Water Authority

- The Wetlands Center is a 32-acre site that includes a wetlands trail and a 4,800 sq/ft building complex comprised of an exhibit/learning area, a 50-seat auditorium, offices, and a conference facility.
- Outreach includes: website, maps, tours, brochures, guided walks
- Close to a major urban center



**Reclaimed water** has forever changed the practice of integrated water resources planning by providing a proven, local, reliable, drought-proof, water source that is safely used across the U.S. and abroad.