Water Hist (2009) 1:59–74
DOI 10.1007/s12685-009-0006-3

ORIGINAL PAPER

Fleeting fame and groundwater: isolation and water in Kings River Valley, Nevada

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Received: 1 March 2009 / Accepted: 16 April 2009 / Published online: 3 July 2009

Abstract This article examines how crop irrigation with groundwater briefly transformed the image of the Kings River Valley, a remote arid valley in northern Nevada, US, and captured state and national attention during a brief period in the mid-twentieth century. The valley's short time in the limelight reveals the appeal of finding and recovering abundant water in arid places, bringing to light how groundwater use, technology, and regulation may be connected with alternating cycles of remoteness and popularity in a place. Coupled with improvements to infrastructure was the backdrop of a successful place; success, in this case, being associated with the know-how and capacity for massive withdrawals of groundwater and the ability to use this water to enhance agriculture. However, agriculture dependent upon groundwater in an arid place is complicated and uncertain, made more so when isolation is involved. As the technologies that supported large-scale groundwater pumping became more commonplace throughout the country and as groundwater became less readily accessible in the valley, attention to the Kings River dwindled and it slipped back into obscurity. Although groundwater has not completely disappeared, heavy groundwater pumping has altered the Kings River Valley, the place itself changing in the process. There are, however, some who gain advantage from isolation. The economic and political advantage of greater isolation accrued principally to absentee landowners, whose roots in Western cities were removed from daily life in the King River Valley. Isolation allowed less regulatory oversight of existing groundwater users, resulting in financial benefits which accrued primarily to those who supplied the cash and expertise for crops, cows, and groundwater, but did not actually reside in the valley. Absentee ranch owners generally had this capital, having the requisite connections and motivations to operate skillfully in the more structured and regulatory environment. Thus, this article analyzes water history coupling it with questions that are geographic in nature. What is it that makes a place isolated and how does groundwater figure into changes in isolation? How do cycles of isolation fit with changes in water technologies and regulation? And while the

I appreciate the work and assistance of Mark Rincon on this project, who assisted with data collection and created the maps for Fig. 1.

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consequences of isolation may be apparent, what are the advantages of isolation to those using groundwater?

Keywords Groundwater use · Irrigation history · Absentee ranch owners · Patterns of isolation · Western United States

There are many secluded places in the western United States, but few are as isolated as the Kings River Valley in northern Humboldt County, Nevada. Situated along Nevada's northern border with Oregon, the Kings River Valley has never supported a town, has no gas station, café, or shop; there are no paved roads within the basin. It is one of the only two places in the state that have never sustained sufficient population or infrastructure to support a post office (Harris 1973). The anonymity surrounding Kings River Valley is borne out on empty spaces shown on maps and in the dearth of public knowledge about the place. Literally "off the map," few today have ever heard of the Kings River and fewer still have been there. Unfamiliar to all, but a handful of people today are the Double H and Montana Mountains that come together at Thacker Pass and form the eastern boundary of the valley. Few people are aware of the Trout Creek and Bilk Creek Mountains, homes of Disaster and Trident Peaks, which forge the northern and western edge of the basin from which the river originates. Most are not acquainted with the confluence of the Kings River, which episodically contributes flow to the Quinn River (Fig. 1).

