Geo-Environmental Disconnection and the Colorado River Delta: Technology, Culture, and the Political Ecology of Paradise

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ABSTRACT

This article examines the alienation of water users in the lower Colorado River Basin from the river and its delta during the twentieth century. The author posits technological advances, affluence, geographic distance from the river itself, and prevalent Newtonian attitudes towards the landscape as the principal reasons for these geo-environmental disconnections. Politically, the competition between municipal, agricultural, and tourist-related activities contributed to the severing of ecological linkages between the urban and irrigated oases and the delta.

KEY WORDS

Colorado River, water abstraction, alienation, geo-environmental disconnection

> Every politician, every bureaucrat, every water lawyer, every judge who ruled on such matters, every editorial writer who opined on them – in fact the millions of people in the West who bathed, shaved, cooked, watered their lawns and irrigated their fields with Colorado River water – should be required to walk one mile across the burning sands of the delta to experience firsthand the true cost of living in an arid land and having to import water long distances.
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> Philip L. Fradkin[1]

> The ultimate luxury is to turn the world into what it is not.
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> Thomas A. P. van Leeuwen[2]

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INTRODUCTION

In August 1884, scientist C.R. Orcutt explored the recently inundated Laguna Salada region, located in present day Baja California, Mexico, in the lower Colorado River Delta. Six years later he reported that flooding had again rejuvenated the desert wilderness of the delta. 'The barren, but naturally fertile, desert plains had been transformed', he reported, 'into a jungle of tropical luxuriance, a Paradise for manor beasts. The mesquite trees were loaded with their crisp bean pods, the grass was growing as high as a horse's back, and all the sloughs and lagoons were full of water and delicious fish.' Orcutt returned to the delta in October 1890, appreciative of the delicate balance of desert and wetlands that comprised this paradisiacal setting.[3]

Some thirty-two years later conservationist Aldo Leopold visited the 'Green Lagoons' of the delta. While steamboats had linked the region's modest mining industry to San Francisco and world markets beyond, Leopold stressed the limited impact that humankind exerted on the ecosystem. Canoeing through the region, Leopold noted the ubiquity of fresh and saltwater lagoons and an abundance of rivers that ran away from the main body of the Colorado River. '[T]he river was nowhere and everywhere', he observed, 'for he could not decide which of a hundred green lagoons offered the most pleasant and speedy path to the Gulf … he divided and rejoined, he twisted and turned, he meandered in awesome jungles, he all but ran in circles, he dallied with lovely groves, he got lost and was glad of it, and so were we.' Leopold also noted the ever-present mesquite trees that flourished in the region, as well *cachanilla* brush, duck, quail, coyotes and deer, 'all of incredible fatness'.[4]

Like Orcutt's description of the region, Leopold's account also qualifies as a 'paradise' narrative. The Old Persian word *pairidaeza* refers not only to a walled garden, but also to a piece of wilderness free from extensive human influence.[5] While a wall of human construction generally divided private gardens from outsiders in the Near East, lack of integration to the emerging world economy of the late nineteenth and early twentieth centuries isolated the Colorado River Delta from outside exploitation. Furthermore, native agricultural practices rarely modified the region's landscape to the point of disrupting its natural interactions.

Yet while the river brought life to the desert paradise, it also left open the possibility that intensive exploitation of the river upstream could destroy the walls of isolation that had made the 'green lagoons' near the Gulf of California so ecologically diverse. Leopold recognised such a possibility as he reflected on what had happened in the region since his 1922 trip. 'All this was far away and long ago', he noted, 'I am told the green lagoons now raise cantaloupes. If so they should not lack flavor.' Leopold ended his reflections on his memories in the delta with a more macabre observation. As the Colorado River linked the delta to the agricultural, municipal and recreational needs of the American West, its

FIGURE 1. The Hoover Dam, one of the main barrage dams on the Colorado River, 1998. (Photograph: P. Rumler, Leiden, The Netherlands)

beauty and natural abundance declined. 'Man always kills the things he loves, and so we the pioneers have killed our wilderness.' Sombrely, America's pioneering conservationist predicted the decay of this desert paradise.[6]

Construction of Hoover Dam, and other dams that followed on the Colorado, increasingly brought the wild river under control. However, with the construction of Glen Canyon Dam, which began in the late 1950s, and the mandate to begin storing water behind the new dam in Lake Powell, water from upstream declined to a trickle, and then evaporated into a dry desert riverbed in the delta by 1961.[7] Onesimo Gonzalez Saiz, a leader of the Cocopah community in the Mexican delta during the 1960s, remembered that the extensive mesquite and willow forests of the region disappeared in the 1950s. Noted Cocopah scholar Anita Alvarez Williams also recollected the onset of increased salinity in the region at about the same time as the water dried up. 'When I discovered salt crust covering the ice cubes from our refrigerator', she noted, 'we decided it was time to drink filtered water'.[8] Ultimately, overuse of water upstream for communities, agriculture, and recreation wreaked real consequences not only for the flora and fauna in the delta paradise, but also for the extensive Cocopah and Mexican communities that depended on interactions between the river and sea to sustain fishing for subsistence and as a means of earning a livelihood.[9]

Viewing the delta as a paradise fed by – but also linked to the rest of the American Southwest by – the Colorado River provides an effective lens for exploring the relationship between the delta and the rest of the Colorado River Basin. The question of how the delta declined from a series of green lagoons to a desiccated wasteland by the 1960s has been sufficiently explored elsewhere.[10] Yet why did it happen? This essay contends that technology, geographic distance between users and the river, economic prosperity in the United States portion of the Colorado River basin, prevalent attitudes towards nature, and cultural expectations encouraged *geo-environmental disconnections* (or geo-environmental disengagement) between the river basin's inhabitants and the delta.

