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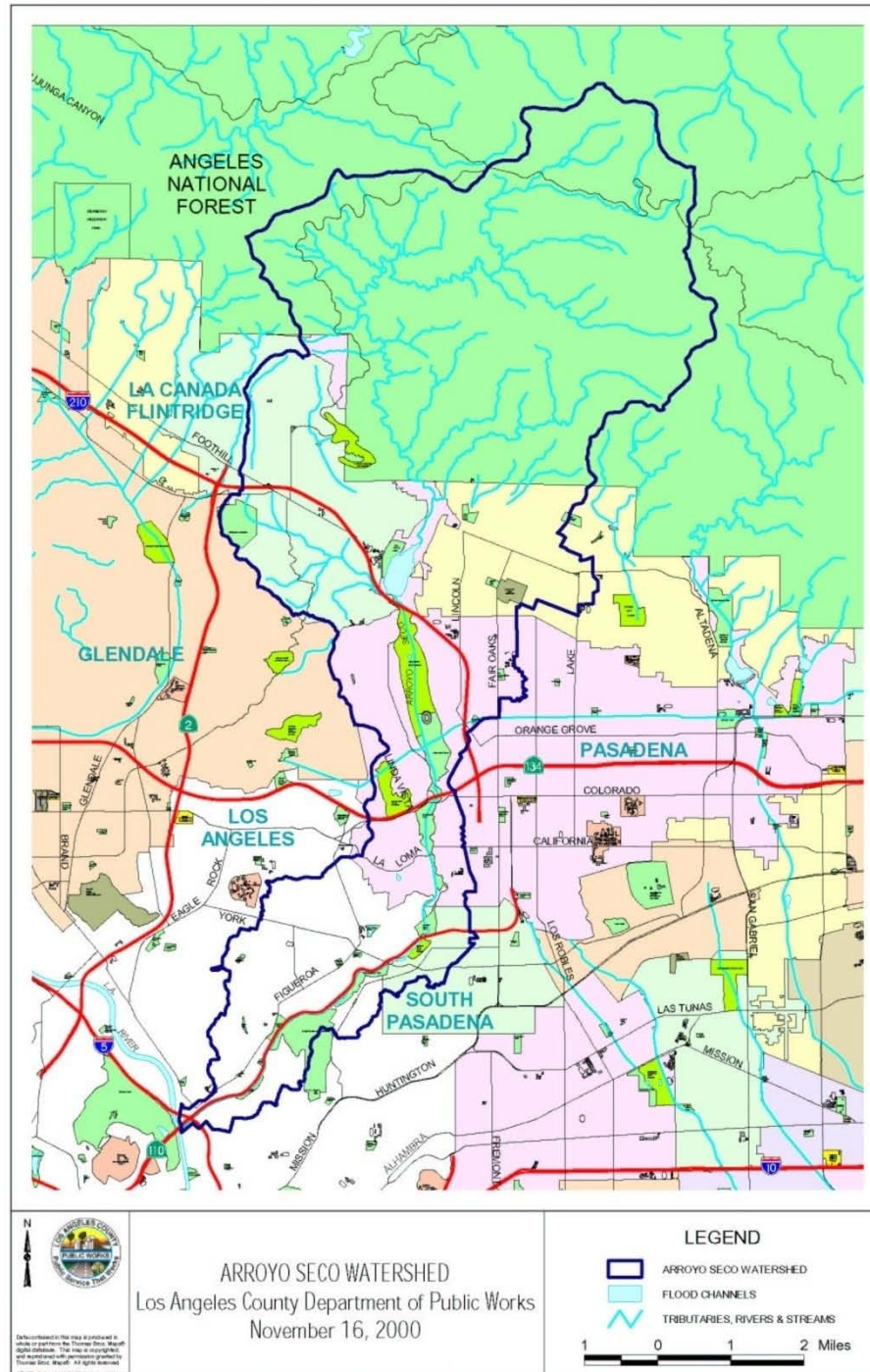
*Breaking Down the Barriers to Generate
Sustainable Water Solutions*

