Reconstructing the Void: Owens Lake

Barry Lehrman

Two hundred miles due north of Los Angeles lies a 108 square mile playa, the abandoned corpse of Owens Lake, a silent victim of the destructive thirst of the city. Almost a century ago Los Angeles became dependent on this distant watershed, funneling its life-giving liquid into a vast aqueduct to nurture its delirious growth. Long a vicious history of water, politics, and exploitation, this relationship has grown ever more complicated and inextricable, demonstrating the way that nature and society alike are being thoroughly reshaped by the politics of negotiation.

Over years the environmental costs for both watershed and the city have been tremendous—Los Angeles is now a thoroughly urbanized landscape while the Owens Valley faces stagnant growth, lost water, and vast dust storms. But in taking the water from the Owens River Valley, Los Angeles prevented the establishment of agribusiness and real estate speculation, thereby preserving a unique fragment of the American frontier as a permanent rural antipode to the sprawling metropolis to the south. This relic landscape stands in stark contrast to the San Joaquin Valley a mere twenty miles to the west across the Sierra Nevada Mountains. There, farmers drained once verdant wetlands and sloughs, creating the nation's vegetable garden only to see it become one of the most rapidly growing regions in the country today. Thus, the presence of the Los Angeles Aqueduct has preserved the rural openness of the Owens Valley, something acutely lost in Southern California. With the growing population pressure, little can be done to limit the growth of California as long as there is available water. If Los Angeles suffers a major earthquake, fire, riots, or mudslide—it will be rebuilt. If Los Angeles loses its water—that may very well be the end of Ramona's dream.

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The tangled relationship between the desiccated valley and the city that drained it, first emerged a century and a half ago. Long before water, the Owens Valley aided Los Angeles's rise from a sleepy cattle town into a vibrant global metropolis. The discovery of silver at the Cerro Gordo mine above Owens Lake in 1865, funneled the first flush of wealth through Los Angeles.[1] That silver helped bring the Southern Pacific Railroad to the city in 1876, in turn ensuring the success and growth of San Pedro harbor, financed the initial real estate boom in the 1890s, and as the population swelled, inspired Henry Huntington to create the streetcar lines that tied the city together. This first significant wave of growth was sustained until the city started running out of water at the end of the nineteenth century.[2]

By diverting the Owens River two hundred miles south to slake Los Angeles's thirst, chief city engineer William Mulholland changed the future of the West by promoting urban growth over rural agriculture. When Mulholland completed the Los Angeles Aqueduct in 1913, he sparked the second wave of growth, creating the city we recognize today. The Aqueduct could deliver ten times as much water as was available from local resources in the city, yet the phenomenal growth that ensued meant that within a decade, Southern California was once again searching for even more water—a quest that continues today. The Aqueduct became the new Los Angeles River, stretching the city's watershed some three hundred fifty miles north to the Mono Lake Basin while making the original river superfluous, allowing its unpredictable flows to be funneled to the ocean as rapidly as possible, through a system of channelization not unlike that which straitjackets the Owens River on its epic journey south to the San Fernando Valley.

Ironically, the Aqueduct preserved the rural character of Owens Valley, allowing it to escape from the development pressures that are consuming most of California. To protect the city's water rights and the purity of the watershed, a series of legislative acts at the local, state and federal levels effectively prevent development in the area, the political clout of the young city steamrolling over the wishes and dreams of Inyo County.[3] Adding to this regulatory oversight, the Los Angeles

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Department of Water and Power became the second largest landholder in the county after the Federal government. For its par, Washington created Inyo National Forest at the behest of the city to preserve the watershed in the mountains surrounding the valley. As a result of these external limits, the Owens Valley and surrounding Inyo County have remained rural, one of the few places in California with no projected growth.[4].

The development of the irrigation network that today crisscrosses California goes back to the indigenous tribes of Southern California and the Spanish colonists. Long before California was home to Europeans, the Tongva tribes had a village on the banks of Porciúncula River, below a hill on a raised site that didn't flood during the winter monsoons. They created a modest network of ditches to irrigate some crops that supplemented their hunting and gathering. Their irrigation network was taken over by the colonizing Spanish, who expanded the ditches and instituted rule and regulations for access to the water of the *Zanja Madre*. The Spanish moved the diversion point up to their ditched up into the Elysian Valley, and the city of Los Angeles was officially born.

