The Story of the Santa Ana Watershed

How We Got to Where We are Today or…

"From Conflict to Collaboration"

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With special thanks to Daniel Cozad and Jason Uhley from the San Bernardino Valley Water Conservation District and the Riverside County Flood Control and Water Conservation District for slide sharing

The Santa Ana Watershed

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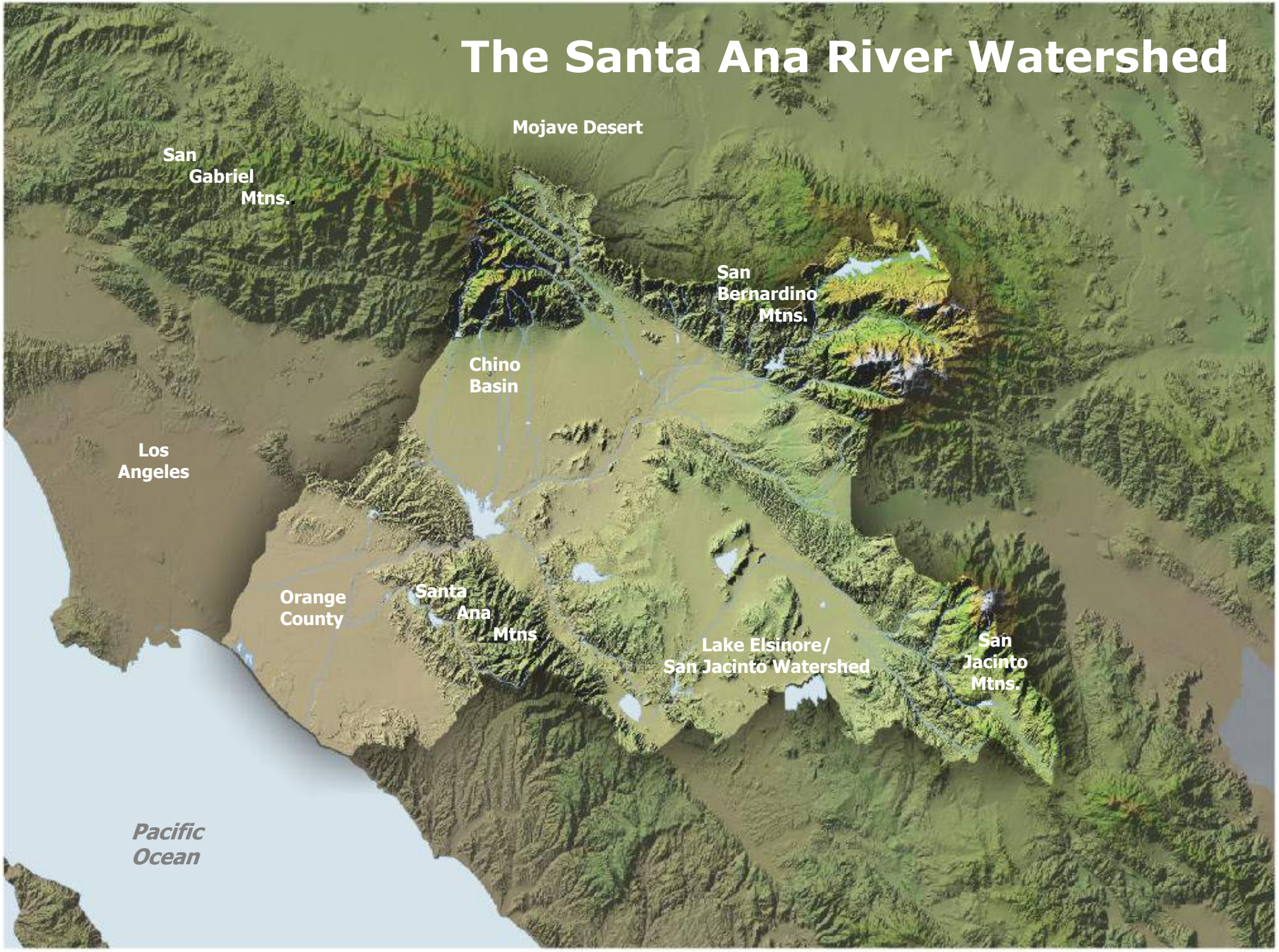
- Over 2,650 square miles
- 6 million residents: 15% of the State's urban population
- Portions of 4 Counties
  - Orange County
  - Riverside County
  - San Bernardino County
  - Los Angeles County
  - All Linked by one River