The Arroyo Seco – A Case Study

*Tim Brick and Eliza Jane Whitman
Arroyo Seco Foundation*

The Arroyo Seco

- Major tributary of the Los Angeles River
- Linking downtown LA to the San Gabriel Mountains
- Home of JPL and the Rose Bowl
- Watershed Management Program for last ten years
- Corps Feasibility Study



The Historic Arroyo Seco

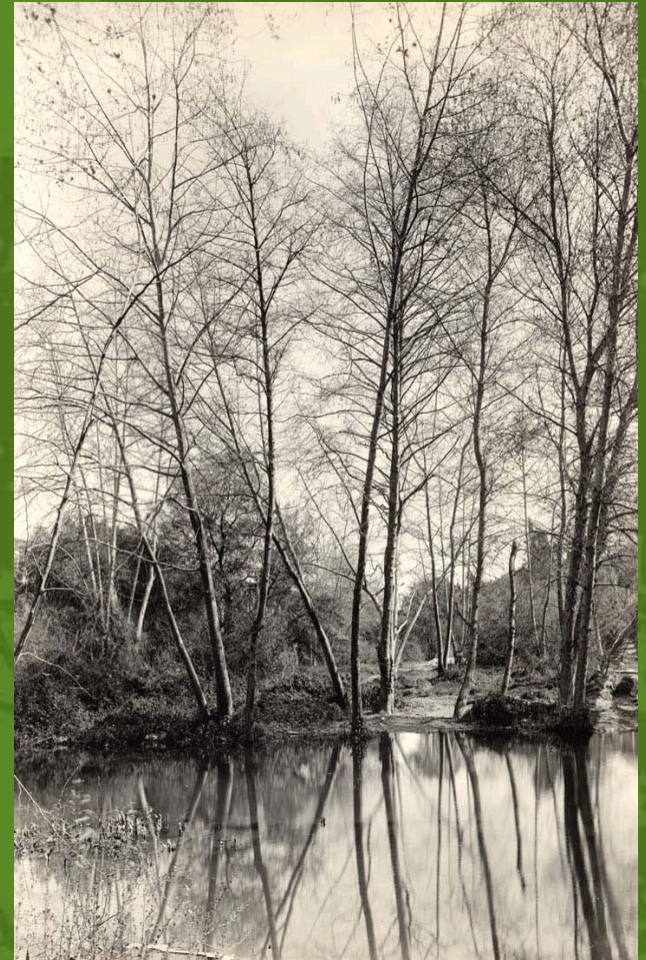


Two different views of the Colorado Street Bridge

The Most Celebrated Canyon in Southern California

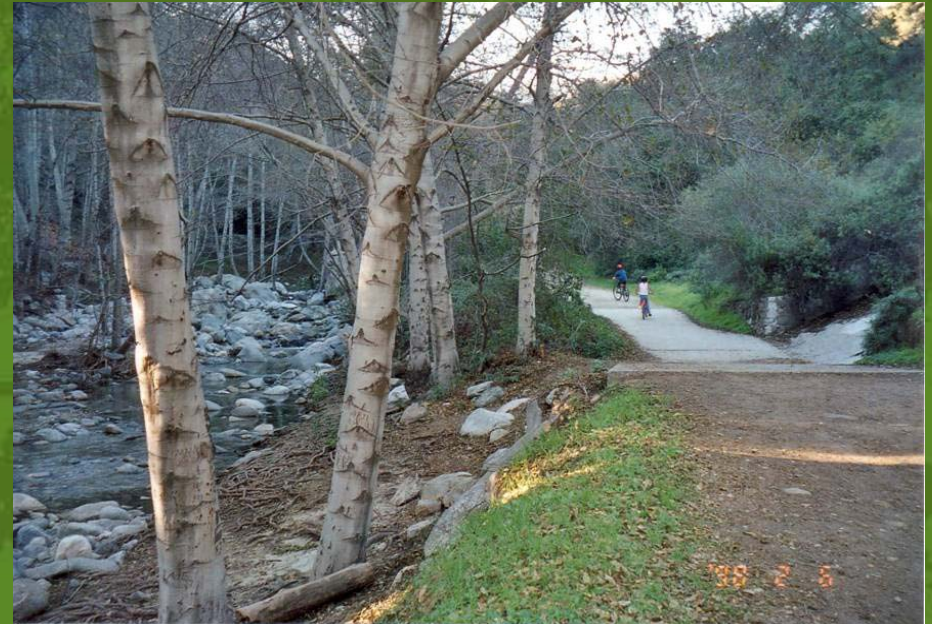
“This arroyo would make one of the greatest parks in the world”

