

**Flowing Waters, Fruitful Valley
A Brief History of Water Development in the Arroyo Seco**

By Tim Brick

Geographically and historically the Arroyo Seco has played an important role in the development of water resources in Southern California.

The Natural History

Geology divided the Arroyo Seco into three distinct sections with very different hydrologic characteristics: 1) the precipitous upper mountain watershed; 2) the Raymond Basin area including Pasadena and surrounding communities; and 3) the region below the Raymond Dyke in South Pasadena and northeast Los Angeles.

About half the length and area of the Arroyo Seco lies in the upper mountain watershed. This is the front range of the Sierra Madre or San Gabriel Mountains, well known for their harsh conditions. Fierce rainstorms and raging forest fires periodically attack the steep erosion-prone slopes in this relatively small upper watershed (32 square miles) to create the conditions for substantial floods that occasionally roar into the heavily populated communities below.

As the Arroyo Seco emerges from the San Gabriel Mountains, its steep descent slows and the waters cut through an alluvial plain. Beneath this region, which includes La Cañada-Flintridge, Altadena, Pasadena, Sierra Madre and part of Arcadia, lies the Raymond Basin – a massive bowl of alluvial sand and gravel filled with water. The south rim of the basin is the Raymond Dyke, a geological fault that runs from Highland Park to Raymond Hill at Pasadena's southern boundary with South Pasadena and then through San Marino just north of Huntington Drive to Santa Anita Canyon on the east side of Arcadia.

Flowing water and rich soil conditions endowed the Arroyo Seco communities with a rich natural heritage. In La Cañada streams flowed out of the mountain canyons and across the foothills and flatlands into what is now Flint Wash, which enters the Arroyo Seco just to the north and west of Devil's Gate. While most of Pasadena tilts away from the Arroyo Seco to the Rio Hondo, hundreds of years ago abundant springs and streams lined the western part and the southern rim of that city. Below the Raymond Dyke, which lines the southern boundary of Pasadena, more springs bubbled from the ground on the Arroyo ridges as the main Arroyo stream flowed for five more miles to the Los Angeles River. Highland Park and Garvanza were so rich in springs that pioneers thought it sat on a "sea" of underground water

The Early Settlers

Water was the attraction that brought the first settlers and succeeding generations to the Arroyo Seco. While the Spaniards dubbed the watershed Arroyo Seco or "dry riverbed," the Tongva or Gabrielino Native Americans referred to the region between the Los Angeles and San Gabriel Rivers as Hahamongna, "the land of flowing waters, fruitful valley." They settled on bluffs overlooking the stream that linked the San Gabriel Mountains to the Los Angeles River. At the mouth of Millard Canyon, the Gabrielinos established one major settlement. Further south were three minor settlements: a village on the banks of a brook on the east side of Raymond Hill, one more at Los Robles Canyon in Oak Knoll and a third at Garfias Springs on the banks of the Arroyo. Just west of the confluence of the Arroyo Seco and the Los Angeles River in what is now Elysian Park, they established another major village, Maungna, on a bluff overlooking the Arroyo Seco.

The Mission Era & Rancho Eras

The combination of substantial runoff from nearby high mountains, large alluvial volumes to absorb the flood flows and a natural underground dyke that forced groundwater to the surface resulted in perennial springs and artesian wells that were used by the early Native Americans. Lacy Park in San Marino lies at the base of the Raymond Dyke and was once a natural lake resulting from these artesian conditions. The padres of the San Gabriel Mission and the Spanish and Mexican settlers of the early 1800s tapped these rising waters for such purposes as operating a mill, a sawmill, and a tannery in addition to domestic uses. Springs flowed in the canyons cutting south across the terrace until wells sunk in Pasadena lowered the water table of the Raymond Basin.

At what is now 1120 Old Mill Road in San Marino, Padre Jose Maria de Zalvidea built the first water-powered gristmill in California in 1816. The Old Mill, *El Molino Viejo*, harnessed the flows from Mill and El Molino cañons to grind grain for the San Gabriel Mission. The Mill's output helped establish San Gabriel's reputation as the richest of the Missions. During Zalvidea's administration, nearby Mission Lake (later Wilson Lake) was dammed and used for irrigation of orchards, vineyards and other crops.