The Santa Ana River Watershed
Mojave Desert
San Gabriel Mtns.
San Bernardino Mtns.
Chino Basin
Los Angeles
Orange County
Santa Ana Mtns
Lake Elsinore/ San Jacinto Watershed
San Jacinto Mtns.
Pacific Ocean

Water IS Critical

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- All life is linked by one element – WATER
- All life in a watershed is drawn to its river and tributaries

- These truths drove exploration, settlement and development in the Santa Ana River Watershed past and present and are critical to our future.

Early Story of How the Headwaters Were Shared

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"It took several hours for the water to run from Crafton to the lower reaches. East end users could refrain from taking water until 3:00 pm allowing irrigation until bedtime in the west end. The water turned into the ditch at 9:00 pm would refill the channel before west end farmers awoke and cattle needed watering. Water would reach the Barton Ranch by 4:00 am and thereby all have daylight for irrigation."

Permanent Weir/Gates
November 21, 1930

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Later Named Cuttle Weir 1933

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Agricultural Origins

- 1880's
  - Over ½ million citrus trees in California
  - Well over half of these in Upper Santa Ana River Watershed
- By 1895
  - Farm centers in Riverside and Redlands traded positions as the wealthiest city (per capita) in America
- All due to robust surface and groundwater availability & irrigation


Gage Canal

Agricultural Origins

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- 1850
  - California's largest wineries
  - Barton - Redlands
  - Cucamonga Appellation

- Destroyed by flooding
- Converted for Development

Domenico in vineyards with crew

Thomas Winery

1862 Changed Everything

- Great Flood of 1862
  - 10 Feet of rain in 28 days
  - Impact from Washington to San Diego
  - The Los Angeles, San Gabriel and Santa Ana River Deltas MERGED.
    - Govt surveys indicated solid expanse of water from Signal Hill to Huntington Beach
  - Arkstorm event
  - 200,000 cattle drowned in Anaheim
  - Sacramento abandoned from Dec 1861-March 1862
  - Factoid: Los Angeles Population ~5,000 people
  - Severe statewide drought followed, effectively wiped out state's cattle industry

1938 Floods

Santa Ana River flooding – March 1938

1st WATERSHED FACT

The Santa Ana River was declared the "greatest flood hazard in the US west of the Mississippi River" by the Army Corp of Engineers in 1941 after the floods of 1862 and 1938.

Since then, the Corp built two dams, Prado and Seven Oaks, and the waters of the Santa Ana River have been adjudicated.

SAR Settlement

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- 1942 Irvine/OC Water District settlement
  - Limits spreading in the Wash Basins
- 1951 OCWD v Redlands, San Bernardino, Colton and Riverside
- 1963 Western Municipal files against 240 defendants
- 1963 OCWD files against all water producers above Prado Dam
- 1969 SAR and Western/SB adjudications
- Adjudicated basins are exempt from SGMA

River Serves as Water Pipeline to Orange County

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- The river is a primary conduit for water from the upper watershed to OC
- 232,000 Acre Feet required by the judgement in 1969
- Water must be able to be used
- TDS is the limiting constituent for use
- OC now reuses much of its wastewater

Our River Provides Many Services

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- Floodway for storms
- Precious Habitat for species
- Drinking water pipeline
- Recreational and park amenity
- Home to homeless

Conflicts exist in all of these

100 Years of Management

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- Water supply critical agriculture
- Agriculture critical to homesteading
- Homesteading led to settlement
- Settlement allowed development
- Development provided economic value, jobs and raised the quality of life
- Groundwater recharge was critical to sustaining historic activities and is even more essential to our future

Early Spreading Grounds

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Santa Ana Basins

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Mill Creek Basins

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Seven Oaks Dam

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- Improved the flood condition of the river
- Significantly changes recharge and river habitat and impacted water quality
- Enabled Enhanced Recharge

Still Working Today

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Endangered Species

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Wash Plan Land Use

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- Improve land use and habitat of Wash Area
- Wash Plan Task Force
- Changes in ownership with BLM and others
- Improves habitat and ensures future recharge operations
- Benefits Cities, District and Mining Partners