Once California became an American territory, the growing population and thirst for water continued to drive ditches further from the Los Angeles River. Eventually the diversion points reached nine miles north of the small city to what is now Griffith Park at the southern edge of Burbank. By 1886, so little water was left in the riverbed below the ditch's intakes that tunnels were dug below the riverbed to tap the remnant subsurface flow in order to provide drinking water and to continue irrigating the 1100 acres of fields, homes and businesses of the young city.[5]

Looking north to the Owens Valley for more water was not such a great leap of faith for Mulholland in 1904. All the chief city engineer needed to do was extend the ditch digging by an order of magnitude.

When the Los Angeles Aqueduct diverted the Owens River's water to the city, the draining of Owens Lake was only a matter of time.[6] The lake's water level started to drop drastically with the loss of fresh water from the River just months after the 1913 opening of the Aqueduct, and the

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saline content of the lake increased as water evaporated. A new industry harvesting the precipitating salt was born, taking advantage of the ideal arid conditions and harvesting the valuable minerals. Salt works sprung up on the eastern and western shores, but soon the falling water level left the lagoons on the east dry. After making an effort to pump the brine into the saltpans failed, they were abandoned. By 1923, only a dusty brine pool covered the lowest part of the once mighty lake. By 1926, the dust storms had begun.[7]

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But Owens Lake could hardly have avoided this fate if it had stayed independent of the City's thirst. The lake's water level had already begun to drop after farmers dug irrigation ditches along the Owens River in 1872. Thirty years later, the Federal Bureau of Reclamation proposed to divert water to a vast irrigation network to serve the area's agricultural interests. Such a scheme would have resulted in a similar desiccating impact on the lake.[8]

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With Los Angeles's rapidly growing population exceeding projections and the city facing drought in the 1930s,[9] the Department of Water and Power began drilling hundreds of wells to tap the Owens Valley's ground water to bolster its supply. Until the 1970s, the impact of these wells was minimal to life in the Valley compared to the draining of the river. Then in 1969, Los Angeles started constructing a second aqueduct in the attempt to wring every last drop of water from Owens Valley for the thirsty city. As soon as the Second Los Angeles Aqueduct was completed in 1970, pumping greatly increased and the groundwater level started to drop. As a result, lush meadows, sparkling lakes and the rolling river were replaced by the modern landscape of sagebrush and sand dunes.

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The modern Owens Valley is still a contested landscape, chafing against the imposed infrastructure serving the distant metropolis. The 1970's groundwater pumping sparked the "second Owens Valley water war," as the inhabitants of the area protested the death of their land. But unlike the infamous water war of the 1920s and 1930s, when the valley residents dynamited

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the aqueduct to little avail, they had a new weapon to fight the annexation of their ground water—the California Environmental Quality Act (CEQA). CEQA provided the citizens of Inyo County a process and the legal leverage to challenge impact of the Second Aqueduct. Already in 1925, the state legislature had passed a law requiring compensation of all business and property owners for financial losses due to water diversions, This was finally enforced in 1929 by the California Supreme Court which forced Los Angeles to comply but this injunction only compensated direct financial losses and did not require any attention towards environmental costs. Only with CEQA, half a century later, did these get considered. When the original Los Angeles Aqueduct was built, there were no environmental review laws on the books anywhere in the country. By the time of the Second Aqueduct, however, the country was in the midst of the burgeoning environmental movement. In response to legal pressure, Los Angeles was forced to create an Environmental Impact Report (EIR) and to mitigate the reported impacts. The mandated EIR process leveled the battlefield and, at least to a degree, made it possible to address the environment costs of the city's vast infrastructure. The EIR process discovered several conditions caused by the Los Angeles Aqueduct that required immediate mitigation: the dropping water table from the increased pumping, the death of Owens River below the Aqueduct intake, the lowering of Mono Lake's water level, and the dust storms from Owens Lake Playa.

Litigation to rectify the environmental damages in Owens Valley against the city started in 1970 with the first successful case being a 1972 Inyo County suit to limit groundwater pumping. Only in 1990 was this lawsuit completely settled after extensive scientific studies and ground water modeling defined a sustainable level of pumping that would preserve the plants life above.[10]

The second successful fight under CEQA was over Mono Lake, just north of the Owens Valley a unique ecology of two million migratory water birds nesting among dramatic tufa towers formed by the lake's unique, saline chemistry. In 1940, the Department of Water and Power had bored eleven miles through solid rock to create the Mono Craters Tunnel to increase the water for the

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Los Angeles Aqueduct, diverting water that would otherwise sustain Mono Lake. As at Owens Lake, the water level dropped, but this time local residents and scientists were able to get the courts to help. With the lowered water level, coyotes and raccoons could walk across the lakebed to reach the formerly isolated island were the endangered California Gull's rookeries were. In 1979, with the leadership of biologist David Gaines, the Mono Lake Committee launched lawsuits against the DWP to protect the bird nesting sites. The 1994 Mono Lake Accord established a minimum water level for Mono Lake to protect the rookery and established a schedule of allowable water diversions that would gradually increase water in the lake to a sustainable level.