- Theodore Roosevelt, 1911



Current Status of the Arroyo Seco

- ◆ Though long celebrated as one of the most beautiful streams in Southern California, the Arroyo Seco has not escaped wide-spread damage caused by human impact



Damage Caused by Urbanization / Channelization

- * destruction of habitat and wildlife
- * reduced infiltration
- * impaired water quality



Central Arroyo Planning

How does a golf course fit into watershed management and restoration?

Alternative Alignments for Stream Restoration





Celebrating the Arroyo

*The Central Arroyo
Stream Restoration Program*

*Improving the health of a stream and ensuring
the future and sustainability of Pasadena*

LOCATOR MAP



The Central Arroyo



Brookside Golf Course



Project Accomplishments

- Improved water quality
- Enhanced trail network
- Implemented runoff BMPs
- Restored aquatic habitat
- Reintroduced the native Arroyo Chub
- Provided a model of stream restoration for urban SoCal



Improved Aquatic Habitat

☀ Created backwater pools and structures to provide resting, foraging, and spawning areas for fish.

☀ Stabilized stream banks

☀ Improvements were constructed with natural materials (native trees and arroyo stone).

☀ Under direction of CDFG, reintroduced 300 arroyo chub to the central Arroyo Seco.



Backwater pool and woody debris



Weir



Wing Deflector

Improved Vegetation

- Removed over 60 non-native trees.
- Replanted over 200 native trees and shrubs.



Non-native vegetation removed from west side of the Arroyo



Volunteer planting event

Trail and Bank Stabilization

- Stabilized over 1000 feet of bank and trail.
- Installed signage at the trail head to the south area and in Parking Lot I.



LOCATOR MAP

YOU ARE HERE

THE ARROYO SECO STREAM

A TRIBUTARY OF THE LOS ANGELES RIVER

THE ARROYO CHUB (*Gila orcutti*)

APPEARANCE: The Arroyo chub is a small round fish, often called a minnow. As larvae grow, they have large eyes and brown-black pigment spots on the top of their heads. As adults, they generally grow to large bodies with greenish sides, white bellies, and very small mouths. Males have larger fins than females, and a rounded tail. (Source: California State Parks)

WHAT THEY EAT: The Arroyo chub is an omnivorous feeder, a mix of plant matter and animal. They feed mostly on algae, but also eat other plants, insects, and tiny aquatic insects called detritivores, which they eat off other plants or surfaces. The Arroyo chub has been listed a great connector of riparianity.

WHERE THEY LIVE: Arroyo chubs live in clear flowing water with sandy bottoms or streams. They like the cool temperatures of the mountain ranges of Southern California streams, and are able to adapt to high stream water temperatures. They are generally with other native fish, but have the highest freshwater fish count.

HOW DO CHUBS BREED? Arroyo chub breed from February to November, although the best breeding happens in late fall. During this time, male chub will show their color and swim below the top of the female chub, and the female releases her eggs.

THREATS TO THE ARROYO CHUB: Fresh riparian efforts such as bank, channel, sediment and stream bank stabilization have all degraded the riparian habitat that the Arroyo chub and other tributary species rely on to survive. Other threats include habitat loss and fragmentation, and competition for water from agriculture, urban development, and other uses. The riparian habitat is also degraded by the growth of earth, large shrubs, trees, and other plants, which can block the stream and reduce the amount of water that reaches the stream.