In 1819 Joseph Chapman, the first Anglo settler in southern California, found lumber to build the old Plaza church and much of the early pueblo Los Angeles in what he called “Church Canyon,” later known as Millard Canyon, a tributary of the Arroyo Seco. Chapman established the first sawmill on the west coast there, indicating the forested nature of the mountains at that time.

The region’s earlier settlers referred to Pasadena as a mesa, as it sits atop the Raymond Basin higher than the rest of the San Gabriel Valley. The name they chose for their community, Pasadena, is a Chippewa word for “crown of the valley”.

Settlers entering the region followed the Tongva practice of locating near the Arroyo or near the flowing springs. Don Manuel Garfias, the last Mexican landholder of the Rancho San Pasqual, placed his hacienda at Garfias Springs on the edge of the Arroyo at 433 Arroyo Boulevard near the historic Cathedral Oak in what is now South Pasadena.

Because the natural rainfall was insufficient to maintain agricultural crops on a year-round basis, settlers soon discovered how to tap the springs along the Arroyo that flowed perennially. The first orchards, subdivisions, and settlements were made possible by piping water from the numerous springs along this water table or by pushing horizontal tunnels back into the hills to tap the waters held in the immense bed of gravels that fed the aquifer beneath.

The Indiana Colony

In the 1860s, Benjamin Eaton, who moved to the Rancho San Pasqual a few years before, experimented by growing grapes without irrigation, something that had never been done before in Southern California. Eaton’s grapes flourished, and their wine was so delicious that residents from throughout the region clamored for it. Realizing the limitations of dry farming, though, Eaton in 1867 helped Benjamin Wilson and William Griffin, the owners of the ranch, to build “Wilson’s Ditch,” the first attempt to export water from Devil’s Gate in the Arroyo Seco to the mesa lands of their rancho.

In 1873 Eaton gave Daniel Berry, representative of the California Colony of Indiana in Indianapolis, the grand tour of Rancho San Pasqual. Berry wrote back enthusiastically to his backers: “Found tract of 2,800 acres at \$10 an acre about four miles from town, about 500 acres, a wooded and watered canyon, suitable for wood and cattle grazing. The wood is plenty, the water delicious and cool, leaping out of the rocks on the side in little cascades.” (note source)

When the pioneers of the Indiana Colony arrived at Rancho San Pasqual the next year, Eaton laid out their water system. He brought water all the way from Devil’s Gate in the Arroyo Seco through three miles of pipe to a 3,000,000-gallon reservoir located a few hundred feet north of the present intersection of Colorado Street and Orange Grove Avenue on the hill that is now home to the Pasadena Historical Museum. From there the pipeline ran south on Orange Grove Avenue to the lower Indiana Colony lands extending into what is now South Pasadena.

Eaton’s pipeline was a bold departure from the primitive water distribution systems in place in southern California at that time. Open ditches, known by their Spanish name of zanjas, were the

standard. William Mulholland, the Irish immigrant who would build Los Angeles' water system, began his service to that city as a lowly zanjero or ditch-tender at about this time.

The Indiana Colony incorporated the San Gabriel Valley Orange Grove Association, whose main task came to be the development of an adequate water system. When the association sunseted after ten years, three land and water companies assumed responsibilities for developing Pasadena and its water system: 1) the Pasadena Land & Water Company (west of Fair Oaks), the Lake Vineyard Land & Water Company (east of Fair Oaks), and the North Pasadena Land & Water Company (2000 acres of north Pasadena between Lake and the Arroyo).

In 1881 the first wells were drilled in the Raymond Basin just north of the Raymond Dyke.

In 1883 John D. Yocum built a water wheel that he used to bring water to the Linda Vista area west of the Arroyo. Despite the streets and water system Yocum built, the area remained primarily a ranch with sheep and vineyards until the 1920s.

In 1887 C. W. Scoville built the first major dam for irrigation in the Arroyo Seco, a six foot rock wall dam and bridge where the Colorado Street Bridge is now located. Water from the pond behind the dam was pumped to the land above, where groves of oranges and avocados flourished. Portions of the dam still can be seen today by the diversion structure under the bridge.

Less than a mile south, at the base of the La Loma Bridge, another windmill pumped water up to irrigate the Campbell-Johnstone lands in the San Rafael section of southwest Pasadena.

