THINKING STRATEGICALLY ABOUT WATER SUPPLY FOR THE BORREGO VALLEY

Tis the time's plague, when madmen lead the blind.[1]

Nothing is more useful than water;
but it will purchase scarce anything;
scarce anything can be had in exchange for it."[2]

DISCLAIMER: The following brief is for discussion purposes only, is in draft form, and represents the thoughts of the author only and not those of the Borrego Water District (BWD) or any other group or individual referred to or mentioned herein.

EXECUTIVE SUMMARY: Based on the analyses presented below and in "The Borrego Water Brief"[3] it appears on first blush that the Valley's *overdraft problem* is intractable.

Solutions to the overdraft problem are neither obvious nor non-trivial. In 2002, the BWD board approved a plan to address the overdraft problem based on the assumption that "*obtaining water from state projects and transporting it to the Borrego Valley was prohibitively expensive and much more expensive than fallowing agricultural lands*."[4] Yet, by 2008 a different board with a new district manager claim that fallowing agricultural lands is insufficient and a pipeline is required to import water into the Valley to ameliorate the overdraft problem. Who is right? On what basis should we believe either assessment?

Any pipeline-build scenario may cost as much as $30-$60 million. Who will pay for this project? Even if someone else agrees to pay, the pipeline must be operated and maintained and then replaced after its useful life. O&M costs can equal the original capital costs over the useful life of the project. Who will pay these O&M costs? Replacing the pipeline once its useful life is complete typically costs a multiple of the original capital cost. Who will pay the cost to replace the pipeline if one is built? Most importantly, where will

---

[1] William Shakespeare, *King Lear* quoted in Raj Patel, *The Value of Nothing: How to Reshape Market Society and Redefine Democracy* (New York: Picador, 2009), 25.

[2] Adam Smith, *The Wealth of Nations* quoted in Steven Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization* (New York: HarperCollins Publishers, 2010), 379. Adam Smith was musing about the "diamond-water paradox." "Why was water, despite being invaluable to life, so cheap, while diamonds, though relatively useless, so expensive?"

[3] See http://www.scribd.com/doc/28618873/Borrego-Water-Brief.

[4] See BWD "Groundwater Management Plan" (October 18, 2002), III.

the water come from to fill any new pipeline? Who has extra water to spare in Southern California today or in the future? Is the concept of *water banking* even viable today, given drought and climate change and potential groundwater contamination issues?[5] Few of these questions have been explored, much less answered to satisfaction.[6]

Yet, both the 2002 and 2008 *plans* accept the notion that fallowing agricultural lands is a viable, if only partial, solution to the overdraft problem. Is this a sound assumption? Has an ecological analysis or environmental impact study been performed to determine whether the fallowing of agricultural acreage that is predominantly over-story trees might alter the microclimate of the valley and adversely impact the precipitation that it presently receives? It would be unfortunate if fallowing agricultural acres of trees to produce a net gain in available supply (less overdraft) changed the microclimate in ways that resulted in a net net loss of recharge vs. gain from fallowing.

Also, the system of County groundwater protection ordinances and State water laws and their government bureaucracies are stacked against actually arriving at a real solution to the overdraft problem. Instead, the system is predisposed to being content with short term fixes, cosmetic, if you will, Band-Aids.

There are good reasons, however dis-economic these reasons, for the Valley to have been in overdraft of its groundwater basin these past 60-years. Maybe the primary and overdetermining causal claim is based on ignoring and distorting the value of groundwater. This has resulted in groundwater being overused, degraded, and misallocated. Without price signals or other indicators of value to help guide policy, too little attention and funding for

---

[5] *Water banking* involves storage of excess water from a diversion if the entity *entitled* to this diverted water is unable to use it immediately. The water would be *banked* (stored) in one of the Valley's aquifers until it is withdrawn in the future when needed. Issues of potential contamination of the Valley's groundwater by untreated Colorado Basin river water exist. Treated water cannot be added to the aquifer due to potential contamination from chlorine compounds when water is stored for long periods of time. Also, rights to the Valley's existing groundwater are potentially at risk if the owner of the banked water wishes to *borrow* potable water from the aquifer beyond the amount that has been banked.

[6] The economic and environmental impacts of such ideas have not been thoroughly vetted.

resource management and protection of ground water has occurred.[7] Present water laws of prior appropriation for beneficial use are wholly inadequate and economically ruinous for the community as a whole.

Can the overdraft problem be solved. Probably. Maybe with a different board, different consultants, lots of broad-based community support, and a wholly different level of accountability for whomever is the district manager. To solve the problem is technical, political, and social. It will probably require out-of-the-box thinking. It will probably require a willingness on the part of the community to move beyond entrenched interests and historical patterns of “this is the way we have done things in the past” both at the community and at the governmental levels. The necessary changes will most likely be wrenching.

A BREIF INTRODUCTION TO THE “OVERDRAFT PROBLEM” This brief begins with the assumption that the following statements are true or mostly true:

> Borrego Valley Groundwater Basin is the sole source of water for the Borrego Valley.[8] This groundwater, which comes principally from the upper aquifer of the basin, is shared by agricultural interests, golf course resorts and residential homes.[9]
>
> “Today, the agricultural area (predominantly north of Henderson Canyon Road) operates approximately 50 wells. Golf courses operate approximately 8 wells for irrigation. Domestic water supplies for the Borrego Springs Park Community Service District and the Borrego Water District

---

[7] Committee on Valuing Groundwater, *Valuing Ground Water: Economic Concepts and Approaches*, National Research Council Press, 1997.

[8] The groundwater basin covers a surface area of about 150,000 acres (240 square miles) and includes three aquifers that reside collectively in both the main Borrego and Lower Borrego Valley area. The basin lies within western Imperial and eastern San Diego Counties. See Borrego Water District, “Integrated Water Resources Management Plan (IWRMP)” (March, 2009) prepared by William R. Mills, P.E., P.G., 4, 11, 12-13, a study developed to qualify BWD for Proposition 50 (water use efficiency grants) and Proposition 84 (integrated regional water management grants) funds.

[9] Just as for oil fields, the amount of water in storage in the three aquifers that comprise the Borrego Valley Groundwater Basin is not necessarily an economically extractable amount for the purposes of either providing water for irrigation or potable water for drinking purposes.

are pumped from 14 wells. Individual domestic wells total in the neighborhood of 50."[10] This does not count the many wells that are currently abandoned or those that are planned or new wells since 2001. Of these approximately 100 wells withdrawing water from the aquifers in the basin, only about 20 wells are metered or have authenticated withdrawal data over time.

Water levels in the area are dropping from 2-4 feet annually and the aquifer has been in a state of overdraft for the past 60 years.[11] Presently, this overdraft may be more than 11,600 acre feet (af)/year (one study estimates the overdraft at 14,300 af/yr) over the projected annual average recharge to the aquifer of approximately 5,000 acre feet af/year.[12]

What these above true (or mostly true) statements mean is that, if everything continues with business as usual, two things will happen, in due time, with a high degree of certainty:

- The remaining groundwater will tend to become ever more polluted with nitrates.[13] What this means is that it will cost more, potentially much more, to treat the groundwater to potable standards. In a worst case scenario, the groundwater could potentially become contaminated beyond the ability of currently available treatment technology to economically treat the water to potable standards;

---

[10] GMP 2002, 41.