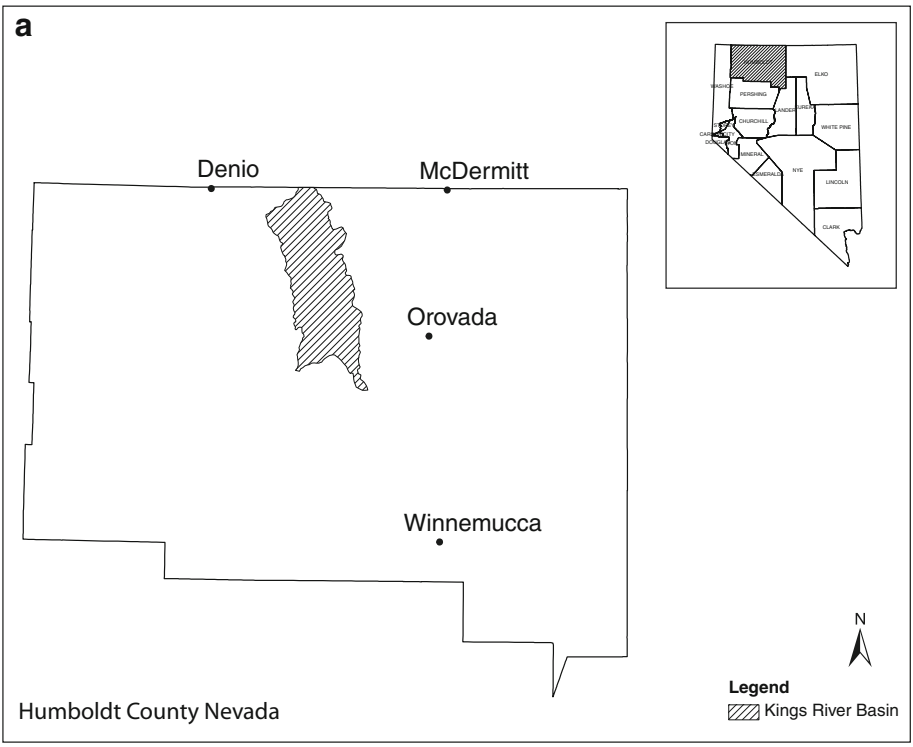

Fig. 1 Map of Kings River Valley within Humboldt County and State of Nevada, US

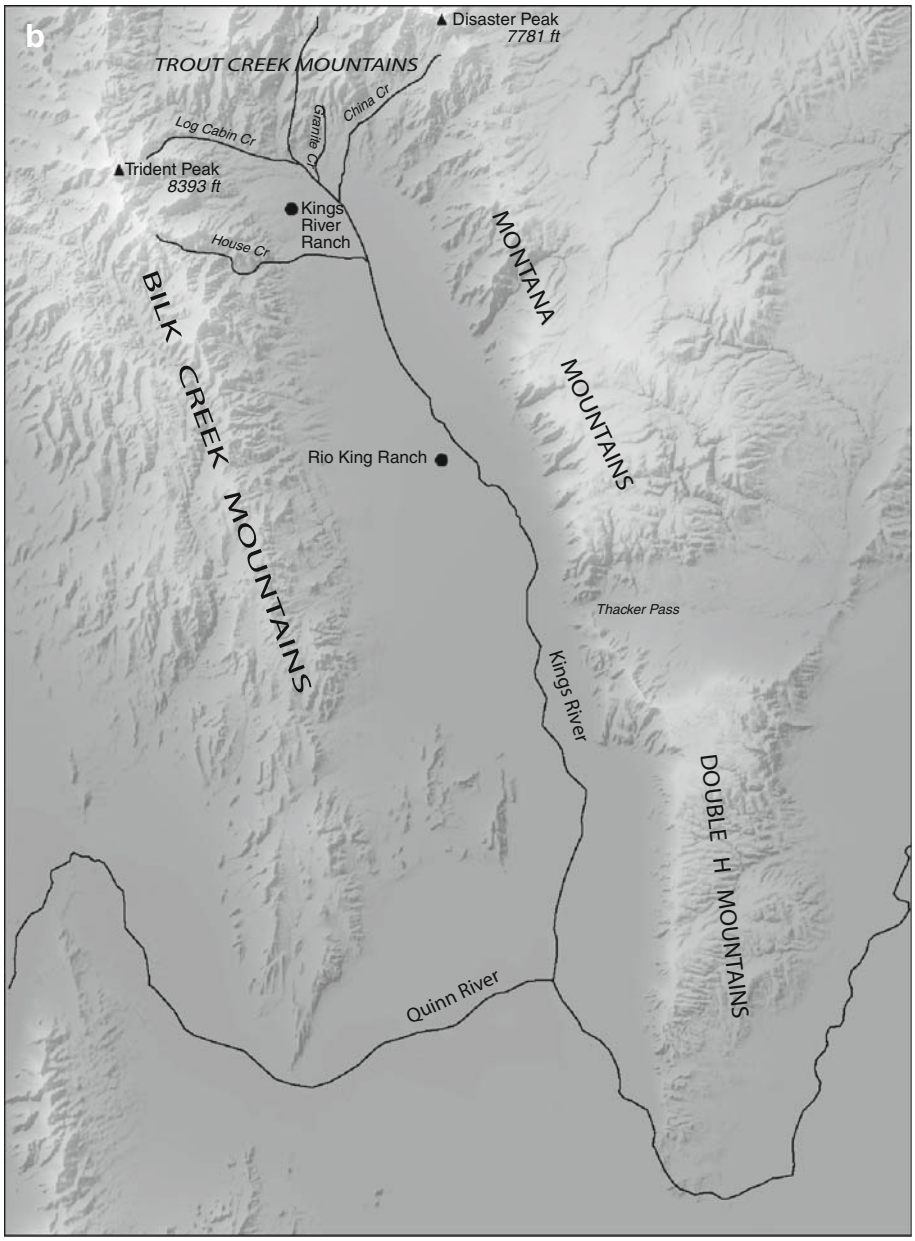

Fig. 1 continued

However, it has not always been so. Despite the sparse peopling of the valley and its inaccessibility, there was a short time when politicians and the media glorified the Kings River as a triumph of industriousness coupled with the introduction of new water technologies in the most arid state in the US. They praised the abundance of groundwater that nourished its crops and presented the valley as a model of agricultural progress. Life in the Kings River Valley was made out to be the envy of many across the country.

This article examines how crop irrigation with groundwater briefly transformed the image of a remote arid valley, and during a brief period in the mid-twentieth century, captured state and national attention. The Kings River Valley's short time in the limelight reveals the appeal of finding and recovering abundant water in arid places, bringing to light how groundwater use, technology, and regulation may be connected with alternating cycles of remoteness and popularity in a place. This article examines temporal patterns of changing water use in conjunction with an exploration of isolation. While isolation is patterned on socio-spatial unevenness, isolated places are bound to their histories as well. Thus, water history is coupled with questions that are geographic in nature. What is it that makes a place isolated and how does groundwater figure into changes in isolation? How do cycles of isolation fit with changes in water technologies and regulation? And while the consequences of isolation may be apparent, what are the advantages of isolation to those using groundwater?

Physical environment

About 80 km northwest of Winnemucca, Nevada, the watershed of the Kings River is situated in north-central Humboldt County, Nevada, centered at latitude 41°45′ and longitude 118°15′. Elevations on the valley floor range from 1,250 to 1,400 m above mean sea level.