Acre Feet of Conserved Water in the Bunker Hill Basin

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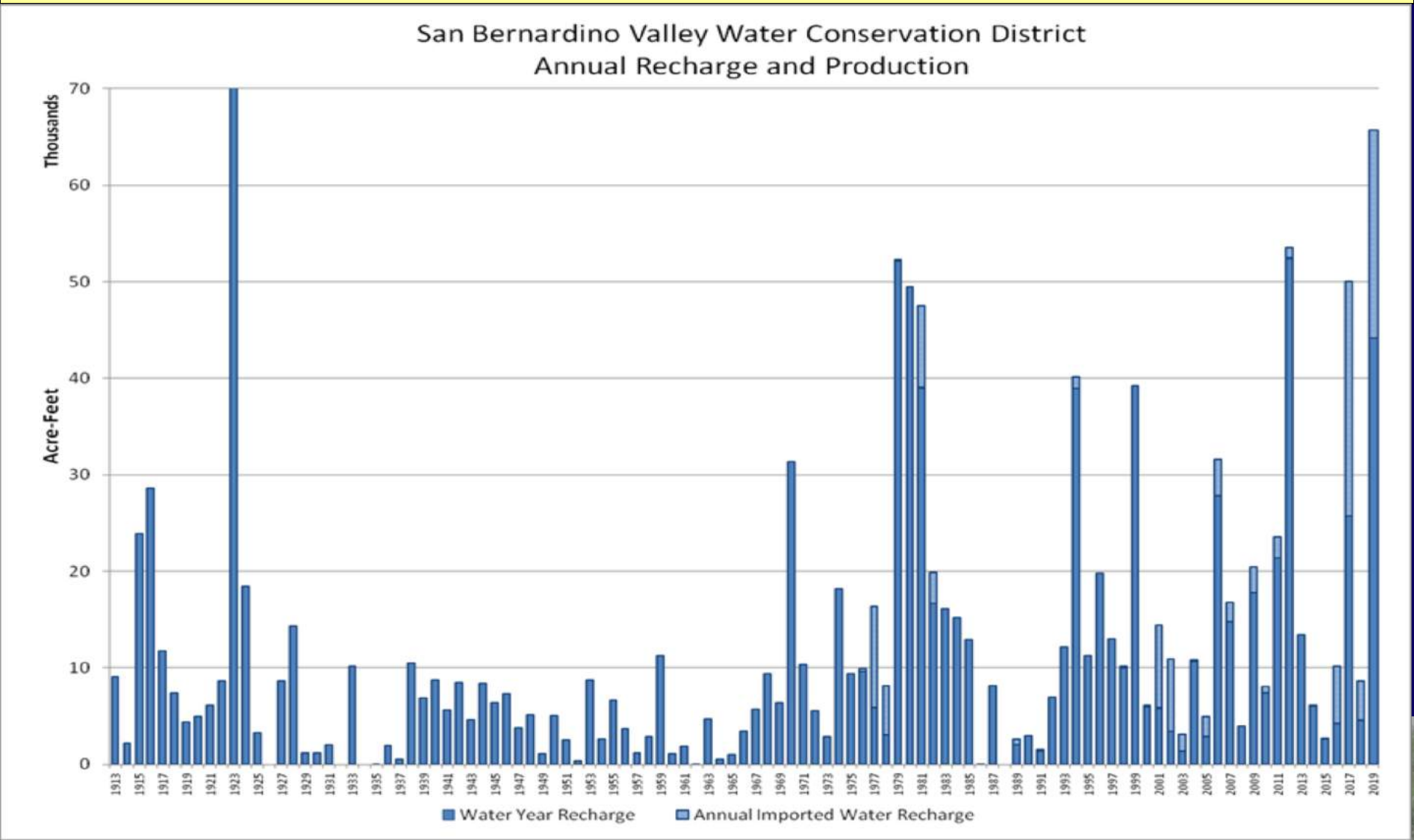