Even with these reforms upstream, Owens Lake was left an ecological disaster. Wind gusts above twenty miles an hour lifted over fifty tons per second of "Keeler Fog" off the lakebed. These dust storms often reached over two miles high and blew the dust over 250 miles from the lake. These spring and fall dust storms occurred two dozen or more times each year, and often sent over 130 times the EPA's limit for particulates into the atmosphere. Containing significant levels of toxic metals like selenium, arsenic, and lead, along with efflorescent salts in microscopic particles smaller then ten microns, this dust was a threat to the 40,000 people in the immediate region. The dust reduced visibility so badly that the China Lake Naval Air Station to the south had to stop flight operations 5 to 10 days each year—costing the Navy over $5 million per year. Physicians at China Lake linked the dust to significant health problems in the region, including higher rates of cancer, lung disease, and eye problems.

Finally in 1998, the City of Los Angeles and the Great Basin Unified Air Pollution Control District reached a third major court-negotiated settlement to abate the dust blowing off the lakebed.[12] The dust mitigation process initiated by the Memorandum of Agreement (MOA) focused on a few specific and tangible results: the reduction of dust being blown off the dry lake and the preservation of the nesting habitat of the Snowy Plover, a petite wading bird.[13] As a result of the MOA, Los Angeles installed over 300 miles of pipe (some as large as five feet in diameter), more

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than 5000 irrigation bubblers, and hundreds of miles of fiber optic control cables and valves, all to irrigate the thirty square miles of the Playa from which most of the dust would originate.

The scale of the dust control project on Owens Lake is roughly equivalent to a waterworks for a city of over 220,000 people and has cost the City of Los Angeles $425 million dollars to build the first five phases, treating the worst thirty square miles of dust emitting soils on the playa.[15] But that sum doesn't factor in the lost revenue from the water being appropriated for the project (around $15 million/year) or the operations and maintenance budget, some $10 million per year.[16]

Instead of continuing with MOA's open ended mandate for additional construction until the dust emission goals are met, the city negotiated a final phase for the construction of an addition 12.7 square miles of shallow flooding amidst "moat and row" dust control landforms. Projected to cost another $100 million and to be completed by 2010, moat and row is a promising alternative compared to the widely deployed shallow flooding. It will have many fewer pipes to leak, valves to stick, or controls to break, while using less water and requiring almost no energy to operate. The future of dust control on Owens will look like a zigzagging wet corduroy of low berms sheltering water filled ditches instead of the sparkling braids of water bubbling over bright red salt flats that the bubblers create.

51,000 acre-feet of water, once bound for Los Angeles, are now being diverted back onto Owens Lake each year. But this amount will never refill the lake. For that to happen, it would take at least seven years of the entire Owens River flowing unimpeded back into the basin. Still, this bounty of water has been the genesis for a new Owens Lake, and brine flies and microbes are now flourishing in the shallow pools. The acres of mudflats and brine pools have become the dreamed of habitat for the migratory shore birds that inspired the MOA. Birdwatchers and birds are visiting Owens Valley in increasing numbers, enhancing the local ecology and economy.[17] The sky may never be completely darkened by millions of ducks as reported by early pioneers, but the Pacific Flyway has restored an oasis that balances some of nature's needs with human greed.

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Los Angeles is just starting to adjust to the imposed reductions of water from the Owens River Valley and the Mono Basin. In the days of unlimited water exports, the Los Angeles Aqueduct provided 70% of the water for the city. Currently, one-third of the aqueduct's flow remains in the Owens River Valley and the Mono Basin for crucial environmental use. At best, the Aqueduct can provide half the water the City's needs in the foreseeable future. But with the specter of climate change, the future of Los Angeles is starting to look dry. The best-case climate models predict that California should expect a 30-60% loss in the Sierra snow pack and available water.[18]

There are no unclaimed or unutilized water basins left for the city to tap. Around the country, water diversion sources are being challenged from many different interest groups and water users fighting for their share of this precious resource. To the east, the over-allocated Colorado River is being fought over by the other Western States along its banks and by Mexico. Moreover, the Colorado's water quality is threatened by pollution from farms and mines, including piles of radioactive tailings in Utah. To the west and north, the massive California Aqueduct has looming problems as well. With the possible extinction of several species of fish, saltwater infiltration into the delta, collapsing dikes and competing economic interests over that water—there is likely to be even less water guaranteed for metropolitan Southern California.