The headwaters of the river rise in the Bilk Creek and Trout Creek Mountains, supported by a number of tributaries, including Cold Springs Creek, Log Cabin Creek, House Creek, Granite Creek, and China Creek as well as the occasional mountain-front spring. After emerging from the mountains, the Kings River enters a north-south oriented alluvial valley about 40 km in length and ranging in width from 6 to 13 km (Zones 1963). At its confluence with the Quinn River, waters from the both streams combine to form the Quinn River Lakes, which today are pasture lands rather than open water. From there, the Quinn River heads westwards toward its terminal sink in the Black Rock desert. As with all surface water within the western United States' Great Basin region, no drop from the Kings River Valley ever makes it to the ocean. All water stays within the basin or evaporates.

Summers in King River Valley are hot and dry, with maximum temperatures from 35 to 40°C. Winters are very cold with minimum temperatures dropping below −15°C in December and January. Precipitation averages about 23 cm annually on the valley floor, mostly falling as snow during the winter months. It is dry and windy throughout much of the year, with low relative humidity and high evaporation rates (Malmberg and Worts 1966). Vegetation on the valley floor includes sagebrush, greasewood, rabbitbrush, and native grasses.

Early years

The Kings River Valley was once at the center of *Numa* land, or Northern Paiute lands, which spread northward to the John Day River in central Oregon and southward to Mono

Lake, California (Fowler 1989). Little is now known about the specific activities and residency patterns in this area before the nineteenth century, but groups of *Numa* likely came to the Kings River to hunt game, gather plant materials, and use water from springs and creeks. The valley may have offered shelter for seasonal encampments for *Numa* as well.

Kings River was not the first valley in the region to attract non-native settlers. In 1870, the Queens River township included the Kings River Valley, but centered around what is today known as the Quinn River Valley to the east. The vast majority of lands throughout the township were part of the public domain, owned by the federal government. In northern Humboldt County, as throughout much of the arid western US lands in the public domain could become private property if they were settled and made economically productive. This was often done by staking a claim to land with a reliable source of water, using private lands to grow crops for domestic and livestock feed during the winter, and relying on the surrounding public range to support grazing during the spring, summer, and fall. Sixty-five hectares (or 160 acres) was the typical size of a homestead in the western US under the federal Homestead Act.

In 1870, there were 76 residents of the Queens River township.[1] While it is likely that stockmen and prospectors who spent time in Kings River Valley and the surrounding mountains were among the populace counted in the 1870 census, Kings River did not become recognized as on its own until the census of 1900. At the turn of the twentieth century, 23 people were listed as living in Kings River Valley. Most were unmarried men working in ranching, but two families along with their school-aged children—four in total—made Kings River their home. Residents mostly hailed from the Midwest and East but a few were born on the West Coast, and there was a cook born in China as well as three French Basque sheepherders.[2]

The earliest stockmen wintered sheep in the valley, and during the summer months led their stock to pasturage and water sources in the surrounding mountains. In the 1870s, a drought in California sparked the interest of several Californian livestock businesses in the grazing lands in northern Humboldt County that led to forays into Kings River Valley (Sawyer 1971). Large sheep operations, such as those owned by Henry Miller, Patrick Flanigan, and John G. Taylor, reaped fortunes from northern Nevada's sheep industry and expanded their enterprises through the early 1890s (Sawyer 1971; Treadwell 1931). These owners did not reside or spend much time in the area, leaving the daily management of these herds to ranch hands and poorly paid sheepherders, who were often from the Basque country in France and Spain. Over time, however, some sheepherders found ways to establish their own herds. This was the case for Juan Largasa who in 1905 had a homestead of 65 ha on the east side of Kings River Valley to support his flock of 2,000 sheep (Bragg 1976).

In the late nineteenth and the early twentieth centuries, the cattle industry and sheep industry were often positioned as rivals, to the extent that there were fears of armed conflicts in Humboldt County. Cattle ranchers, whose political and economic power base within the state continued to escalate from the late 1880s onward, criticized the destruction that sheep wrought on grazing lands in northern Nevada and complained that sheep operations did not pay for their use of the public rangelands (Townley 1981). Left unsaid was that cattle ranchers did not want nomadic flocks of sheep using pasturage in the moister parts of the range or congregating in areas cattle ranchers relied on, particularly

[1] US Bureau of Census (1870).

[2] US Bureau of Census (1900).

around water sources. Cattle operations were expensive propositions, highly dependent upon scarce water sources; therefore, concerted efforts were made to minimize the risk of losing riparian range or reliable water sources to sheep (Treadwell 1931).

By the first decade of the twentieth century, there were several small cattle ranches in the mountains surrounding the upper Kings River Valley. Perry Boyd, Issac Choate, S. G. Choate, and C. E. Mullinix each had 65-ha homesteads that served as a base for their cattle operation and allowed them to harvest hay (Bragg 1976). Within the valley, there was one sizable cattle ranch. Situated near Rodeo Creek and Granite Creek along the upper Kings River, A.W. Riley of Santa Rosa, California claimed over 6,000 ha of private lands and rights to public lands. Riley's Double O Ranch cultivated 600 ha of native meadow and alfalfa. Despite being one of the "leading cattlemen in the state," Riley was an absentee landowner who relied on his ranch manager, Floyd McReynolds, and a crew of ranch hands to work on the Double O cattle ranch (Bragg 1976).