Santa Ana River Trail and Parks

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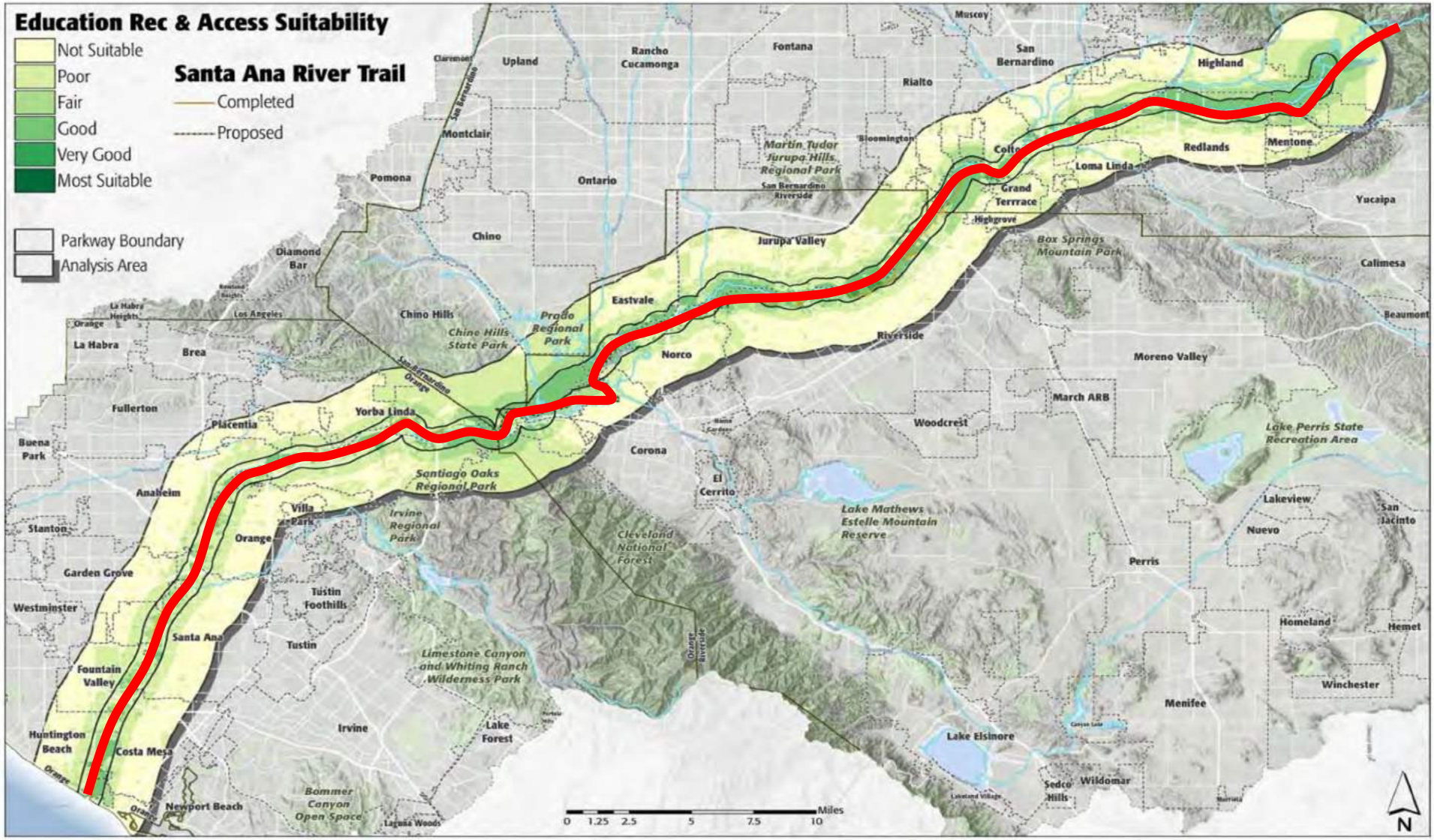