In 1891 the Pasadena Land and Water Company began a series of tunnels in the Devil's Gate area. A major tunnel, 4730 feet long, and several smaller spurs were cut through alluvium and provided a major supply to the growing community. Between 1897 and 1904 a subsurface dam was built at the Devil's Gate to increase percolation of mountain runoff and the flow in these tunnels. Between 1913 and 1919 the tunnels yielded an average of 3400 acre-feet of water per year, an amount which declined in later years due to the construction of Devil's Gate Dam and the sedimentation of the flood basin.

Pioneers of Watershed Management

It is noteworthy that two of the most vigorous early apostles of watershed management, forest protection and the development of a national forest system hailed from the Arroyo Seco Watershed – Abbot Kinney, noted architect, and Theodore Lukens. Kinney, who established his home at Kinneloa in the Altadena foothills, was president of the Southern California Forests and Water Association and vice-president of the American Forestry Association in the 1880s. Later Kinney went on to develop the canals of Venice.

Theodore Lukens, who was mayor of Pasadena in 1894, saw a direct link between the mountain watershed and water resources. "During the summer of 1896," he wrote, "the Watershed from which Pasadena drew its water supply was burned. The next year our supply had so shrunk as to nearly cause a famine. We were compelled to sink wells and pump in order to live." Lukens,

motivated by his view that local watersheds needed healing, made a personal crusade of reforesting the San Gabriel Mountains. “It is a fact not conceded by many,” he said, “that our Southern California mountains were in a great measure well-clothed with trees, only a small portion of which were utilized, but were recklessly burned; leaving only a few remnants of the once useful tree covering on steep, rocky places.”

Lukens watched the mountain watershed above his city and knew that protecting it was key to the health and growth of his city. In 1911 he stated “Pasadena does not need to look elsewhere for water now or in the future, if she will take care of the watershed from which her supply of water now comes.”

The Strain on Local Supplies

Renowned engineer J. B. Lippincott had a very different view. Lippincott, who along with Mulholland played a key role in developing Los Angeles’ Owens Valley supply, was hired in 1898 by Pasadena to assess local water resources. He warned city officials that local sources were being rapidly depleted and stressed the need to develop outside sources promptly.

As pumping increased to meet the needs of a growing population, groundwater levels continued to fall. By 1908 there were 141 wells in operation in the Pasadena area. In 1914, after consolidating the three land and water companies that had developed Pasadena’s early water system into the municipal water department, Pasadena began a spreading program in the Arroyo Seco and along the foothills to replenish the Raymond Basin by percolating storm runoff through the gravel beds. The spreading continued until 1924 when the program was discontinued in the midst of a drought, replenishing the basin with more than 20,000 acre-feet.

During this period Pasadena also began buying up Arroyo Seco land to protect its water rights and quality. Eventually Pasadena bought the entire stretch from the South Pasadena boundary up into the Angeles National Forest. Pasadena bought several thousand acres extending up into the mountain watershed and by the 1940s evicted the settlers there to ensure water quality.

Following torrential floods in 1914 and again in 1916, the Los Angeles County Flood Control District built Devil’s Gate Dam in 1920 at the southern end of the flood basin at the mouth of the Arroyo Seco. The 100 foot tall concrete arch dam had a dual purpose of flood protection and water conservation.

By the early 1920s water had become a critical problem for most southern California cities. Pasadena was particularly hard-hit and aggressive in its pursuit of new supplies. The water level in the Raymond Basin was falling 10 feet per year. When the Copelin well was drilled during the drought of 1899, the drillers found water at 154 feet. By 1924 the level had fallen to 190 feet; by 1929 it was at 240 feet. Local pumping was draining the Raymond Basin by 10,000 acre feet each year.

While pumpers in the Raymond Basin observed the water table receding, they did not fully understand the effects of their actions on each other and on the basin. There was no complete

description of the basin's geology and underground storage characteristics until the California Division of Water Resources published Bulletin No. 45 in 1934.

The Raymond Basin Adjudication

In 1935 Pasadena officials called together all the pumpers in the Raymond Basin in an effort to reduce pumping to a sustainable level, but this effort was not successful. In 1937 Pasadena initiated legal proceedings against Alhambra and other major Raymond Basin water users. The action sought to legally divide or adjudicate water rights in the basin and to end the annual overdraft. *City of Pasadena v. City of Alhambra et al.*, was the first basin wide adjudication of groundwater rights in California and the first to use the California Division of Water Resources to determine of water rights.