Ample water was the key to the success of the Double O Ranch. Allen Bragg, a newspaper editor traveling in 1905 to explore and advance the fortunes of Humboldt County through his writings, declared Riley's Ranch as one of the best ranches in the state with the best range he had seen. Water made all the difference. Bragg saw the verdant bunchgrasses on the sides of the mountain and the choice meadows and alfalfa fields on the valley floor as being possible only through the Double O Ranch's possession of ample water. Bragg was the first journalist, but not the last, to visit the valley and conclude that control of plentiful water turned the ranch and the valley into "one of the choices spots in Nevada" (Bragg 1976, p. 50).

In the years that followed, other homesteads in the Kings River Valley were settled, titled, and sold. Over the years, many smaller parcels were purchased and aggregated into larger ranches. Thomas Nelson and Randall Sage were among those with ranches in the first decade of the twentieth century, who later sold their lands and water rights. The purchaser of Nelson's and Sage's lands was the Ellison Ranching Company, a Utah-based agriculture company. These lands, purchased in 1911 and 1912, were aggregated together with lands from Riley's Double O Ranch and renamed as the Kings River Ranch. A drought in the mid-1920s put a strain on ranching operations because of the expenditures for feed and losses of livestock, and so, the Ellison Company sold the Kings River Ranch in 1926 (Kane 1979). Fifteen years later, Kings River Ranch was sold again, and this time, Basque sheepmen, the Bengoa brothers (Cleto, Frank, and Chris) bought it, acquiring the funds to purchase the ranch through the sale of 5,000 of their sheep.[3]

Lands with sufficient water from springs and streams for irrigation and stockwatering were the most desirable. However, these were limited to three households who were granted rights to surface water in the valley. Pete Yrueta established a water right dated 1902 to use a small amount of surface water for his sheep from the Kings River. Henry and Candida Marcuerquiaga received a right for water from a tributary, Horse Creek, for up to 191,000 m^3 annually based on a priority of 1886 for irrigation and stockwatering. The most significant (and for the most part the oldest, hence highest priority) was a series of water rights for the Bengoas' ranch from the Kings River and a number of its tributaries. The Bengoas' rights for irrigation and stockwatering totaled over 25.9 million m^3 annually with a priority date of 1874.[4]

Water was used for ranching in the valley and surrounding mountains for decades before anything was done to formalize water use and establish legal rights to springs and

[3] Nystedt (August 19, 1959).

[4] 6th Judicial District Court of the State of Nevada in and for the County of Humboldt (April 11, 1966).

stream water. Until the mid-1950s, as water issues arose, localized means were generally relied upon to work out differences. The valley's isolation meant that the Nevada State Engineer's Office, responsible for water regulation throughout Nevada, was physically and administratively removed from the water matters and ranching issues. Few absentee ranch owners or residents of the valley had an interest in raising attention about the Kings River to state administrators, as they had little to gain through formal oversight of water use or through legal processes. Yet this was to change in 1957 when the Bengoa Ranching Company petitioned for a determination of their water rights. Although it took a few years, the Nevada State Engineer responded by issuing a determination of surface water rights, followed in 1966 with a court-issued decree that confirmed the State Engineer's findings. Beyond the three water uses mentioned, no other water rights from springs or streams were ever confirmed, and the Kings River Decree stated that there was no additional water available for irrigation. What prompted the move toward regulation was discovery of groundwater in the valley in the late 1950s.[5]

Groundwater and agriculture bring attention to the valley

In the mid-1950s, Cleto Bengoa and his family at Kings River Ranch started looking seriously for new sources of water to irrigate hay and alfalfa. He was particularly concerned about the availability of water during dry years. Trained as a civil engineer at the University of Nevada, Cleto found his source of water underground, starting with small wells for stockwatering in 1956 and 1957. The Bengoas were able to raise monies for drilling wells by expanding their cattle operation, which resulted in the need for more feed, which resulted in the need for more irrigation water to support these livestock feed crops. By 1958, deep wells sunk 90–220 m below the ground surface supported irrigation. Yielding tremendous quantities of water, the best of these wells were reported to produce from 6,400 to 14,000 l min^{-1} with "a supply thus far that has been limitless."[6] Networks of irrigation ditches were constructed to move water from the well heads to the fields. By the end of the decade, the Bengoas had an estimated two million dollars invested in their ranch, much of their wealth was based on the productivity of the wells that supported the lands and livestock. They were able to support 2,000 cattle, 200 sheep, 100 horses, as well as swine.[7]

It was only after the wells were drilled and the groundwater applied to crops for irrigation that they filed for water rights. The Nevada State Engineer's Office awarded the Bengoa Ranching Company a certificate for 1.26 million m^3 of groundwater based on a 1959 filing date.[8] This award was followed with another groundwater certificate in 1961 for 1.45 million m^3 annually. The Kings River Ranch made several other claims to

[5] Kings River Decree (1966).

[6] Nystedt (August 19, 1959).

[7] Ibid.

[8] The discussion that follows only considers water for stockwatering and irrigated agriculture. Although clearly households use water as part of their daily routine, rural domestic use of water for households does not require a water right in Nevada so it is also not included in the discussion. In addition, water rights based on mining usage, which were few and far between, have not been covered here. The discussion in this article concerning water rights is based on data from the 1966 *Kings River Decree* as well as the Nevada State Engineer's Water Rights Database: http://water.nv.gov/water%20Rights/permitdb/permitdb_index.cfm.

groundwater in 1959 and through the early 1960s, but no other water rights were awarded to them.