The days of building massive aqueducts are over and most alternative sources of drinking water are not viable. Desalination doesn't create high quality potable water, is very energy intensive (even with the high efficiency membranes being developed by the Metropolitan Water District), and is very expensive. Icebergs from Alaska or giant bags of fresh water floated down from the

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Columbia River are just pipe dreams, since those places need the water too, and the cost of these enterprises appears to be prohibitive.

But Los Angeles has a long tradition of pursuing efficiency and conservation of water back to the days of Mulholland, who installed the first water meters in the city. Even with the rapidly growing population, the amount of water used in Southern California has stayed almost steady, near the 1990 level. The entire state of California has struggled to use less water, and postsuburban California is beginning shift from its earlier ideal of a verdant, irrigated Eden of swimming pools and lush lawns, to the native xeriscape of chaparral and oak savannahs. Within the culture of conservation lies the new water source for continued urban growth. Water recycling, off-stream reservoirs and in-ground storage are a few proven solutions to creating more available water with the existing supply.

Hyperion Sewage Treatment Plant in El Segundo, sends over 362 million gallons of secondary treated water out into the Santa Monica Bay every day. Reclaiming this discharged water through tertiary treatment and additional filtration could provide for the needs of another 1.6 million people or more. The biggest hurdle to recycling water is the psychological factor of drinking water that once flowed in our toilets. The accepted method of mentally "sanitizing" this connection is to recharge groundwater with the treated effluent, then pump it out at a later date for use.[19] Since the 1960s, some recycled water has been discharged into the Santa Ana River where it enters the aquifer through the unpaved riverbed. Negative press and public opinion, much to the entire region's loss, have defeated other water-recycling projects in the LA region. For now, however, most of this valuable water is dumped into the Los Angeles River or Santa Monica Bay, and only a small fraction gets reused for irrigation or industrial uses.

As the antipode to sprawling Los Angeles, the artificial emptiness of Owens Lake simulates the conditions of the frontier. Standing at the edge of the Lake, the stark flatness of the playa recedes into the distance with the monumental dust control project is barely visible, comprising only a

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subtle shading of grays, reds and greens against the white salt until the visitor arrives in the midst of the bubblers on the terraformed lakebed. This vast infrastructure collapses the romantic notion of discovering a pristine wilderness in this otherwise featureless terrain. Looking back out towards the surrounding mountains, the other subtle traces of human activity jump into stark relief - the road snaking up the shear wall of the mountains, the gossamer threads of the power lines, and absolute horizontal trace of the aqueduct cutting into the foothills.

Once natural, California is now thoroughly artificial. Perversely, only in places as heavily regulated as Owens Lake is there any semblance of what the territory might have been like before settlers arrived. We can dream that if Los Angeles hadn't taken its water, a prehistoric Owens Lake might still reflect the sky and mountains. But more likely, if Los Angeles hadn't taken its water, Owens Valley might be filled with agribusiness being rapidly supplanted by cookie cutter subdivisions. Yet in a strange gift, Los Angeles has preserved the open rural landscape of Owens Valley, re-creating the void where by all rights we shouldn't expect to find it.

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[1] Jeff Putnam and Ginny Smith, editors. *Deepest Valley: A Guide to Owens Valley, Its Roadside and Mountain Trails- 2nd Edition* , (Palo Alto: Genny Smith Books/Live Oak Press, 1995), 245-249. Cerro Gordo produced $17 million of silver and lead between 1865 and 1879. While this seems small compared to other bonanzas, it was enough to catapult post-Alta California Los Angeles from being a town of less then 2000 people in 1850 to over 50,000 in 1890. Between 1880 and 1890 alone, the city experience 450% growth.

[2] Remi Nadeau, *The Water Seekers,* (Santa Barbara: Crest Publishers 1997), 11-15. Based on the precipitation in the Los Angeles River watershed, the city has a sustainable population below the 1904 total of about 200,000 people. There are many other factors that helped Los Angeles grow, from the discovery of oil to the climate, but water was the first critical resource.

[3] Norris Hundley, *The Great Thirst – California and Water: A History*, (Berkeley: University of California Press, 2001), 141-166, for a chronicle of the politics behind the Los Angeles Aqueduct. For the economic

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analysis, see Gary Libecap, *Chinatown: Transaction Costs in Water Rights Exchanges the Owens Valley Transfer to Los Angeles*, (Tucson: University of Arizona, 2004, NSF Grant 0317375).