After an extensive investigation of the "safe yield" of the Raymond Basin, in 1943 most of the 20 parties involved in the action agreed to a stipulation which provided: 1) an admission that taking water was adverse to the claims of other parties; 2) allocation of the basin's safe yield; 3) declaration and protection of each party's rights; and 4) arrangement for the exchange of pumping rights among parties. The agreement was based on a process called mutual prescription. Instead of honoring only senior water rights and cutting off pumpers with more recent claims, each party agreed to reduce its annual pumping and take a percentage of the Basin's safe yield. Judge Frank Collier accepted the determination of the parties of a "present unadjusted right," defined as the highest amount of water continuously produced during a five-year period prior to the filing of the lawsuit. Each party owned this right by prescription, and the rights were of equal priority. Judge Collier then defined a "decreed right" for each party, which was that party's present unadjusted right adjusted downward about one-third so that the sum of all parties' decreed rights matched the estimated safe yield of the basin.

On December 23, 1944 Judge Frank Collier signed the judgment adopting the stipulated agreement worked out by the parties. The California Department of Water Resources became the watermaster for the basin, charged with policing the adjudication. In 1949 the California Supreme Court affirmed *Pasadena v. Alhambra*. The decision validated mutual prescription as a basis for resolving groundwater overdraft problems and establishing water rights.

In 1955 the estimated safe yield was adjusted to 30,622 acre-feet. In 1984 the Raymond Basin Management Board, made up of representatives of the local parties, assumed watermaster responsibilities for managing the basin. The Raymond Basin Management Board (RBMB) has been a cooperative mechanism for local management of groundwater resources, while retaining the safe yield concept of the original adjudication.

In the early 1990s, the RBMB established long term storage policies and allocated storage capacity to the basin parties, an important step in allowing all parties to benefit from the storage potential of the basin.

In the early 1980s contamination of the wells in the Devil's Gate area was detected. Industrial solvents such as Trichloroethylene (TCE) and Perchloroethylene (PCE) had seeped into the groundwater. Four wells had to be closed because the water did not meet health standards. In

1990 a closed aeration system treatment plant was installed on the east side of the Hahamongna basin across from Jet Propulsion Laboratory. JPL is now finalizing long term cleanup plans.

Below the Raymond Dyke

Below the Raymond Dyke, the Arroyo Seco enters a canyon bounded by the Monterey and Montecito Hills on the east and Mount Washington on the west. While there were numerous historical springs and wetlands in the area, there is no significant groundwater basin. The Arroyo stream and its underground flow proceed directly to the confluence with the Los Angeles River and then flow to its outlet in Long Beach.

The Highland Park area was particularly rich in a hydrologic sense. A major tributary of the Arroyo Seco, called the North Branch, flowed for six miles through northeast Los Angeles from the Annandale area of the San Rafael Hills near Poppy Peak. The stream flowed along Figueroa Street to Branch Street and then Aldama Street flowing into the Arroyo Seco at Sycamore Grove Park. The North Branch was fed by a series of healthy springs including Springvale and Glen Rock Springs. There were also numerous springs in the area about York Boulevard and Figueroa Boulevard and along Sycamore Grove Park.

The Arroyo Seco was instrumental in determined the location of the early pueblo of Los Angeles. In the late 18th century, settlers strategically sited the pueblo to avoid the floods from the San Gabriel Mountains that would pour in through the Arroyo Seco adding substantially to the ferocity of the Los Angeles River in flood periods as it wound around Griffith Park and the Glendale Narrows.

The Arroyo provided a major water supply for the growing city. In 1870 the Buena Vista Reservoir was built in the hills of Elysian Park immediately west of the confluence of the Arroyo Seco and the Los Angeles River. In the 1880s the reservoir was expanded and other facilities were constructed to tap the river for a rapidly growing population. In 1904 William Mulholland and Los Angeles built the southernmost of this series of diversion facilities, the Narrows Gallery, to squeeze every available drop out of the river. A 1,178 foot tunnel was drilled at a depth of 115 feet through the bedrock beneath the Los Angeles River up the Arroyo Seco. Nine wells were drilled to allow water to percolate into the tunnel where it was then collected and conveyed through the Zanja Madre to downtown Los Angeles.