The Bengoas were friendly with the Rocca family, which is how Curt Rocca learned about the Kings River Valley. Curt Rocca, a resident of Berkeley, California, had searched for the right place to start his "farming empire" in Nevada. In 1955, with the onsite assistance of farm manager Otto Engler, Rocca founded the Rio King Ranch near Five Mile Creek, south of the Bengoas' Ranch.[9] The Rio King Ranch was an ambitious agricultural undertaking designed to do more than support fields of hay and alfalfa for livestock. By 1959, Rio King Ranch had 2,400 ha under cultivation and anticipated putting 1,600 more under production by the end of following year, with the goal of eventually cultivating the entire 5,000 ha parcel.[10] Rio King Ranch produced hay, alfalfa, oats, two varieties of clover, and four varieties of wheat as well as test plantings for carrots, onions, potatoes, grass, and legume seed crops.[11] Farm manager Engler believed that productivity in Kings River Valley exceeded that of California's fertile San Joaquin Valley.[12] The variety of crops and test plantings of Rio King Ranch gave the valley an identity as a multifaceted farming place rather than only a place for cattle and sheep ranching.

Even more than the Bengoas' Kings River Ranch, the Rio King Ranch relied upon deep wells to supply water to their fields. As a result, the Rio King Ranch sought security through legalizing their use of water and acquiring title to water rights. Rocca began to file applications for many of his groundwater rights before the Bengoas did, despite their two generations of history in the valley. In a single year—1955—Rio King Ranch filed for 20 water rights for irrigation and followed up with seven additional groundwater claims in the following years. Although the Nevada State Engineer's office only awarded a portion of the claims made and it took years of waiting, the simple steps of making water rights claims eventually translated into millions of cubic meters of groundwater becoming legally available to sustain the crops of the Rio King Ranch.

Another notable landowner in the valley at this time was James R. Buell whose ranching lands were south of the Rio King Ranch. At his Nine Mile Ranch, Buell started filing water right applications on the same day in 1955 as Rocca, continuing with his claims until he had over 50 water rights applications, many of which were eventually granted by the State Engineer for stockwatering and crop irrigation. Buell was a veterinarian, rancher, entrepreneur, and director of a Southern California horse racing organization. He split his time between Reno, Nevada and Buellton, California, where he owned a horse and cattle ranch, Rancho Jonata. Buell was another capitalist who reaped benefits but did not reside in the Kings River Valley, using hired managers and ranch hands to run his agricultural operations.

The irrigated land base in the Kings River Valley increased, as groundwater usage expanded. In 1949, an estimated 12.5 thousand hectares were irrigated throughout the valleys of northern Humboldt and northern Washoe counties, including the Quinn, Kings, and valleys to the west (Hardman and Mason 1949). However, by 1966, Kings River Valley alone was considered to have a water supply sufficient to irrigate 12–17.5 thousand hectares (Bourns 1966).

[9] Nystedt (August 19, 1959, front page) and Anonymous (August 23, 1959, p. 16).

[10] Anonymous (August 23, 1959, p. 16).

[11] Nystedt (August 19, 1959, front page).

[12] Anonymous (August 23, 1959, p. 16).

During the late 1950s and early 1960s, the number of applications increased as did the granting of water rights in the form of groundwater certificates. Altogether, 158 water rights applications were filed for irrigation, far more than any other time period. Twenty-nine percent of these applications were denied, withdrawn, or cancelled. Not only did groundwater use in the valley go from none to very large amounts quickly, but more formalized means were used to assert control over groundwater. By 1963, 44 wells in the valley were pumping groundwater for irrigation (Malmberg and Worts 1966).

Technological innovations which facilitated access to deep groundwater along with the commercialization of groundwater pumps made this possible. In addition, it was the combination of abundant water and technology that caught the attention of state politicians and the media. On a trip to Kings River Valley during the summer of 1959, Nevada Governor Grant Sawyer was quoted as saying "this development is an example of the fullest beneficial use of underground water."[13] The Governor and his entourage were impressed with the abundance of water and the technological mastery that led to agricultural success, particularly in such a remote location. Governor Sawyer saw the Kings River as a model for the rest of the state and promised to urge the State Engineer to "cooperate in determining the relative availability of water in other valleys of the state in hope of creating other developments comparable to that of Kings Valley."[14] The Governor was not only pleased with agricultural productivity and groundwater technology in the valley, but also he pointed the Kings River as a model for the rest of the state.

Picking up on the enthusiasm for the valley, a series of three high-profile newspaper articles with photos were published about Kings River in the *Reno Evening Gazette* and *Nevada State Journal* during August 1959. The journalists writing these articles also attributed much of the valley's agricultural success to the abundance of water. The stories also highlighted the broader implications of such success with groundwater and agriculture. One article, for example, alluded to the international implications with a discussion of six exchange students from India, who worked in Kings River Valley as part of their training and studies of large-scale agriculture and engineering at the University of Chicago.[15]

A couple of years after the Governor's visit to the valley, another important visitor arrived. Donald Williams, head of the Soil Conservation Service in the US Department of Agriculture, came to visit from Washington, DC. Williams was impressed with the tremendous output of livestock feed produced in the Kings River valleys and was hopeful that this would offset shortages of hay on most cattle ranches. He commended the progress made in land leveling and improved irrigation practices.[16]

Throughout the early 1960s, other news stories about agriculture in the state's newspapers remarked favorably on agricultural and irrigation progress in Kings River Valley. In 1964, a news story praised the expansion of seed growing in Kings River Valley.[17] New silos, feeding shelters, and a cattle feedlot in the valley drew attention in 1966.[18] Seed production was also highlighted in another story in 1968, which pointed out that together

[13] Anonymous (August 23, 1959, p. 16).