[11] Overdraft is defined as the amount that net extractions from the groundwater basin exceed recharge to the basin. "The valley is not using water that is being replenished but mining water that has been in the aquifer for a millennia or more" (A 2001 study determined that the water from Well 11 was 873 ± 42 years old; the water from Well 18 was 1,982 ± 54 years old (GMP 2002, III, 44).

[12] Presently, on a net basis (water withdrawn less water available for recharge): agriculture may use approximately 10,000 af/yr; golf course irrigation 4,500 af/yr; municipal and commercial 1,900 af/yr; and public landscaping 1,000 af/yr (IWRMP 2009, 22-39). 1 AF = 325,851 gallons; 1 AF = 43,560 cubic feet;1 CF = 7.48 gallons.

[13] "Borrego Springs Water Company Well #1, (2475 Stirrup Road) in the late 1960's became contaminated and the water was unsuitable for domestic water service because of high nitrates.... Three wells owned by Di Giorgio Corporation (# 11, #14 and#15) located on Borrego Valley Road and north of Henderson Canyon Road all pumped high quality water in the 1960's. By 1985 when the wells were being used for the Roadrunner Tree Nursery, the water quality had deteriorated with TDS ranging from about 1, 700 to 1,800 mg/L and with a nitrate range of 120 to 180 mg/L, far above the drinking water standard of 45 mg/L" (IWRMP 2009, 16-17).

- At some point in time, potentially in the near future, economically extractable groundwater available in the Borrego Valley Groundwater Basin will run out. What this means is that when one turns on the tap to obtain water no water will be available because the wells have gone dry (of economically extractable potable water).

From the present 2008 data set it also appears that under present use patterns water conservation, at best, may only slow somewhat the onset of running on empty. Under present assumptions of growth, supply augmentation is required.[14] The two uncertainties are: (1) how soon must supply augmentation be in place to avert the contingent risk of running out of groundwater; and (2) at what expense is a solution to the overdraft situation in the Borrego Valley achieved.

From planning research conducted at the John F. Kennedy School of Government at Harvard[15] and at the Massachusetts Institute of Technology, there are generally three interacting factors or levels in making decisions regarding complex problems such as the Borrego Valley community faces:[16]

- Technical. The data and analysis to support potential technical options must be available. However, this technical engineering data must be translated into language that is digestible and communicated to the decision-makers. The most important aspect of this data and analysis is that it is *credible* from the perspective of the decision-makers. Technical

---

[14] This is in conflict with BWD's 2002 approved groundwater management plan that found that "obtaining water from state projects and transporting it to the Borrego Valley was prohibitively expensive and much more expensive than fallowing agricultural lands" (GMP 2002, III).

[15] *The essence of ultimate decision remains impenetrable to the observer - often, indeed, to the decider himself* - John F. Kennedy. See http://en.wikipedia.org/wiki/Essence_of_Decision.

[16] "Studies of the valley's groundwater occurred as early as 1909 following the development of major agricultural wells. In the 1950s and 1960s, there were limited studies of water use, estimated recharge and water in storage by private and public entities. The first major study [by the USGS] of the Borrego Valley aquifer that received any widespread distribution occurred in the early 1980s in response to concerns about the impact that the proposed Rams Hill Country Club project might have on the valley's groundwater resources. At that time there were strong feelings among many non-technical people that golf courses and residential development were the main uses impacting groundwater resources in the valley" (GMP 2002, 7).

analyses ultimately are not just reports the experts who may be producing or reviewing the data or analyses;

- Institutional. There are typically many institutional barriers to innovation (almost all real problem-solving involves innovation as if the problem was easy to solve it most likely would have been solved already). Sometimes, a particular institutional barrier can seem insurmountable and the 'experts,' will claim that this institutional barrier is immovable. However, almost invariably, to arrive at a real solution to a complex problem will involve work to remove institutional barriers that are preventing arriving at an economically viable, workable, timely solution to the problem at hand;

- Personal. Ultimately, solutions happen because the right individuals are involved. These individuals possess the persistence and credibility to achieve what has been unachievable. Often, this requires only a few key individuals who are uniquely suited due to their knowledge, experience, position, and/or temperament to take on a daunting task of accomplishing what has heretofore been undoable or too hard for the institution to achieve until now.

Since 2002, the Borrego Water District[17] has been designated as "the groundwater management agency for the Borrego Valley Aquifer as allowed under State Statute AB 3030. Thus, the subsequent adoption of the GMP placed the District as responsible for the stewardship of this large but limited resource and as the agency responsible for the resolution of the overdraft."[18]

COMMON MISTAKES WATER DISTRICTS MAKE. Maybe the three most common first-order mistakes water districts, at least in the United States, make regrading water supply are the following:

---

[17] The Borrego Water District (BWD) was established in 1962 as a "California Water District" formed under Division 13 of the State Water Code. Until "1979 the Borrego Water District existed only to protect the water supplies of the valley from being exported outside of the district. The district during that time consisted primarily of the agricultural land areas. In 1979 the district was activated to provide water, sewer and flood control service to the Rams Hill Country Club project. That area is now designated as Improvement District 1 of the BWD. Improvement District 2, the Town Center Sewer, and Improvement District 3, La Casa del Zorro and Deep Well Trails, were added in the 1980s. However, that was the extent of the service area until April 1997 when the District acquired the Borrego Springs Water Company, which served the western, residential area of the valley" (GMP 2002, 8).

[18] IWRMP 2009, 1.

- Waiting for a supply crisis to force decision-making;
- Imagining that supply augmentation is always possible, affordable, and readily engineered;[19]
- Believing that conservation is a viable sole-solution to a supply deficit.[20]

The three most common second-order mistakes that water districts make include the following:

- Violating the *Law of Complementarities* by implementing a hodgepodge of policies and programs. Each may have good intent, but together may actually cancel each others' results to some extent or at worst, represent just a laundry-list of underfunded and ineffective activities;
- Focusing primarily on investments in physical capital while underinvesting in organizational capital and other intangibles. Unfortunately, physical water-related infrastructure does not necessarily produce the results intended without competent, ongoing, and resourceful operating policies and operators. Underinvesting in O&M (operations and maintenance) and R&R (repair and replacement) has typically devalued and in some cases even destroyed the projected value of very expensive capital investments in water infrastructure;
- Developing metrics that measure the cost-effectiveness of capital decisions and "designing incentive mechanisms for encouraging innovation for information goods" that provide additional insight as to the efficacy of capital investments and operating policies are often neglected. Without this long-term data, there are few efficient means to establish whether or not an investment in specific water infrastructure or policy initiative projects was a prudent and effective use of capital.[21]

---

[19] This is the *magic bullet* response. Technology, engineering and human ingenuity will save the day as a matter of faith. However, long-distance water transfers are becoming less possible, more expensive, and often, in the end, merely postpone for a few years the inevitable decisions that must be grappled with (Solomon, 381).