WHAT CAN I DO FOR THIS LITTLE FISH? The Arroyo chub is a California Species of Special Concern, and should be protected. The best thing you can do is to help riparian habitat and remove chub from the stream and encourage it to stay in the stream and encourage it to stay in the stream.

THE CENTRAL ARROYO SECO STREAM

has been restored as a pilot project to re-establish habitat for native fish populations with special concern for the Arroyo chub, a native fish, a California Species of Special Concern designated by the State Department of Fish and Game. Boulders, fallen trees and logs, and sustainable design have been used to create pools needed for protection and resting areas and increase plant life needed for food and egg-laying. The added design elements work in combination to stir and direct water flow and create oxygen-rich waters, which in turn support more plant and animal life.

Construction of these stream improvements along with several water quality related improvements to trails, banks, upland areas, adjacent Parking Lot I and citywide storm drains with trash capture inserts will serve as a model for stream restoration in the community of Pasadena, the Los Angeles River watershed and the state of California.

DID YOU KNOW? Fishes that prefer the flowing conditions near streams are called *Riparian*, for the Latin word "riparis" meaning "riverside."

CONKOR PLANTS IN THE ARROYO SECO WATERSHED

ARROYO SECO Riparian HABITAT

Live Oak Woodland is dominated by the Coast Live Oak and is found on sandy, rolling hills and rocky slopes.

Manzanita & Willow Scrub is dominated by native Manzanita & Willow, and is found in the riparian zone, where the ground is wet and the soil is sandy.

Sycamore Riparian Woodland is dominated by native Sycamore trees, as well as other riparian tree species like Mexican alder, willow, and cottonwood.

Parking Lot Improvements

- Installed 10 stormwater cleansing basins constructed of planted areas and porous parking spaces to remove 50 pounds of oil & grease annually
- Existing sycamore and oak trees were incorporated into the planter island design, enhanced by additional native plants.



City of Pasadena Contributions

The City of Pasadena's in-kind contributions include:

- Installation of 500 catch basin inserts through out the city.
- Parking Lot I sealing and striping.



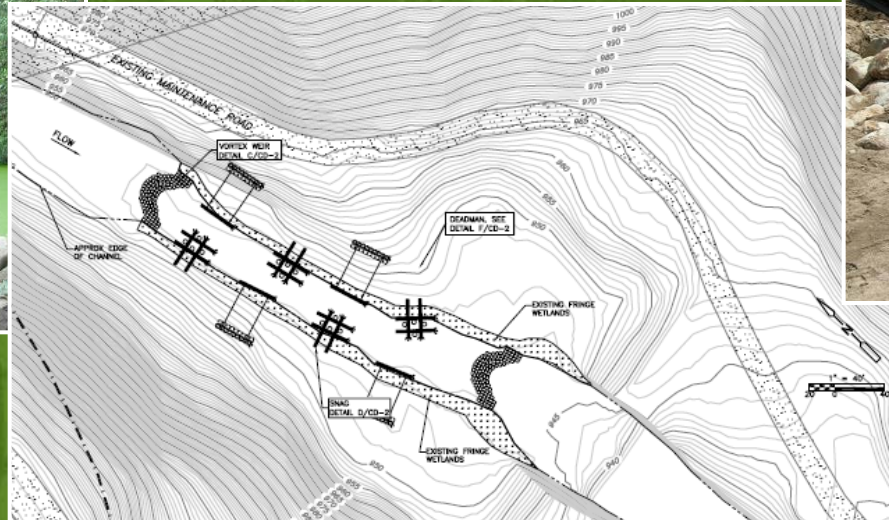
Environmental Stewardship

- Reintroduction of 300 arroyo chub
- volunteers removed trash, removed non-native plants, planted over 30 native trees
- Extensive public outreach, education and participation