[4] Owens Valley/Inyo County has projected population growth less then 10% over the next 50 years and may even lose population. State of California, Department of Finance, *Population Projections for California and Its Counties 2000-2050, by Age, Gender and Race/Ethnicity*, (Sacramento, California, July 2007). There are some pending projects for exurbs of Las Vegas just inside California state line that may double the County's population, but the state seems to have ignored these projects in their projections.

[5] Blake Gumbrect, *The Los Angeles River: Its Life, Death, and Possible Rebirth* , (Baltimore: Johns Hopkins University Press, 1999).

[6] Marith C. Reheis, "Owens (Dry) Lake, California: A Human-Induced Dust Problem" US Geological Survey, http://geochange.er.usgs.gov/sw/impacts/geology/owens (accessed October 2004).

[7] In 1872, the lake was 49' of depth; by 1876 it had dropped to 38'. In 1913 it was only about 29' deep. At the end of Pleistocene Ice Age, Owens Lake was 270' deep, when it was part of a chain of lakes, flowing through Haiwee Pass into China Lake, filling Death Valley with Lake Manley and cascading into Lake Lahontan north of Lake Tahoe. Hoyt S. Gale and F.L Ransome; "Salines in the Owens, Searles, and Panamint Basins, Southeastern California", *United States Geological Survey Bulletin 580,* (Washington, DC: US Government Printing Office, 1913). See also the 1888 map reproduction in (Putnam & Smith, 1995 p.247).

[8] A. S. Jayko and C.I. Miller*, Impact of Climate Change on the Landscapes of the Eastern Sierra Nevada and Western Great Basin – Workshop Summary*. (Washington: U.S. Geological Survey Open-File Report 01-202, 2000) have found that Owens Lake Playa possibly emerged a few times over the past 1,000 years during prolonged droughts. George I. Smith and James Bischoff – editors, *An 800,000-Year Paleoclimatic Record From Core OL-92, Owens Lake, Southeast California.* (Boulder, Co: Geologic Society of America 1997), claim that Owens Lake continuously existed for at least 800,000 years.

[9] California droughts over the past 150 years include: 1863-64, 1887-88, 1912-13, 1922-24, 1928-34, 1947-50, 1959-61, 1976-77, and 1987-92. 1977 was the driest year on record with only 20% of average precipitation. A. S. Jayko & C. I. Miller, *Preparing for California's Next Drought - Changes Since 1987-92.* (Sacramento: Department of Water Resources, State of California, 2000).

[10] Greg James et al, *Green Book For The Long-Term Groundwater Management Plan For The Owens Valley And Inyo County* (Los Angeles: City of Los Angeles & Inyo County 2000). Additional Technical Memorandums have been issued as addendums to the *Green Book,* to address specific subjects and refine the management/monitoring of the pumping. The City of Los Angeles and Inyo County have recently started work on a major revision of the *Green Book* for completion in 2009.

[12] The 1998 mitigation Memorandum of Agreement was court ordered after a successful lawsuit brought by several local community groups and national environmental groups. The Great Basin Unified Air Pollution Control District/Inyo Water District administer/monitor the process, and the Los Angles Department of Water and Power funds and implements the projects. The Environmental Protection Agency and the US Navy also brought considerable pressure on Los Angeles to reduce dust emissions.

[13] There are three strategies for dust reduction legally specified in the MOA are: shallow flooding, planting, and gravel cover. It is also specified that all berms have 'snowy plover crossings incorporated every 500 feet'.

[15] Up to 54,000 acre-feet may be diverted from the Aqueduct for the dust mitigation project. This amount can support a population of between 220,000 and 440,000 people. On the other hand, if the dust control project's area were settled at the population density as the city of Los Angeles, then the lake would have 31,000 residents.

[16] Wayne Bamossy, email correspondence with the author June 22, 2007.

[17] Wayne Bamossy, conversations with author January 5, 2005. Richard Cervantes (Inyo County Supervisor), conversation with author January 7, 2005. LADWP, *Policy for Public Access to LADWP Facilities at Owens Lake* (Los Angeles, May 20, 2004).

[18] Dan Cayan et al*, Climate Change Scenarios for California: An Overview* (Sacramento, CA: California Climate Change Center 2006), www.energy.ca.gov/2005publications/CEC-500-2005-186/CEC-500-2005-186-SF.pdf accessed May 2007

[19] Bureau of Sanitation, "About Wastewater" (City of Los Angeles Department of Public Works), http://www.lacity.org/san/wastewater/factsfigures.htm accessed May 2007.