[20] "Water efficiency is [always] a necessity, but not a sufficient, response for" water scarcity (Solomon, 407). Typically, water efficiency can deliver another unit of water for a fraction of the cost of a supply augmentation project's cost.

[21] See Erik Brynjolfsson and Adam Saunders, *Wired for Innovation: How Information Technology is Reshaping the Economy* (Cambridge, MA. & London: The MIT Press, 2010), 124.

WATCHING A SIX-DAY TRAIN WRECK. Running out of water is sometimes like watching a six-day train wreck. Everything is happening in such slow motion it is hard to notice much less act in time to get out of the way of the wreck. It is almost as if humans are not readily constituted to see change that evolves very slowly.[22] Only once the change is readily perceptible to the majority of people, it is sometimes much too late to prevent a catastrophe.

Historically, the most probable forcing function for the demise of a community, no matter where in the world, during whichever time period, for whatever precipitating cause (destruction of the watershed, climate change, drought, polluting the water supply, overdrafts from existing supply, etc.) is the loss of the community's supply of freshwater. The first recorded historical account of a community's demise due to poor management of their freshwater resources and the resulting suffering is contained in the Book of Jeremiah in the Old Testament of the Christian Bible (the Nevi'im of the Jewish Tanakh).

Not only is the historical record replete with examples of communities running out of supply of adequate freshwater, but communities have run out even as they have dug additional and deeper wells and/or they have built pipelines to augment local water supply from new sources afar.[23] The first deep wells were dug by hand over three thousand years ago and transporting water from afar through pipelines has been going on for more than two thousand years. Thus, the modern equivalents such as the half-mile deep wells in the northern-China breadbasket and the $40 billion pipeline to transport freshwater to Libya from the deep Kufrah aquifer under the Sahara Desert only differ in scale and cost as to what has been commonly attempted before.

No matter what the technological approach, the technology has a useful life, after which it must be repaired or replaced at a cost that today is typically

---

[22] We often miss "large scale, long duration problems. We are not wired to see large systems, as being in motion. The larger the phenomenon, the more stationary it is likely to appear to us." See http://gregor.us/coal/jevons-and-the-six-day-car-crash/.

[23] Pipelines typically fail for two reasons: (1) the producing source from which the pipeline draws its water declines over time for a variety of reasons and the pipeline is no longer able to provide adequate supply for the needs of the community on the receiving end of the pipeline. This is essentially what is occurring today for all pipelines that withdraw water from the Colorado River Basin; and (2) the community runs out of the economic resources to adequately operate, repair and replace its existing pipeline{s) so that over time they fall into disrepair and no longer serve their purpose.

1.5x to 3.0x its original capital cost.[24] Oftentimes, the build decision fails to factor the cost of operating the technological solution during its useful life. Such operating cost can equal or exceed the original capital cost during the useful life of the supply infrastructure.

TIMING MAY NOT BE EVERYTHING, BUT IT IS CLOSE. Waiting beyond a critical point in time to decide on solutions and to implement these solutions to a community's water supply problems is very expensive. That is because, often an economic point of no return is reached beyond which any proposed solution is unaffordable or unobtainable at any cost. Maybe the most blatant example of this principle, although not related to water supply, is the failure of the levees surrounding New Orleans post-Katrina.[25] The cost to bring these levees up to specification was immaterial compared to the clean-up of the devastation to New Orleans once these levees failed.[26]

THE YEARS-TO-EMPTY FALLACY. Depending on whom one is talking to and what year's study one is quoting, the Borrego Valley has either 500-years of water left, 200-years, 100-years (2002 study) or maybe only 50-years. Presently, many are waiting for the ongoing USGS/DWR study to know for certain how many years of water are left in the aquifer. Unfortunately, that is not what the USGS/DWR study will tell us.[27] Only God knows for certain how much potable (useable) water is left in the aquifer.

The best the USGS/DWR study can do is to provide a *probabilistic estimate* of remaining potable supply based on: (a) a best-guess estimate of the volume of the underground aquifer, (b) a best-guess estimate of the amount of

---

[24] See http://www.nytimes.com/2010/03/15/us/15water.html; http://www.scribd.com/doc/9989811/Water-Infrastructure-Stimulus-Jobs-Package.

[25] See http://www.scribd.com/doc/22163392/Consequential-Catastrophic-Risks.

[26] Katrina represents two particularly pernicious results of the myth of *free markets* that pits "free markets" over government "interference" in markets to solve real economic problems: (1) *an erosion in public-sector capability* to respond to events that are larger and more complex than any one private sector entity or even the private sector collectively has the resources to adequately address; and (2) *predation* of public institutions for private profit and/or the "systematic undermining of public protections for the benefit of private clients." See James K. Galbraith, *The Predator State: How Conservatives Abandoned the Free Market and Why Liberals Should Too* (New York: Free Press, 2008), xii-xiii.

[27] "There is no single investigative technique that can provide an answer to the question concerning the so called 'life' of the Borrego aquifer system" (IWRMP 2009, 45).

water that has already been withdrawn from this volume, and (c) a set of assumptions, all of which have varying degrees of uncertainty, as to inflow and withdrawals over a projected number of future years.

Compounding the level of uncertainty of any final estimate of remaining water are two factors: (1) the estimating volumetric models are essentially linear models of reality, but the real-world aquifer situation comprises a complex, non-linear system. What this means in practice is that small variances of initial numbers used for model assumptions have the potential to cause very large fluctuations in the final outcomes from the model. That is, our resultant can be far off the mark. This is one reason why re-calibrated models, over time, end up producing vastly different estimates of remaining supply in the very same physical aquifer; and (2) the model assumes no *Black Swans*, even though highly improbable, unlikely events are known to occur in reality (over sufficient time horizons) with a high degree of regularity.[28] For example, in active seismic areas, aquifers have been known to essentially disappear over short periods of time as fissures open-up and drain the aquifer of their contents (the list of potential Black Swans is very large and *always* incomplete).

What the USGS/DWR study will actually produce is a uncertainty risk curve for any given set of pre-conditions. For example, assuming no additional withdrawals beyond ______ acre feet/year and assuming _____ inches of rainfall during each year over the estimating period, there is an x percent probability that _______ acre feet of water remains, or _____ years at present withdrawal rates and y percent probability that _____ acre feet of water remains. Often this set of probabilistic estimates are simplified down to one number i.e. 100-years of water remaining.

But, for planning purposes, the District and the community need to determine how much risk it wishes to assume since any estimate will include (whether explicitly stated or not) a probability that indicates that this estimate is uncertain (e.g. 80% probability that there are at less-than 100-years of wa-

---

[28] These are often referred to as uncalculable, *rare* events. Because they are rare, there is just not enough understanding of the event itself, nor its frequency to plot a probability curve. What a risk manager must remember is that even though a specific rare event may not be knowable either as to probability or harm, the *class* of Black Swan risks is highly probable to occur in any one planning period. That is, it is almost always prudent, from a risk management perspective, to plan for a Black Swan and to manage systems for their resiliency to avoid cascading failure or collapse, should a Black Swan event occur during the planning period.

ter remaining and 95% probability that there are more than 20-years of water remaining).[29] This is why, at best, an estimate of water remaining in the aquifer is only a first step in a comprehensive planning process that establishes a strategic set of objectives for allocating capital to addressing supply problems in the Valley.