Design Build Approach

- ❖ Sponsored by a nonprofit (**ASF**)
- ❖ With and for a city (**Pasadena**)
- ❖ Funded by the state (**CA**)
- ❖ Designed and built by private corporation (**CDM**)



20 month
window

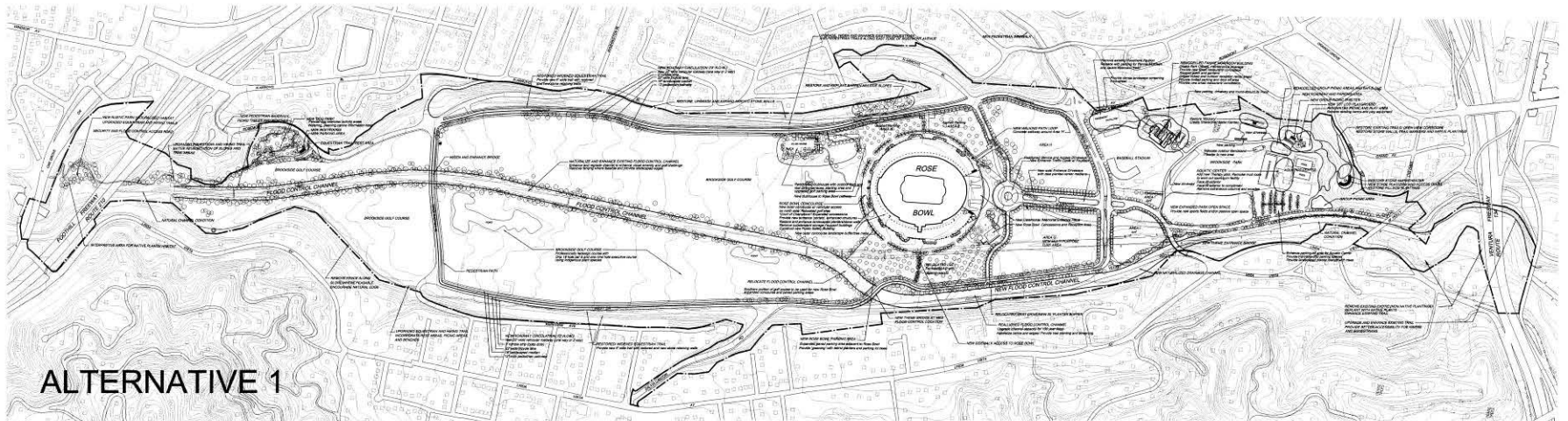
Here's the crew
who brought native
fish back to the
Arroyo Seco



The Arroyo Chub



Opens New Doors



ALTERNATIVE 1

CENTRAL ARROYO SECO MASTER PLAN

Benshoof, Withers, Sandgren & Smith Ltd.
1150 Foothill Boulevard, STE. A, La Canada, CA 91031

The Central Arroyo Stream Restoration Project:

- fulfills a key part of the restoration master plan, and
- establishes a context for greater funding and project opportunities in the Arroyo and LA River watershed

Pasadena's Current Water Challenge



- Serves over 150,000 customers in an 50 sq mi area
- Significant decline in adjudicated groundwater basin in recent decades
- Region facing the three year drought
- Reduced water from the Colorado River to MWD
- Restrictions on the Bay Delta and the water supply of MWD

The Result



Water: Don't Waste It!

Mandatory Conservation Now in Effect

Pasadena is in a serious water shortage. Please adhere to the city's Level 1 Water Shortage Procedures, enforced by Pasadena Municipal Code 13.10.

Outdoor watering is restricted to **TUESDAYS, THURSDAYS and SATURDAYS ONLY** from April 1 through October 31.*

Mon	Tue	Wed	Thu	Fri	Sat	Sun
×	💧	×	💧	×	💧	×

Note: SATURDAYS ONLY from Nov. 1 – March 31

*Watering by hand and drip irrigation are exempt.