Homeless in River Floodway

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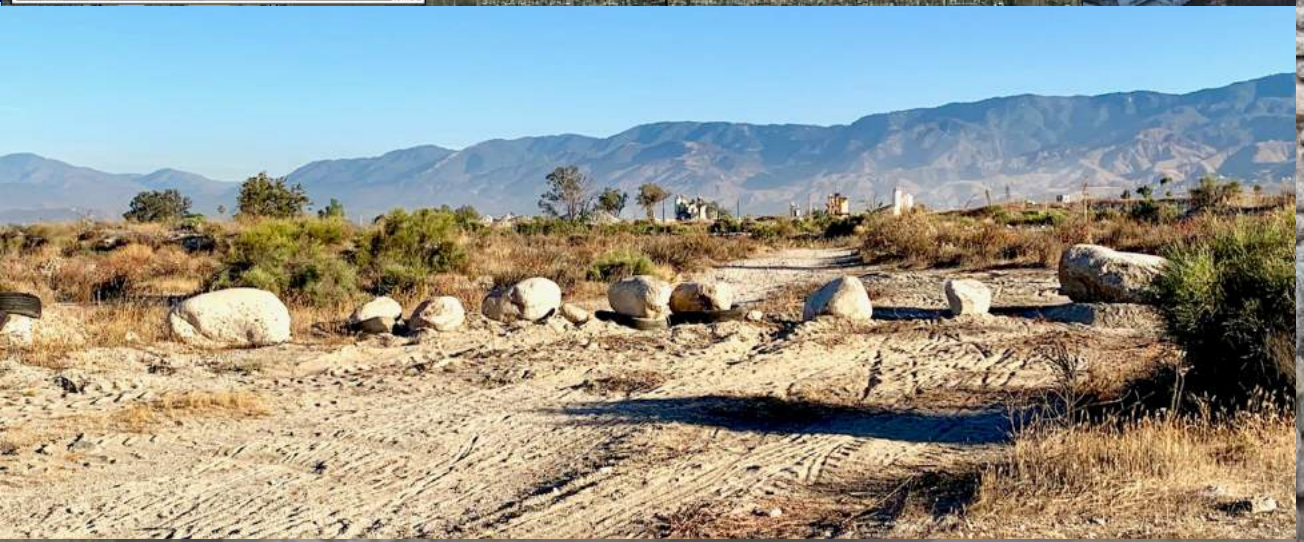

Watershed Challenges

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- Fire
- Flood
- Water Quality
- Discord
- Impacts of Climate Change

THREE TRAITS OF CLIMATE CHANGE IMPACTS IN DEVELOPED SOUTHERN CALIFORNIA

"The New Normal"

01

DROUGHTS

(current on 20 years and running)

- Longer
- Drier
- Hotter

02

FIRES

- More extreme
- Burning larger areas
- Occurring more frequently

03

FLOODS

- Storm events getting wetter and after big fires, post-fire debris flows at the base of semi-arid mountains are getting worse

Alluvial Fan Task Force

What are Alluvial Fans?

Alluvial fans are gently sloping fan-shaped landforms that are created over long periods of time by the natural deposition of eroded sediment from an upland source. They are a common landform seen at the base of semi-arid mountain ranges and serve as natural buffers between fire-prone mountain ranges and flooding. Flooding on alluvial fans is different from flooding on riverine and coastal areas. Paths of flooding and debris flows on alluvial fans may be uncertain making development challenging.

Joshua Tree
San Bernardino County

Santa Rosa Mountains
San Diego County

Whitewater Area
Riverside County

Residential development in California clusters on "fan-shaped" alluvial fans at the base of semi-arid mountains because the building sites provide panoramic views.

Alluvial fans and alluvial floodplains are prone to wildfires and post-fire debris flows

Geologic hazards on these landforms increase abruptly after wildfires followed by heavy rains that increase debris flows emanating from mountain canyons.

Property losses due to wildfires on these landforms are an unfortunate consequence of residential development here. Wildfires are often propelled by dry "Santa Ana " winds funneling down mountain canyons.

The Integrated Approach

The Integrated Approach (IA) consists of a suite of local planning tools for pre-project screening designed to assist local communities that need to plan for and evaluate future development proposals on alluvial fans. The tools provide a method for planners to evaluate hazards, resources, and site-specific issues in alluvial fan areas that are proposed for development. This evaluation helps determine, in the pre-project phase, whether new development can be designed to promote flood management sustainability, by avoiding the most hazardous areas and conserving the most valuable resources. Flood management tools are included that are consistent with FEMA guidelines to analyze alluvial fan flood hazards and to formulate flood hazard protection.

The Model Ordinance

The Task Force authorizing legislation also directed that a Model Ordinance (MO) be developed to assist city and county governments in planning and development activities in alluvial fan areas. The MO provides a process and guidance to implement the local planning tools presented in the IA to provide informed land use decisions for development proposals in alluvial fans areas. The MO was designed to ensure that land use decisions achieve three critically important objectives:

- Minimize flooding and other hazards that may result by locating development on alluvial fans;
- Minimize the costs and damages that may result from these hazards; and
- Preserve and maximize the flood protection, environmental and other beneficial values that alluvial fans provide.