THE PRA - PROBABILISTIC RISK ASSESSMENT. Once an uncertainty risk curve is provided by the geologists, the next step is to look at the potential projected *economic* consequences of the different levels of risk associated with these supply estimates *if they prove to be wrong*. That is, for example, if we believe that we have a 70% probability that there are 100-years of water left in the aquifer at present withdrawal rates, but in reality, we run out of water in 60-years.

There can be many reasons why our estimate was off, but let's say that the primary driver is lack of confidence in withdrawal rates due to the fact that our largest users, the citrus groves irrigation uses unmetered water or irrigation water whose volume is not authenticated over long periods of time (e.g. over varying annual growing seasons).[30] If it turns out that the economic cost of being off in our supply estimates by 40-years, for example, is $100 million, we learn two things: (1) we should be willing to spend the money to meter all water use to get more accurate withdrawal data over time, and (2) it may make economic sense to push up in time our water management decisions to the present rather than waiting 60-years to act, assuming there is a practical 40-year planning horizon on many supply augmentation options that may be under consideration.

---

[29] "Planning is inherently imperfect, but in the absence of planning, disaster is certain" (Galbraith, xiii).

[30] "If water use is not metered, it may be difficult to accurately assess the impact exempt wells have upon hydrologically connected waters. While the impact of an individual exempt well on water resources may be negligible, the aggregate impact of many exempt wells can be significant. Inasmuch as exempt wells have the potential to impact water resources, states should evaluate whether current policies regarding exempt domestic wells are consistent with state or local growth management policies. Incorporating domestic wells into existing water regulatory schemes may prove necessary before land and water management can be comprehensively integrated." See Western States Water Council, "Water Laws and Policies for a Sustainable Future: A Western States' Perspective" (June 2008) at http://www.westgov.org/wswc/laws%20&%20policies%20report%20(final%20with%20cover).pdf.

What the PRA does, at best, is to provide a better feel for the potential economic consequences of different risk choices the District and the rate-payers may be willing to make. The objective of the PRA is to take the discussion beyond “I think” or “this is my opinion” to establish the analytics that are a consequent of someone’s opinion or belief. The PRA does not predict the future. It only provides one analytical view of the possible economic consequences of multiple futures. Most of all, it has the power to dispel myths.[31]

ONLY NOW ARE THE ENGINEERING SOLUTIONS WELCOME. Once the District and rate-payers have analyzed the economic consequences of different levels of risk and the timeliness of the water supply problem that the Valley is facing, then a set of alternative set of engineering solutions may be assessed. “Engineering solutions’” is meant to be inclusive of policy, procedures, and administrative practices that include pricing, developer’s fees, conservation programs, and the full panoply of demand management tools, as well as more traditional supply augmentation schemes.

FINANCIAL ANALYSES ARE THE LAST PLANNING STEP. Once the various engineering options and their costs are developed that address the level of water supply risk the District and rate-payers are willing to assume, then the work of identifying how the District is to finance these costs needs to be done. In today’s financial climate with cash flow constraints on both federal and state budgets, it may require, for example, 40-years for the District to accumulate adequate capital or 10-years to develop the credit worthiness for a low-interest loan to undertake a specific $30-million cost set of demand-management and supply augmentation initiatives to manage supply risk for the District and its rate-payers.

THE PLANNING PROCESS IS AN ITERATIVE DESIGN PROCESS. Unfortunately, the planning process is not a one shot deal. It is also not a linear process, but may involve numerous iterations over a multi-year period. Sometimes, additional research and analyses are required. Sometimes, it is necessary to act now, even in the face of incomplete information. However, it is almost never beneficial or economically prudent to pick one “solution” and to put all the District’s eggs in this one basket sans hard analysis and strategic planning because it is someone’s opinion (usually the loudest or most

---

[31] Myths or misbeliefs that are promoted concerning the realities of supply serve mainly as a “device for corralling the opposition, restricting the flow of thought, shrinking the sphere of admissible debate.... This in turn limits the range of presentable ideas, conveniently setting an entire panoply of reasoned discourse beyond the pale of what can be said, at least in public, by reputable people” (Galbraith, xi).

well-positioned voice) that this particular solution must be chosen. Adding additional complexity to the Valley's water planning is the need to protect the surrounding desert ecosystem from further degradation through resource-centered management, restoration science, and improved understanding and valuation of ecosystem services provided by this desert landscape.[32]

He who fights with monsters should take care
lest he thereby become a monster.
And if you gaze for long into an abyss,
the abyss gazes also into you.[33]

ULTIMATELY THE ANALYTICAL FRAME FOR A STRATEGIC VISION MUST ASK, AND ANSWER: "WHAT KIND OF FUTURE DO WE WANT TO LIVE IN?" In the previous sections the impression of *homo economicus* making rational market decisions based on "the numbers" may have been misconstrued. But, strategic planning is nothing of the sort. At least the hard type of strategic planning I am recommending here. For the endgame of any planning must be a strategic vision that asks and then answers to some degree of clarity: "What sort of community do we wish to create? What kind of future do we want to live in?"

I have been in town for barely a month and have been exposed to "solutions" to the Valley's water problem that include (a representative list):

- Building pipelines from the Salton Sea, the Imperial Valley, the coast, or from Canada so that the Valley has the water to grow into another Palm Springs;[34]

---

[32] See See Bruce M. Pavik, *The California Deserts: An Ecological Rediscovery* (Berkely: University of California Press, 2008), 290-304. One bellweather globally is the rising rate of species extinction. Present habitat destruction and abrupt climate change, both human-caused, may have increased this background extinction rate by as much as 10,000x. See http://www.guardian.co.uk/environment/2010/mar/07/extinction-species-evolve.

[33] Friedrich Nietzsche, *Beyond Good and Evil* quoted in Patel, 41.

[34] However, "Northern California water transfer is being reduced for environmental reasons. Access to Colorado River water must be reduced from 5.2 million-acre feet to 4.4 million-acre feet as California has been relying upon using that portion of Arizona's allocation not used by Arizona in the past. That overuse is no longer possible due to the growth in Arizona and the construction of the Central Arizona Project, which can now transfer Colorado River water to that state's urban areas" (GMP 2002, 1).

- Eliminating both the citrus groves and some of the golf courses so that there is enough water without expensive pipelines to currently non-existent and expensive freshwater sources;[35]
- Building a pipeline to the coast to get desalinized water[36] to store in the aquifer so that everything can remain exactly as it presently is today with citrus growers, golf courses, and residential development.[37]
- Condemning all the citrus groves to fallow land so that the Valley will have the water for second home residential development and additional golf courses;[38]

Thus, the primary purpose of the analytical portion of the planning process is to have the data at hand to actually have some content to discuss rather than to shout at one another to see who might present the loudest or most personally satisfying presentation of one's convenient desire. For each of the above "solutions" encompasses a "vision" of community with dramatically

---

[35] A 2002 BWD report estimated that "occupants of the valley are currently using approximately 22,300 acre-feet of water a year. Seventy percent of this (15,590 acre-feet) is used by approximately 4,000 acres of agriculture, twenty percent (4,435 acre-feet) by golf courses and commercial landscaping and the remaining ten-percent (2,272-acre feet) by residential and commercial uses" GMP 2002, I).