[14] Anonymous (August 23, 1959, p. 16).

[15] Nystedt (August 19, 1959, front page).

[16] Anonymous (1961, p. 12).

[17] Anonymous (February 1, 1964, p. 34).

[18] Anonymous (January 27, 1966, p. 9).

the Quinn River and Kings River valleys produced the bulk of the Nevada's alfalfa seed crop and supported the only seed processing plant in the state.[19]

Related agricultural activities built upon the momentum generated by the statewide and national attention, helping Kings River Valley maintain better control of its own future. A Soil Conservation District was formed for Kings River in 1960, and some of the supervisors included the Valley's main ranchers Cleto Bengoa (chair of the District) and Curt Rocca.[20] Valley ranchers also participated in broader agricultural groups, such as the Humboldt County Agricultural Stabilization and Conservation Service Committee, which Chris Bengoa of Kings River Ranch chaired in the early 1960s.[21]

During these years, the valley's success extended beyond groundwater and agriculture, as the increased attention led to other developments in infrastructure. In 1961, power lines were brought into the valley. Pleased to announce the construction of these new power lines, federal Senator Alan Bible proudly noted that this was the first time that power distribution from the Columbia River and Bonneville Power Authority had crossed outside their service boundaries. In his speech on the new transmission lines, Senator Bible was quoted as stating that Kings River Valley and neighboring Quinn River areas "have witnessed the fabulous growth of a new agricultural area, the installation of cattle feeding yards housing some 2,000 head, the advent of a new seed plant and other economic benefits."[22]

Residents of Kings River Valley were able to capitalize on their popularity in other ways as well. In 1961, a new school bus was dedicated to the valley, and 3 years, later the county contracted the construction of the valley's first schoolhouse.[23] Although it remained unpaved, the main road from Orovada was improved in 1964 and phone service was extended into the valley in 1969.[24] With attention associated with ample supplies of groundwater being put to use in productive agricultural activities, the valley had become better connected to other places. It was less isolated, at least for the time being.

Feeling the effects of pumping

Along with the political interest and publicity came increased regulatory scrutiny from the State Engineer's Office on water usage. Trying to prevent too much groundwater from being used, the State Engineer invoked a temporary moratorium in 1962 on the drilling of new wells and started the process which led to the Kings River Valley being designated as a protected groundwater basin. Concerned about restrictions on groundwater development, valley ranch owners and residents objected and asked for an assessment of available water resources (Malmberg and Worts 1966). In the early 1960s, there was little definitive information about the hydrogeologic conditions of the Kings River Valley. Due to its early isolation, reports on irrigation throughout the state from 1902, 1949, and 1953 provided virtually no information about streamflow or groundwater conditions in the valley (Taylor 1902; Hardman and Mason 1949; Anonymous 1953). Studies were initiated in the early

[19] Anonymous (October 22, 1968, p. 12).

[20] Anonymous (March 24, 1960, p. 33).

[21] Anonymous (November 7, 1964, p. 6).

[22] Anonymous (November 5, 1961, p. 20).

[23] Anonymous (September 5, 1961, p. 11, April 12; 1964, p. 37).

[24] Anonymous (November 23, 1964, p. 2; August 15, 1969, p. 19).

1960s by the Nevada State Engineer and US Geological Survey which produced technical reports assessing groundwater conditions (Zones 1963; Malmberg and Worts 1966).

The 1963 report by C. P. Zones underscored the wealth of water below the ground by identifying at least 250 m of alluvium throughout much of the valley that was saturated close to the surface. However, the aquifer's water had been stored over the centuries and millennia, and the rate at which groundwater in the valley recharged from the mountains and valley slopes was estimated at only 18.5 million m^3 annually. Therefore, even as early as 1958, more groundwater was being pumped from the valley for crop irrigation than was estimated to be recharged (Zones 1963).

A 1966 report by Malmberg and Worts Jr. followed up on the Zones report and involved a more extensive appraisal of the water supply in the Kings River Valley. Data on precipitation and from wells across the valley were used to assess groundwater conditions.[25] Recharge estimates for the valley were modified only slightly from the Zones report, with 21 million m^3 estimated as the average rate of annual recharge. This amount also was considered to be the perennial yield—the amount that could be put to use without long-term depletion of the aquifer. Given that the State Engineer had already awarded approximately 74 million m^3 annually in groundwater pumping rights, the basin clearly was in excess of perennial yield. The report made it clear that the aquifer would be overdrawn without corrective actions. Malmberg and Worts projected that if all the awarded groundwater rights were exercised, roughly 300 million m^3 would be depleted from aquifer storage by 1973. They also estimated that this drop in groundwater head would double the energy costs for pumping (Malmberg and Worts 1966).