Old Fire
Grand Prix Fire
Lake Silverwood
Lake Arrowhead
Rancho Cucamonga
OCWD
SBVMWD
Redlands
Chino
Riverside
Prado
Anaheim
Tustin
Huntington Beach
San Jacinto

Legend

Burn Severity

- High
- Moderate
- Low
- Rock

Tree Mortality (Percent Affected)

- 5 - 20
- 21 - 40
- 41 - 70
- 71 - 100

- Impacted Lakes/Recharge Basins
- Impacted Flood, Recharge, Habitat
- Downstream Impacted Area
- Fire Boundary
- Heavily Impacted Stream
- Impacted Stream

Burn Severity and Impacted Areas in Santa Ana Watershed October 2003 Wildfires

2nd WATERSHED FACT

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- Three Counties still working together
- Still plagued by Fire, Flood and Drought
- Need water conservation more than ever
- Water is still a major determinant in the economy and environment of the Valley
- Requiring Leadership, thoughtfulness, problem-solving and partnerships

Sustainability & Diversity

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• Geographic	• Desert to coastal
• Habitats	• Alpine, desert, ocean
• Development	• Irvine/Anaheim to Devore
• Density	• Forest Rural to inner city
• Economics	• Chino Hills to San Bernardino/Santa Ana
• Ethnic	• #2 to Fresno County
• QOL	• Highest to lowest
• Sustainability	• High to low

Integrated Planning

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- SC Integrated Plan and IRMW Planning
- How big should a region be?
- Individual agencies cannot reach their highest aspirations without help in a complicated regulated California
- Integration and partnerships take time
- Builds relationships and resilience for difficult and complex discussions and issues

Collaborative Future

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- Groundwater Council – 2017
  - Voluntary agreement of all producers
  - No courts required
  - Ensures sustainable groundwater is affordable to all agencies by funding imported water needed to balance the basin
  - New era of cooperation and mutual trust and interdependence