[36] See "Desalination as Potential Water Supply Discussion" at end of this brief.

[37] Unfortunately, each of these proposed "solutions" to the Valley's water scarcity problem trades off water security for energy insecurity in that they significantly raise the amount of energy required to supply water to the valley and/or to import additional food-stocks to provide sustenance for the community. In an era where energy availability and attendant costs have "acquired unexpectedly vast significance of global importance," is this tradeoff reasonable or even economically sustainable? See Michael T. Klare, *Rising Powers, Shrinking Planet: The New Geopolitics of Energy* (New York: Metropolitan Books, Henry Holt & Co., 2008), 9.

[38] "The Borrego Valley has nearly 5,000 unused residential lots either improved or approved for future development. There are also large areas of vacant land designated with density appropriate for multi-family units and mobilehome parks. Even with very low-density land use designations, a complete build-out would accommodate approximately 25,000 population, which is five times the current estimated winter population of 5,000" (GMP 2002, 1). "While current county land use regulations would permit a potential full-time population of 13,000, we are far from the growth curve that would yield such demographics. A more realistic maximum full-time population would be 8,000..... "Many residential parcels were first created over 50 years ago and remain undeveloped" ("Borrego Springs Updated Community Plan" 2008, 14, 30).

different economic and social costs and benefits. Unfortunately, potentially the most expensive and least likely outcome over the long haul is for everything to remain just as it is today. Change is afoot. The physical resource (water) will require this change, either sooner or later. Most likely, sooner.

Only after the last tree has been cut down.
Only after the last river has been poisoned.
Only after the last fish has been caught.
Only then will you find that money cannot be eaten.
- Cree Indian Prophecy[39]

But we speak God's wisdom in a mystery.
- 1 Corinthians 2:7

Are we ready to question the status quo; to stop watching the six-day train wreck? To desist in remaining rigid in demanding "my way" as a solution to the problem, that as yet we may not fully understand or perceive? "Do we need unquestionable beliefs in an immutable transcendence - to save us from signs misleading to nowhere?"[40] Are we still caught-up with our misbeliefs that somehow "things will work out" - without hard decisions, without pain, and without prudent and timely investments in activities that acknowledge that we, at some point in time, may be running on empty.

---

[39] In Arnold Toynbee's *A Study of History*, he claims that many advances in societal organization have often occurred as adaptive responses to environmental degradation and the unsustainable use of environmental resources. Jared Diamond, in his *Collapse: How Societies Choose to Fail or Succeed* (New York: Viking, 2005) describes societies that were more or less successful in making the required decisions to successfully adapt to changes in their environments.

Recently, Tim Brick, chairman of the Metropolitan Water District board of directors, who represents Pasadena on the board, led a delegation from California to visit Australian water districts. Australia is presently suffering from 500-year drought conditions. In response to its crisis, the federal government in Australia has made a $50 billion investment in water infrastructure for desalinization plants, states have cut water allocations to farmers by 70 percent, and water districts have implemented demand management strategies that have reduced municipal water use from as much as 180 GPD/person (gallons per day per person) to 30-60 GPD/person. See http://www.pasadenastarnews.com/news/ci_14526188.

[40] Catherine Keller, *On the Mystery: Discerning Divinity in Process* (Minneapolis: Fortress Press, 2008), xiii-xiv.

But all this has happened before. And will happen again. Even 2,600 years ago during Jeremiah's time. It was also a time of competing truth claims. Deniers were plentiful. They claimed to be the voice of conventional wisdom. Wisdom that assaulted and contradicted Jeremiah's message to the people. So Jeremiah raised his speech to cries of anguish. His cries rang out against the drumbeat of the deniers' conventional wisdom: Conventional forms of strategy and policy have failed. All leadership has failed. Our entire future is now under assault. This history-making change is not a secret matter. All this is happening in our midst, in public. All we need is eyes to see and ears to listen. Some of our leaders are adamant to maintain the status quo. They are immune to the notion that their denial will result in the death of our community, our world.[41] The leaders even claimed Jeremiah, the carrier of this discordant message, an 'enemy of the state.' Jeremiah summarized his view of these deniers:

Therefore their way shall be to them
like slippery paths in the darkness
into which they shall be driven and fall;
For I will bring disaster upon them
in the year of their punishment,
says YHWH. (Jeremiah 23:12, NRSV)

But, maybe Thomas Hobbes most succinctly summarized the situation and fascination of humankind's penchant for watching the six-day train wreck and the difficulties faced by those citizens who attempt to get us all out of the way of the train wreck or recommend planning to avoid the train wreck altogether:

For I doubt not, but if it had been a thing contrary to any man's right of dominion, or to the interest of men that have dominion, that the three angles of a triangle should be equal to two angles of a square, that doctrine should

[41] My own view is that *denialism* is best thought of as the preaching of falsehoods out of a utility - whether that utility be avarice, payment for services rendered, in-group acceptance, unchecked desire, pure cantankerousness, an unwillingness to admit one is/was wrong, or a character flaw that renders one mendacious and deceitful by nature. These falsehoods are often malicious or injurious in that they, ultimately, are false. They provide an untrue and oftentimes dissembling assessment of reality. However, what makes deniers ultimately accountable is that they preach these falsehoods. Deniers engage in an active stance to convince others of their wrongful beliefs. But why are deniers listened to and are their promulgating of falsehoods, always also lies? Without some convenience deniers voices are merely wind.

have been, if not disputed, yet by the burning of all books of geometry suppressed, as far as he whom it concerned was able.

-- Thomas Hobbes, *The Leviathan*

This message also applies for water

Ed Stein on Energy

Methods to Manage Groundwater in California

There are three basic methods available for managing groundwater resources in California: (1) management by local agencies under authority granted in the California Water Code or other applicable State statutes, (2) local government groundwater ordinances or joint powers agreements, and (3) court adjudications. No law requires that any of these forms of management be applied in a basin. Management is often instituted after local agencies or landowners recognize a specific groundwater problem. The level of groundwater management in any basin or sub-basin is often dependent on water availability and demand. Each method is discussed briefly below:

(1) Local Management through Authority Granted to Local Water Agencies by the State. There are two types of local management:

(a) Local agencies with authority to deliver water for beneficial uses and may have authority to institute some groundwater management.

(b) Special Act Districts with groundwater management authority. Special Acts Districts have greater authority to manage groundwater that has been granted to a small number of local agencies or districts created through a

special act of the Legislature. Currently, 13 local agencies have specific groundwater management authority as a result of being special act districts. The specific authority of each agency varies, but they can generally be grouped into two general categories: 1. the agency has authority to limit export and extraction (upon evidence of overdraft or threat of overdraft) or 2. the agency does not have authority to limit extraction but the users in the basin are required to report extractions to the agency (who can levy fees from groundwater management or water supply replenishment).