No outdoor watering between 9 a.m. and 6 p.m.*



Fix leaks and malfunctions in sprinkler and plumbing systems within 72 hours.



Pasadena has instituted a Water Waste Ordinance and a Level 1 Water Supply Shortage

Key Players for Sustainable Water Solutions

- ✓ City of Pasadena/ Brookside Golf Course
- ✓ Arroyo Seco Foundation
- ✓ County of Los Angeles
- ✓ Council of Arroyo Seco Organizations/Agencies





Arroyo Seco Foundation



Founded by Charles Lummi more than one hundred years ago

Purpose to promote the preservation and promotion of the Arroyo Seco, one of Southern California's greatest natural treasures.

Working to restore and enhance the natural splendor of the Arroyo for future generations.

Advocates an integrated, harmonious approach to watershed and flood management, water conservation, habitat enhancement as well as the expansion of recreational opportunities.

Brookside Golf Course



- Landmark golf course
- Located at the Rose Bowl
- Brings in over \$3M/year to the City of Pasadena
- Provides water for fire fighting purposes to the community

Brookside Golf Course



Brookside's Water Concerns



Devil's Gate, Water Supply of Pasadena, Cal.

A romance

- Water restrictions by Pasadena
- Water price increases
- Upcoming course management contract
- Alternative water sources - quantities and quality unknown
- Need: Water Management Master Plan to handle crisis

Barriers To Overcome



- ❖ Economic
- ❖ Social
- ❖ Environmental
- ❖ Institutional
- ❖ Aesthetics/Reliability
- ❖ Psychological

Economic Barriers

- Increasing water rates and restrictions due to water shortages and tiered program
- Ratio of water costs to revenues increasing (9% to 19% in 12 yrs)
- Potential water and landscape modifications to the course may be expensive
- American Golf's O&M current contract pays for all irrigation – new contract may not

Solutions: Efficiency, tiered rates, financing, grants

Additional Concerns

Social

Maintaining recreational opportunities in a unique natural setting

Environmental

Restoration of the Arroyo Seco's native fish (chubs) limits water usage

Fire-fighting Capacity

Ponds represent a fire fighting advantage in a dry canyon



Institutional Barriers

- Multiplicity of agencies with some jurisdiction or responsibility
- Conflicting goals of various agencies
- Overlapping jurisdictions
- Liability and risk concerns

Solution: Integrated planning, trust-building partnerships, cooperation and stakeholder involvement.

Council of Arroyo Seco Agencies/Organizations

Aesthetics And Reliability

- Concerns of golfers – greens must be 'perfect'
- Integrity of greens may be maintained by reduction of irrigated turf, but must be monitored
- Operational Concerns



Reduction of turf, irrigated greens, irrigation efficiency and alternative sources of water will dramatically improve reliability.

Of course

Psychological Barriers



- Golfer preference for rich green turf
- Changes may turn customers away
- Recycled water may present operational challenges for maintenance crew
- Inherent resistance to change

Solutions: Trust-building partnerships, community education and stakeholder involvement

Sustainability Roles

Pasadena

Implementing tiered water rates & water restrictions
Working with commercial & industrial clients

Brookside

Evaluation of fairways – potential to reduce water use
Determine if the character of the golf course can be changed

Arroyo Seco Foundation

Participation on the Brookside Golf Club Water Management Committee

Bringing the watershed mentality and vision: all types and sources of water should be linked together as one

Potential Sources

- Recycled water
- Local streamflow?
- Non-potable tunnel water
- Better irrigation techniques
- Re-landscaping of the course to celebrate the natural setting

Overcoming the Barriers

- ❖ Cooperation – Building Trust
- ❖ Integrated Planning
- ❖ Stakeholder Involvement
- ❖ Community Education
- ❖ Political Leadership
- ❖ Professional Technical Expertise
- ❖ Vision - Focus on the Future



What Barriers Do You Face?



For more information, visit: www.arroyoseco.org