Recharge Future

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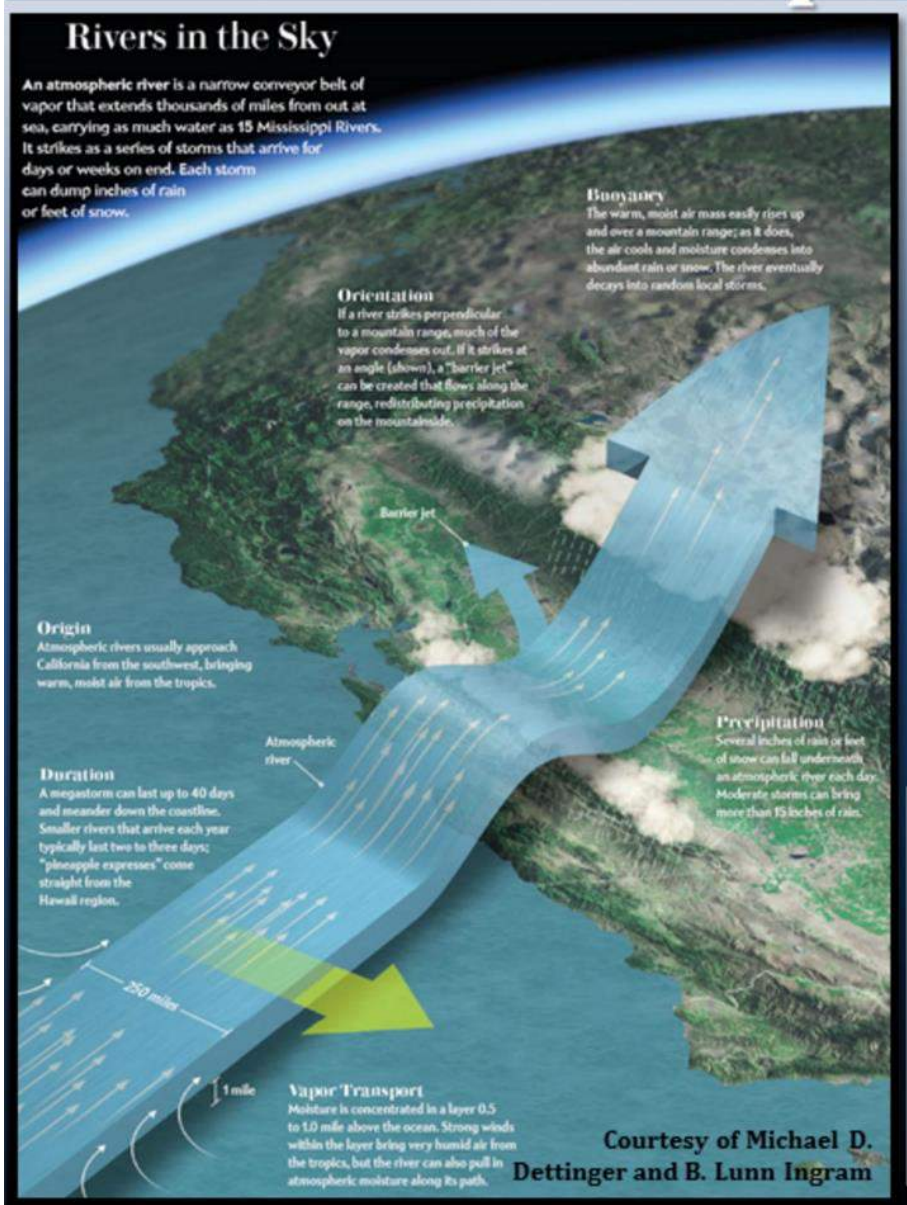
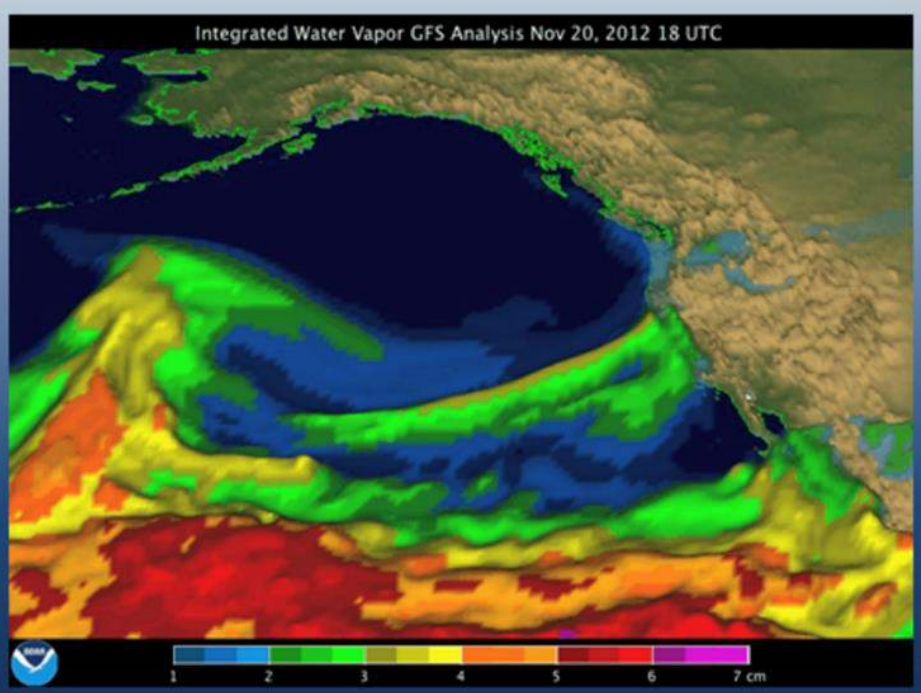
- Enhanced Recharge
  - Increase recharge of SAR water in the SBVWCD basins and new basins
  - Constructed by SBVMWD and Operated by SBVWCD
- Active Recharge
  - New cooperative recharge of native tributary creek flows
  - Construction by SBVMWD and SBVWCD

Atmospheric Rivers





Quick Facts

- On average, about 30-50% of annual precipitation for west coast states occurs in a few AR events; contributing to water supply.
- In the strongest cases ARs can create major flooding when they make land-fall and stall over an area.
- On average ARs are 400-600 km wide.

Closing Thoughts: A Bright Future

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- Progressive Leadership over 100 years
- One of the most collaborative areas of CA
- When we work together – We Can
- Harness value provided by the River
- Highly regulated – opportunity for incentive
- Best use of layers is to craft fair agreements that reduce the need for future litigation – Peace Dividend