(2) Local Groundwater Ordinances. Local Ordinances utilize the land use planning and police powers of locally elected county boards to address groundwater management to varying degrees and in different forms and contexts. Groundwater management is also achieved through local groundwater ordinances. Ordinances are laws adopted by local agencies such as cities or counties. More than twenty counties have adopted groundwater ordinances, and others are being considered. The authority of counties to regulate groundwater has been challenged, but in 1995 the California Supreme Court declined to review a lower court decision (Baldwin vs. Tehama County) that holds that state law does not occupy the field of groundwater management and does not prevent cities and counties from adopting ordinances to manage groundwater under their police powers. However, the precise nature and extent of the police power of cities and counties to regulate groundwater is uncertain. Ordinances that have been adopted by local governments are available on their web sites: for San Diego County http://www.sdcounty.ca.gov/dplu/docs/GROUNDWATER-ORD.pdf.

(3) Court Adjudications. Adjudicated Basins are managed by court decree, typically where overlying stakeholders cannot come to agreement over hydrogeologic operations or resources. Court Adjudications. In basins where a lawsuit is brought to adjudicate the basin, the groundwater rights of all the overliers and appropriators are determined by the court. The court also decides: 1) who the extractors are; 2) how much groundwater those well owners can extract; and 3) who the Watermaster will be to ensure that the basin is managed in accordance with the court's decree. The Watermaster must report periodically to the court. There are 22 adjudicated groundwater basins in California; 21 adjudications were undertaken in State Superior Court and one in federal court.

Adjudicated groundwater basins (Final Court Decision include: Beaumont Basin (2004); Brite Basin (1970); Central Basin (1965); Chino Basin (1978); Cucamonga Basin (1978); Cummings Basin (1972); Goleta Basin (1989); Main San Gabriel Basin : Puente Narrows (1973); Mojave Basin Area (1996); Puente Basin(1985); Raymond Basin (1944); Santa Margarita River Watershed (1966); Santa Maria Valley Basin (2008); Santa Paula Basin (1996); Scott River Stream System (1980); Seaside Basin (2006); Six Basins (1998); Tehachapi Basin (1973); Upper Los Angeles River Area (1979); Warren Valley Basin (1977); West Coast Basin (1961); Western San Bernardino (1969).

The following agencies manage groundwater in accordance with the court decision that governs the groundwater basin. These agencies overlie an adjudicated groundwater basin: Apple Valley Heights County Water District; Apple Valley Ranchos Water Company; Baldy Mesa Water District; Chino Basin Water Conservation District; City of Adelanto; City of Barstow; City of Lakewood; Crescenta Valley Water District; Cucamonga County Water District; Foothill Municipal Water District; Hesperia County Water District; Hidden Valley Lake Community Services District; Hi-Desert County Water District; Jurupa Community Services District; Kinneola Irrigation District; La Cañada Irrigation District; Los Angeles Department of Water and Power; Main San Gabriel Basin Watermaster; Mariana Ranchos County Water District; Mojave Water Agency; Monte Vista Water District; Orchard Dale Water District; Rancho California Water District; Rowland Water District; San Bernardino Valley Municipal Water District; San Gabriel Basin Water Quality Agency; San Gabriel County Water District; Santa Fe Irrigation District; Santa Margarita Water District; Serrano Irrigation District; South Montebello Irrigation District; Tehachapi-Cummings County Water District; Three

Valleys Municipal Water District; Upper San Gabriel Valley Municipal Water District; Valley County Water District; Victor Valley County Water District; Walnut Valley Water District; Water Replenishment District of Southern California; West San Bernardino County Water District.

Desalination as Potential Water Supply Discussion[42]

Seawater desalination is often cited as a reliable and potentially significant, though largely untapped, means of addressing California's continued problems of drought and critically low water supply. The high cost of producing desalinated water has traditionally limited investment in the desalination industry in California. However, the combination of newer, more efficient desalination technologies and the need to reduce water supplies from the Sacramento-San Joaquin Delta and Colorado River have led to the development of numerous desalination plants in California: more than 20 coastal desalination facilities have been proposed to date and a dozen more have been approved or are in the pilot testing phase.

The State Water Plan and Desalination

The Department of Water Resources, in its 2009 draft update to the state Water Plan, maintains that continually increasing water demand requires the consideration of desalination as a future water source in California; a common estimate is that desalination will comprise up to 10% of California's future water supply portfolio. However, the significant environmental impacts and high energy costs associated with desalination underscore the need to consider this as only one alternative among a larger portfolio of water supply options, which also include cost-effective recycling, water conservation and efficiency measures.... Experts on water supply issues in the state agree that desalination is not the cure-all to California's water problems; rather, it is one tool in the toolbox that the state can use to address the ongoing depletion of freshwater supplies from other sources. Conservation and recycling and reclamation of wastewater from homes, businesses, agriculture, and stormwater runoff must also be prioritized, and perhaps mandated, if the state is to address the existing water shortage and the growing threat of increased droughts anticipated with climate change.

Economic and Environmental Impacts

Desalination requires significant amounts of energy to turn seawater into drinking water. Energy demand comparisons estimate desalination uses between 3.8 and 5.2 MWh/AF (Megawatt hours per acre foot), versus an average of 0.7 MWh/AF to recycle local wastewater and 3.2 MWh/AF to convey water from northern to southern California under the State Water Project (SWP). The energy costs incurred from transportation of freshwater across the state are high—current studies estimate that the transmission and treatment of freshwater supplies across the state under the SWP account for approximately 20% of California's electricity demand. Even with this high energy cost, the desalination process still requires about 19% to 47% more energy on average than transfers of freshwater from the SWP for Southern California. Experts state that the energy consumption of a typical desalination facility accounts for 1/3 to 1/2 of the total operating cost of the plant.

There are significant environmental impacts from the desalination process that must be considered in addition to the energy-cost balance. Discharge of hypersaline brine produced as a result of the desalination proc-

---

[42] Adapted from Desalination in California – Environmental and Economic Considerations for our Future Water Supply Portfolio.

ess poses another potentially significant impact to the ocean environment.The concentrated brine may include certain toxic elements, such as chlorine, sulfuric acid, and heavy metals, introduced during the desalination process. Brine discharge can effectively kill or harm marine organisms.

NOTES: DOCTRINE OF PRIOR APPROPRIATION[43]

In states west of the 100th meridian within the Colorado River Basin, a *doctrine of prior appropriation* was added to the *riparian rights,* based on English common law, that were common in the eastern U.S. Riparian water rights enable landowners whose property is adjacent to a body of water to make reasonable use of it. If there is not enough water to satisfy all users, allotments are generally fixed in proportion to frontage on the water source. These rights cannot be sold or transferred other than with the adjoining land, and water cannot be transferred out of the watershed that feeds the water source. With these rights come the responsibility to not hinder the flow of clean water to other users through pollution or diversion, or in any way infringe the rights of other users.