The Narrows Gallery and similar facilities at the Headworks near Burbank and the Crystal Springs in Griffith Park drained the subsurface flow of the Los Angeles River and decisively demonstrated that the river had reached its limits as a water supply for a burgeoning city. It was that same year that Mulholland wrote of the Los Angeles River, "This is certainly a noble stream to be found running in the semi-arid country after a long success of dry years, and speaks volumes for its constancy and reliability as a source of municipal supply. The time has come, however, when we shall have to supplement its flow from some other source. Earnest and immediate steps are necessary to produce additional water." The Los Angeles Department of Water and Power abandoned the Narrows Gallery more than fifty years ago after developing new sources from the Owens Valley and the Colorado River.

Los Angeles grew to be one of the largest cities in the U.S. in size and population largely due to its tight hold on water supplies. Los Angeles staked out an exclusive “pueblo” water rights claim to the Los Angeles River. In 1899 the Arroyo Seco communities of Highland Park and Garvanza voted to annex to Los Angeles for this reason. Within a few years the community of Arroyo Seco followed. Later, when the river supply proved insufficient, communities such as Eagle Rock were force to annex to LA to obtain the imported supplies from the Owens Valley. Mulholland’s vision was of one great city in Los Angeles County from the mountains to the sea. Only the formation of the Metropolitan Water District in 1928, a unique partnership led by Pasadena and Los Angeles to bring the Colorado River to Southern California’s coastal plain, ended LA’s annexation stranglehold on nearby cities.

Imported supplies from the Owens Valley, the Colorado River and later the State Water Project eventually relieved the strain on local water supplies such as the Arroyo Seco but have not diminished their historic and current importance.

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Historic Springs in the Arroyo Seco.	
Thibbets Springs	Just to the north and east of Devil's Gate
Ivy Springs	Near Flint Canyon just to the north and west of Devil's Gate
Sheep Corral Springs	At the foot of reservoir hill at the south end of Brookside Park
San Rafael or Johnson Springs	On the west bank of the Arroyo opposite California Street was a bog or cienega with continuous water.
Johnson Lake (also Beaudry Lake)	A natural springs that was dammed to supply irrigation for agriculture. Some water was piped to the Highland Park area through the Beaudry Tunnel. In San Rafael canyon there is a small but pretty waterfall -- Puddingston Falls -- with a fine specimen of a pot hole at their foot
Baker's Springs	On Grand Avenue just above West Columbia on the east side of the Lower Arroyo near the Raymond Fault.
San Rafael Creek	The outlet for Johnson Lake and south San Rafael hills to the Arroyo Seco (just south of the San Rafael bridge and above the South Pasadena city limits.
Garfias Springs	On the edge of the Arroyo in South Pasadena, this site near the Cathedral Oak was the home of Manuel Garfias, the last of the Mexican rancho landholders.
Springvale Springs	Just west of North Figueroa street at Springvale drive, this major spring was the source of the North Branch of the Arroyo Seco.
Glenn Rock (Milwaukee) Springs	This was a large spring that fed the North Branch of the Arroyo Seco in Highland Park at the head of Milwaukee Avenue.
Garvanza Springs	Springs at the site of the present reservoir behind Luther

	Burbank Middle School and Garvanza Elementary near Avenue 64 and York. Here there was a deep ravine that drained into the Arroyo Seco. Later it was the site of Los Angeles' oldest reservoir still in use.
Arroyo Verde Springs	On the east side of the Arroyo near York and Pasadena Avenue near the equestrian stables was a rich spring at the ford across the Arroyo on the path from Pasadena to Los Angeles.
Yosemite Springs	These springs right on edge of the Arroyo bluff at 226 S Avenue 54 are still in production, being operated by Yosemite Waters bottling company.
Casa de Adobe Springs	Beginning in 1915 this spring near Casa de Adobe at 4605 Figueroa was used for a bottling operation.
White Rock Spring	At 4835 Figueroa Street across from Sycamore Grove Park, next to the Hiner House and the Alternative School, this spring was home to the White Rock or Rose Spring Water bottling operation. It is now a private home.
Sparkletts (Indian Head) Springs	Just over the ridge into the Verdugo Wash drainage on the former Glassell estate are these major springs that made Sparkletts famous and is now being tapped by the Hinkley-Schmidt bottling operation.