By December 1971, the Kings River was identified as a critical groundwater area by the Nevada State Engineer, and no new groundwater permits were supposed to be issued. This closure was formalized by William Newman, Nevada State Engineer, who in April 1980 declared conditions in the Kings River Valley warranted designation through a state statute that allows groundwater basins to be protected from further withdrawals.[26] Soon after issuing the basin protection order, the State Engineer issued a second order that stated all applications filed after April 24, 1980 to irrigate additional lands in the Kings River Valley with groundwater would be denied.[27]

Recent events

The closure of water rights by the State Engineer's office was not widely announced. In fact, since the early 1970s, no newspaper articles or technical reports or other public documents have raised attention to the hydrologic, biologic, or social conditions in the valley. Without media or public attention and with few things that link the valley to the rest of the state and nation, it has slipped back into obscurity. Neither the valley nor the groundwater technologies used in agricultural irrigation today captures the larger public's attention.

Despite the closure, water rights for irrigation continued to be issued and transferred both after the 1971 declaration and after the 1980 basin closure. During the last three decades of the twentieth century, 21 water rights were granted with early priority dates

[25] Streamflow data was initially collected in October 1962 and continued to be collected until September 1995, far beyond the life of the 1966 study. See USGS surface water data for the USA, 1962–1995.

[26] State of Nevada, State Engineers Office (1980a).

[27] State of Nevada, State Engineers Office (1980b).

(1961 or before) totaling 1.3 m^3 s^{-1} and 16 water rights for irrigation were granted with more recent priority dates (between 1970 and 2000) totaling 0.81 m^3 s^{-1}. There were also two new water rights granted for commercial and stockwatering associated with an operation to make pelleted livestock feed totaling 0.008 m^3 s^{-1}. While these flow rates may seem small in aggregate over the course of a year, they result in significant amounts of water. In 2009, the Nevada State Engineer's office estimated slightly over 78.6 million m^3 of groundwater rights within the basin.[28] This is roughly comparable to the annual allocation in 1966, which Malmberg and Worts' report identified as being far in excess of perennial yield.

Groundwater levels continue to decline throughout the northern and central portion of the valley where ranching and farming is centered. Logs from a sample of 10 randomly selected irrigation wells indicate that in recent years, groundwater levels declined on average two-thirds of a meter annually.[29] Regrettably, concerns pointed out about hydrologic connections 40 years ago in the Malmberg and Worts' 1966 report remain as issues today, although there is little visibility of them. It is likely that such sustained pumping within the valley has affected the hydrologic connection between groundwater and surface water along the main channel of the Kings River, its tributaries, and on the Quinn River as well.

Consider fisheries that are dependent on streamflows, for example. In 1956, there was enough water and a productive enough fishery that the Kings River was slated to have an open fishing season.[30] The Nevada Division of Wildlife no longer identifies the Kings River as being "fishable."[31] Over the years since major pumping began, mean monthly flows range from <0.06 to 0.5 m^3 s^{-1}, conditions which make for poor fisheries.[32] No streamflow from the Kings River makes it to its confluence with the Quinn River in all but the exceptional year (Berger 1995).

The Kings River Valley suffered other woes as well in the wake of heavy groundwater usage. Two major grasshopper infestations struck the valley in 1972, affecting over 6,000 ha. Nevada State Department of Agriculture official Harry Gallaway thought that the grasshopper infestation in the Kings River Valley was as severe as any experienced in the state in the preceding three decades. He also underscored that absentee ownership of some valley lands made abatement challenging.[33] Moreover, during the early 1970s, the Rio King Ranch went into bankruptcy, and by 1972 was being administered by a trustee.[34]

Historian Patricia Limerick suggests that by its very nature, heavy use of groundwater in the arid lands of the western US may sow the seeds of its own destruction. There was a time when "the use of windmills to raise the water seemed an intelligent adaptation to an arid land. But accelerated pumping eventually began to deplete the groundwater, only slowly replenished by rainfall and drainage.… Depletion at least holds the prospect of putting competing uses to rest: there will be no point in fighting when the resource is no longer there" (Limerick 1987, p 138). Although groundwater has not completely

[28] Nevada Division of Water Resources (2007a).

[29] Nevada Division of Water Resources (2007b).

[30] Anonymous (November 19, 1956).

[31] Nevada Division of Wildlife (2007).

[32] Monthly streamflow data is for the only USGS gaging site on Kings River, #10353600 and is for the period October 1962 to September 1995. National Water Information System Web Interface.

[33] Anonymous (June 14, 1972, p. 10).

[34] State of Nevada, State Engineers Office (April 24, 1980).

disappeared, heavy groundwater pumping has altered the Kings River Valley, the place itself changing in the process.

Cycles of isolation, groundwater use, and regulation

In order to understand the cycles and linkages between isolation, groundwater, and regulation, it is worth considering what isolation means in the context of a rural place. Isolation encompasses more than simple notions of physical distance; remoteness also means being away from public attention and governmental scrutiny, outside the sphere of regular interaction with government regulators or other institutions. Moreover, isolation may vanish as soon as a place is held up as a model for others to follow.

Within the Kings River Valley, groundwater technology and usage became a boom for ranchers who embraced new hydrologic and agricultural technologies in the post-World War II era. In the process, the valley became incorporated within the broader public imagination, losing—at least temporarily—its isolation. Through attention by the media and state politicians, the broader public became engaged with agricultural productivity in an arid place, made possible through the introduction of new water technologies and infusions of capital. The Kings River Valley was further "put on the map" as energy, telecommunications, transportation, and educational infrastructure were enhanced to support agricultural development. Coupled with improvements to infrastructure was the backdrop of a successful place; success, in this case, being associated with the know-how and capacity for massive withdrawals of groundwater and the ability to use this water to enhance agriculture.