Doctrine of Prior Appropriation. Also known as the "Colorado Doctrine" of water law states that "while no one may own the water in a stream, all persons, corporations, and municipalities have the right to use the water for beneficial purposes." The allocation of water rests upon the fundamental maxim "first in time, first in right." The first person to use water (called a "senior appropriator") acquires the right (called a "priority") to its future use as against later users (called "junior appropriators"). In order to assure protection of senior water right priorities state regimens define to a large extent just what a water right is.

Acquisition of Water Rights. To create a water right, one must make an appropriation. The essential elements of an appropriation are the diversion of water and its application to a beneficial use. A diversion is made simply by removing water from its natural course or location, or by controlling water that remains in its natural course. The requirement of application to beneficial use is satisfied by irrigation, mining and industrial application, stock watering, domestic and municipal use, and other non-wasteful economic activities.

In contrast to riparian water rights, there is no geographical limitation as to place of use. Concomitantly, the ownership of land bordering a watercourse carries with it no right to the use of the water in the absence of an appropriation.

Because the water right system is founded upon beneficial use of the resource, a lack of use can result in an "abandonment' or "forfeiture" of the right. Most western state laws provide for the loss of a water right if the water is not diverted and used for more than a specified period of time, sometimes as little as five years. Some states also require proof of an "intent to abandon" the water right. Such intent may be presumed if the non-use has occurred for an unreasonably lengthy period.

Types of Water Rights. Water rights are of two general types, direct flow and storage. A direct flow right is generally measured in terms of a rate of flow, not a total volume of water. For example, a direct flow right for "1.0 c.f.s." means that the appropriator is entitled to divert water from a stream or a well at a rate of not more than one cubic foot of water per second of time. He may continue to take water at this rate of flow for so long as it is physically

[43] Adapted from http://library.findlaw.com/1999/Jan/1/241492.html.

available in priority and he needs the water for beneficial use. If a water right was initiated to irrigate a 40 acre tract, the need, or "duty" of that water right is measured as the amount of water necessary to irrigate properly that 40 acre tract.

The duty of water concept operates as a limit on the amount of water that may be diverted under a priority and is designed to prevent waste. In the example, the appropriator may divert 1.0 c.f.s. to the 40 acre tract only until it is fully irrigated. One c.f.s. of water flow is equivalent to 449 gallons per minute.

A storage water right is measured in terms of volume. For instance, the owner of a reservoir may have the right to store up to 1,000 acre feet of water each year, to be used at some later time for a beneficial use. An acre foot is that amount of water required to cover an acre of ground with one foot of water (43,560 cubic feet or 325,851 gallons). Sometimes a limit is placed on the rate at which water can be stored, such as a right which allows for storage of 1,000 acre feet, to be stored at a rate no greater than 5.0 c.f.s. Storage rights are usually only for one filling of the storage vessel per year.

Ground Water. Rights to water from underground vary in their treatment in the different western states. Some states treat tributary ground water--water that is hydrologically connected to surface flow - in the same manner as described above for surface water rights. Such ground water is integrated into the surface water rights priority system. Thus, a well withdrawing tributary ground water is treated in precisely the same manner as a surface diversion from a stream for the purposes of administration of water rights in accordance with the priority system. There may be a legal presumption that all ground water is tributary.

Some states recognize a completely different type of water right in nontributary ground water, that is water coming from an underground aquifer which, because of its unique geology and/or depth below the ground surface, contains water that has no connection to any natural surface stream. Because there is no impact from the withdrawal of this water on the surface stream system, these water rights are not integrated into the water right priority system. Thus, water can be withdrawn from nontributary wells regardless of whether senior surface water rights are receiving their full entitlement. In at least one of the western states, ownership of nontributary ground water is tied to the ownership of the land overlying the water itself.

Many western states also have legislative schemes that allow for the designation of critical ground water areas. These are usually areas in which ground water withdrawals have been a primary source of water supply for municipal or agricultural water uses, and in which aquifer water levels are dropping. The purpose of the designation is to allow special rules to be established for protection of the aquifer resource, yet permitting some continued development, or mining, of the underground water. Priority systems may be put into place, or modified to require all water users to share the burdens pro rata. New wells may be permitted only if the proposed appropriation will not unreasonably impair existing rights from the same source.

Administration of Water Rights. A state agency or official is charged with the administration of all water rights within the state, usually an executive branch department of water resources or the state engineer. Additionally, there may be a "water commissioner" to administer the allocation of water on a particular stream or streams. Competition for water, as well as proper enforcement of the priority system, requires comprehensive administration. For instance,

those persons with the oldest priority dates (senior water rights) can require that others stop taking water so that the water remaining in the stream system will reach the diversion works of the senior users. This type of demand by senior water rights is known as a "call." In times of shortage when senior water rights are calling for water, water users may be shut off in inverse order of priority by order of state administrators. The predicted administration of a water right must be considered in the evaluation of the yield that can be expected from that water right, or its value.

Replacement Plans. The laws of several of the western states provide for replacement plans which are schemes to balance new uses of water with the dedication of other existing water rights to the stream, so that the stream, as a whole, suffers no net decrease. A replacement plan is most often used to allow the out-of-priority diversion of water from the tributary stream system and the replacement of the depletion caused by that diversion from some other source. Sources of replacement water include senior direct flow water rights no longer used for their original purpose, nontributary ground water, or water stored in a reservoir and available for later release. Approval of a replacement plan will permit the water user to continue diversions of water when curtailment would otherwise be required to meet a valid senior call for water.

Problems. The problem with both the riparian water rights and doctrine of prior appropriation laws, as presently constituted, is that neither set of laws anticipate modern scientific understandings of hydrology, watershed management practices, and abrupt climate change impacts on water availability in the Colorado Basin. For example, the “Colorado Doctrine” was embedded into law along with the Colorado River Compact of 1922[44] and the Boulder Canyon Project Act of 1928.[45] The Compact and subsequent Acts were established without adequate understanding of the variability of flows of the Colorado River and mistakenly assumed that the average flow after withdrawals during any continuous 10-year period was 75 MAF below Lee Ferry.[46] Today we know that these flows were historically much higher than “normal” for the Colorado River. Also, the intent of the Colorado Compact when it was formulated in

---

[44] The Colorado River Compact of 1922 (http://www.usbr.gov/lc/region/g1000/pdfiles/crcompct.pdf) defined the relationship between the upper basin states, where most of the river's water supply originates, and the lower basin states, where most of the water demands were developing. At the time, the upper basin states were concerned that plans for Hoover Dam and other water development projects in the lower basin would, under the Western water law doctrine of prior appropriation, deprive them of their ability to use the river's flows in the future. Secretary of Commerce, Herbert Hoover, suggested the basin be divided into an upper and lower half, with each basin having the right to develop and use 7.5 million acre-feet (maf) of river water annually. This approach reserved water for future upper basin development and allowed planning and development in the lower basin to proceed. See http://www.usbr.gov/lc/region/g1000/lawofrvr.html.