After the boom in Kings River Valley came the decline. Writing about water management in arid lands around the world, geographer Gilbert White noted that "arid lands [are] where the margin between human failure and success commonly is narrow and in which delicate changes in rainfall and land use can trigger profound shifts in soil, vegetation, sediment movement, and water flow. These are risky lands. Much of the table is bare, but where chances are taken the stakes are high" (White 1960/1989, p. 126). Agriculture dependent upon groundwater in an arid place is complicated and uncertain, made more so when isolation is involved. As the technologies that supported large-scale groundwater pumping became more commonplace throughout the country and as groundwater became less readily accessible in the valley, both because of increased energy costs and limited water rights, attention to the Kings River dwindled and it slipped back into obscurity. In 2000, only 92 people resided in the valley, a small population for a big place, particularly given that Nevada was the fastest growing state in the nation at this time.[35] Development of infrastructure also seems to have been a phase that has passed; there remains little development within the valley outside work done for and on ranching properties. The roads into and within the valley are rough and unpaved; there are no schools or businesses.

Current isolation in the Kings River Valley has been associated with less sustained attention from the Nevada State Engineer in recent years. There has been little in the way of regulatory implementation that would effectively reduce groundwater pumping or prevent further declines in the water table. Neither periods of isolation from the public nor episodic regulatory attention from the State Engineer have prevented withdrawals of large amounts of groundwater. The economic advantage of tapping into what seemed to be an

[35] US Bureau of Census (2000).

ample source of underground water was a driving force behind those involved in the valley's agricultural endeavors.

Absentee land ownership

Not everyone associated with the valley considered the recent return to isolation as a problem. Isolation allowed less regulatory oversight of existing groundwater users, resulting in financial benefits which accrued primarily to those who supplied the cash and expertise for crops, cows, and groundwater but did not actually reside in the valley. Ranch managers, laborers, and other ranchers who lived year-round in Kings River experienced isolation on a daily basis, with all the attendant pleasures and irritations. Yet the benefits from isolation were largely experiential, rather than economic or political, for long-term residents of the valley.

The long-standing pattern of absentee ranch owners in the Kings River Valley is particularly striking. Many of the ranches were owned from afar, starting with A.W. Riley's Double O Ranch during the first decade of the twentieth century and continuing with the Ellis Ranching Company's King River Ranch in the 1910s and 1920s and even into the 1950s and beyond with Curt Rocca's Rio King Ranch and James Buell's Nine Mile Ranch. While residing outside the valley, these ranch owners introduced ideas about state-of-the-art technology and frequently imported agricultural notions and hydrologic expertise, as well as capital into the valley. At times, these ranch owners worked actively with politicians, administrators, or the media to project the valley as progressive and growing. The valley became less isolated at these junctures, as new public works projects emerged and organizations formed to support ranchers' initiatives.

However, as isolation decreased, regulations on water rights increased. Starting in the late 1950s, the means by which decisions were made and the authority structures for water management underwent a fundamental shift. Decisions once made informally by valley ranchers and residents fell under the auspices of the Nevada State Engineer's regulatory authority. Incorporation of state authority into the valley did not affect everyone in the same way. Those with the funding and insight to formally apply for water rights and certificates had an advantage. Absentee ranch owners generally had this capital, having the requisite connections and motivations to operate skillfully in the more structured and regulatory environment.

Of course, financial profits from the valley's ranching enterprises were also attached to the absentee landowners. When the ranches were profitable, outflows of monies were directed towards the owners in Nevada, California, and Utah. During leaner years in the valley, the situation altered as well-capitalized ranch owners reaped tax advantages and other financial write-offs from losses incurred in Kings River agriculture. Financial losses provide no benefit to those who are tied to a single place, a single enterprise. Ranching losses only become an advantage when they offset other profitable sources of income, generally from outside the valley.

Thus, the economic and political advantage of greater isolation accrued principally to absentee landowners, whose roots in Western cities were removed from daily life in the King River Valley. This seems consistent with Robbins' (1994) argument that unequal capitalist exchanges between cities and rural areas, particularly since World War II, have favored cities, allowing them to solidify control over rural areas and resources. With this shift in the latter twentieth century, extractive primary product economies such as ranching have become increasingly marginalized (Robbins 1994).

Conclusions

In the Kings River Valley, it would seem that both isolation and its antithesis were not permanent states. Media coverage brought aspects of the valley's experience into the public's view, such as in 1905 and again in the late 1950s and early 1960s. However, this attention was not sustained, and so relatively quickly the Kings River Valley retreated out of view for the public. Moreover, remoteness, particularly after a period of increased attention, may offer attractions to a select few, making isolation tough to shake off in the long term.

Writing in 1960, about the time that the groundwater boom began, Gilbert White noted that around the world the pace of technologies for finding, lifting, storing, transporting, and treating water were advancing much more rapidly than opportunities were unfolding to regulate and manage water resources (White 1960/1989). This seems to be the case in the Kings River, which was hitting the apex of its boom in groundwater technology and usage about the time White was writing, while groundwater regulation lagged behind. Changing groundwater technologies were deployed to increase agricultural productivity and expand cropping systems, but the regulation that followed was aimed at organizing and ordering water rights within the valley, targeting conflict avoidance rather than protecting aquifer levels. Despite the State Engineer's involvement, groundwater levels continue to decline, influencing other hydrologic and environmental resources in the valley and beyond. Water continues to be addressed with relationship to properties, managed ranch-by-ranch rather than considered within a broader basis.

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