[45] The Boulder Canyon Project Act of 1928: (1) ratified the 1922 Compact; (2) authorized the construction of Hoover Dam and related irrigation facilities in the lower Basin; (3) apportioned the lower basin's 7.5 maf among the states of Arizona (2.8 maf), California (4.4 maf) and Nevada (0.3 maf); and (4) authorized and directed the Secretary of the Interior to function as the sole contracting authority for Colorado River water use in the lower basin. See http://www.usbr.gov/lc/region/g1000/pdfiles/bcpact.pdf.

[46] See James Lawrence Powell, *Dead Pool: Lake Powell, Global Warming, and the Future of Water in the West* (Berkeley: University of California Press, 2008), 69.

1922 was to develop the arid Colorado Basin for agriculture as an economic objective. Today's economy of the West is far removed from that of 1922. Yet, many of the laws that govern water use in the West have yet to fully reflect these changes in both water availability, and economic conditions.

California-Specific Water Law from BWD Counsel[47]

Since California became a state on September 9, 1850, there have been hundreds of legal decisions and statutes regarding the use of water and water rights. This is a brief overview of some of the legal considerations regarding the use of ground water or what the courts define as "percolating water". The laws may be applied differently in a variety of factual situations. It is not the intent of this section to relate the application of the laws to the various services in the Borrego Valley.

The courts have generally recognized three types of water rights, (i) pueblo water rights, (ii) riparian water rights and (iii) percolating water rights. The pueblo water right is the right of a city to take water as a successor of a Spanish or Mexican pueblo and to use the water occurring within the old pueblo limits for the use of the inhabitants of the city. Two cities that have such pueblo rights are the City of Los Angeles and the City of San Diego. Riparian water rights are the right of a riparian landowner (a landowner whose land abuts a stream) to take water from a stream for use on his or her lands. A stream is water flowing through a known and defmed channel, whether on the surface or on the subsurface of the ground. Percolating water is a vast mass of water confined in a basin, which does not form a part of a body of the flow, surface or subterranean, of any stream.

Although there has not to my knowledge been an adjudication of whether waters in Borrego Valley are riparian or percolating, it is generally conceded that the waters are percolating waters and not riparian waters. The court in *Katz* v. *Walkushaw* 141 Cal 116 (1903) described the existence of percolating water in a manner that mirrors the facts in the Borrego Valley. "It is quite manifest that this body (if it can be so styled) of percolating water cannot be called an underground watercourse to which riparian rights can attach, unless we are prepared to abolish all distinction between percolating water and the water flowing in streams with known or ascertainable banks which confine the water to definite channels. All rain-water which falls upon the hills and mountain-sides which does not flow off at once as surface water is absorbed and percolates down in the same way to the valley below."

The early view of the doctrine of percolating water rights was that the water was part of the land and belonged to the owner of land who could use or remove and control the water to the extent as any other part of the soil. At that time water was capable of assignment and of reservation in the grant of the land. In 1903, this concept was modified in the *Katz case*. In that case, the court established the doctrine o f correlative rights which afforded to each owner of land overlying a percolating water supply a right to the reasonable beneficial use o f the water o f that supply on or in connection with his overlying land with such right of use being equal to the similar rights o f all other owners o f land overlying the same ground water supply. In the event of an insufficiency of water for the requirements o f all o f the overlying landowners, the water may be apportioned among them by a court decree. If there is surplus water in the ground basin, more than the overlying landowners can put to a reasonable and beneficial use on their property, the

[47] See GMP 2002, 10-12.

surplus water may be appropriated by another entity, including a public water district, and be taken away from the overlying lands by the appropriator to be used on non-overlying lands.

The foregoing legal concepts were clearly set forth in a case called *Pasadena* v. *Alhambra* 33 Cal (2d) 908 (1929). The law of percolating water rights can best be explained by summarizing the portion of the decision in that case, as described in "*The Hutchin's California Law of Water Rights".* Applying the law of that case to the Borrego Valley ground water basin (the "Basin"), you would say that each and every landowner that has land overlying the Basin has a right to pump water from that Basin for the reasonable and beneficial use of that water on the owners' lands. Any person that does not have land that overlies the Basin and pumps water to his land from the Basin is an appropriator of that water.

However, as noted in the *Pasadena* case, an appropriator can only appropriate surplus water and as there is an overdraft in the Basin, can an appropriator take water out of the Basin even though all of the present owners of land overlying the Basin have a sufficient amount of water to meet their water needs? It should be noted that the law recognizes that landowners overlying a basin who are not presently using the water do not lose the right to take water from the basin for use on their land.

When a party talks about bringing an action for the adjudication of a basin, he or she is asking the court to allocate the quantities of water in the basin to the various landowners overlying a basin where there is not a sufficient amount of water to meet the needs of all of those landowners. In adjudication a court may also determine the rights of an appropriator and the rights of a proscriptor.

These legal proceedings may be taken to safeguard a percolating water supply once a surplus ceases to exist and may restrain any additional user beyond the point of safe yield. Where the safe yield is less than the present and prospective needs of the overlying lands, the overlying owners are entitled to relief for protection to the extent of their individually declared rights and for protection against any exportation of the water that would unduly increase the cost or lower the ground water level below the danger point. We have seen in the past that adjudications may be necessary in certain circumstances; however, they usually take many years to reach a judgment and are expensive to conduct. Such was the case of the recent decision in *City of Barstow v. Mojave Water Agency* where it took over two years of negotiations among the water users and thereafter eight years of litigation.

The Major Groundwater Studies of the Basin

1982 - "Water Resources of Borrego Valley and Vicinity, California, Phase I - Definition of Geologic and Hydrogeologic Characteristics of Basin" Open-File Report 82-855 issued by the United States Geological Survey.

June · 1984 - "Borrego Valley Water Management Plan" issued by the California Department of Water Resources in cooperation with San Diego County.

1988 - "Water Resources of Borrego Valley and Vicinity, San Diego County, California: Phase 2 - Development of a Ground-Water Model. Water-Resources Investigations Report 87-4199

1996 - Geophysical Studies by Agbabian Associates.

2009-2011 USGS/DWR Study (ongoing)

Additional Groundwater Studies and Monitoring Programs

1909 - United States Geological Survey report by Mendenhall 1915 - United States Geological Survey report by Waring

1923 - United States Geological Survey report by Brown including "watering places in and surrounding Borrego Valley

1954 - United States Geological Survey and the California Department of Water Resources report on well data by Burnham

1968 - Reconnaissance geologic map and data collected subsequent to Burnham by Moyle 1968 and

1972 - U.S. Bureau ofReclamation report estimating recharge, recoverable water in storage and average annual water level decline in Borrego Valley

March 1983 - Draft version "Preliminary Evaluation of Annual Recharge to the Borrego Valley Ground Water Basin" Technical Information Record issued by the California Department of Water Resources by Kenneth Hatai.

1993 - Review of the two U.S. Geological Survey Reports (82-855 and 87-4199) by Dr. David Huntley, Professor of Geological Studies at San Diego State University.

1980-2000 - Ongoing monitoring of Borrego Valley static water levels by John Peterson, Hydrogeologist with the County of San Diego Department of Planning and Land Use.

2001 - San Diego State University graduate thesis on the Borrego Valley Aquifer by Henderson and Netto.