Geo-environmental disconnection and the impulse to transform nature into civilised paradise were not unique to the twentieth-century American West. In colonial America, for example, European colonists not only forged pastoral and urban landscapes from the wilderness that they found when they arrived there, but also contributed to the wealth of European empires through trade with native groups and extraction of natural resources from the land. Thus, while European communities were culturally and economically enriched, its inhabitants knew little of the ecological and social costs associated with the transformation of the land.[11] Furthermore, during the nineteenth century, as the American impulse for growth and expansion reached its zenith, transformation of the Midwest and Far West into resource colonies of the Northeast further encouraged disconnection between consumers and the ecological and social degradation of the affected hinterlands. For example, destruction of the bison on the American plains contributed to the *haute couture* of fashion trends in the Eastern United States and Europe, but also accelerated the decline of the traditional ways of life of Native American groups. Furthermore, large scale exploitation of iron ore reserves and timber stands in the Northeast and Northwest, respectively, allowed new urban landscapes to dot the map, yet left unappealing pock marks on the extraction sites. Urban inhabitants often did not understand the consequences of creating their own civilised settings.[12] Nevertheless, geo-environmental disconnection and the creation of tropical landscapes in the arid Southwest during the twentieth century represented a marked departure from its antecedents. Technology made the manipulation and transportation of water resources less obvious to consuming populations and an increasing number of paradisiacal settings were dedicated exclusively to leisure – as opposed to industrial or agricultural – purposes.

Engineering expertise enabled communities to transport water over great distances, thus estranging its users from the natural landscapes they affected. Geo-environmental disengagement in the delta began during the early twentieth century in the *irrigated oases* of Yuma Valley, Mexicali Valley, and the Imperial Valley. Americans and Mexicans not only transformed the ecosystem with their new technologies, but also displaced natives who had worked the lands adjacent to the rivers for centuries. Ultimately, technology made human interactions with

nature more impersonal in an industrial and post-industrial society. Second, cultural values of affluence, collectively known as the *mirage culture*, spawned a proliferation of lawns, lavish fountains, man-made water-ski parks, and fabricated lakes after 1960. The artificial paradise was constructed at the expense of the river's natural paradise in the delta. These separations of civilisation from its impact on nature largely determined the political ecology of paradise. In other words, the fate of the delta was not only influenced by regional political and economic factors related to the irrigated oases, but also by the actions of residents, tourists, developers, and politicians in the competing *urban oases* of Los Angeles, San Diego, Phoenix, and Las Vegas. Not surprisingly, the Colorado River is one of the only rivers in the world that does not support a major metropolitan area on its banks, yet sustains scores of communities inland whose collective population exceeds several million inhabitants.[13]

THE IRRIGATED OASIS

Throughout the early twentieth century, particularly after passage of the Newlands Reclamation Act in 1902, the way in which residents close to the river viewed the river underwent a profound transformation. This was due primarily to large-scale American and Mexican migration to the delta. In the process these immigrants displaced Cocopah and Quechan bands as the principal users of water from the Colorado River. The value system dominating river use underwent a similar transformation. While naturalists such as Aldo Leopold and C. R. Orcutt appreciated the desert and wetland paradise of the delta for its natural processes, others, including Theodore Roosevelt, viewed the region primarily as a location where an irrigated oasis could link the region to the global economy. The days of strict subsistence production by the Quechan and Cocopah tribes were numbered. [14]

Technology enabled this transformation to take place. Dams served as the focal point of the transformation of the Colorado River basin. However, canals, pumps, and underground siphons also contributed to this ecological revolution. In the 1940s, for example, the Colorado River Aqueduct carried water hundreds of miles from the river to Los Angeles. Likewise, by the late 1980s the Central Arizona Canal carried water from the Colorado River to Phoenix and Tucson. These more mundane aspects of engineering (canals and pumps), perhaps more so than massive dams, allowed people to disassociate their behaviours in the urban and irrigated oases from the consequences of their actions on the Colorado River and its delta.

The vision of nature that the United States Reclamation Service (USRS), local developers, and contemporary scientists brought to the Colorado River Basin and the Delta also played a critical role in the gradual disconnection of the river's beneficiaries from the river itself.[15] As historian Donald A. Pisani noted:

> Residents along the river seemed eager to cooperate with the Reclamation Service, whose officials hoped that a new mining boom in Arizona would create ready markets for farm products raised on a federal project. [USRS Engineer] J. B. Lippincott crowed: 'here is an opportunity to "Build the State." Here is a sleeping empire at our doors awaiting the touch of some Siegfried to awaken it.'[16]

Theodore Roosevelt's advocacy of management and conservation dovetailed with the management revolution that took place in the early twentieth century in American government and business.[17] Influenced heavily by the growth and consolidation of the oil, railroad, and steel industries, government bureaux began to compartmentalise offices, tasks, and duties, sparking a bureaucratic explosion that profoundly influenced the USRS's attitudes towards the ability of humanity to dominate nature.[18]

The bureaucratisation of the USRS also reinforced a Newtonian view of nature in which maps and grids could be superimposed upon the landscape in an effort to develop natural resources rationally. Like chemists in a laboratory, engineers and city boosters alike believed that they could develop the resources of the Colorado River for their community without impacting those living downstream.[19] This perspective elided nicely with the furious competition of western communities for water resources, agricultural development, and municipal growth. This outlook probably encouraged geo-environmental disengagement throughout the region more than any other factor. Even as Westerners slowly acknowledged the inter-connected nature of nature and civilisation at the end of the twentieth century, community planners continued to compete for water resources, largely oblivious to the consequences downstream or in the hinterlands of their own oases.

The Yuma, Arizona, area provides an important example of what happens when technology, science, and the economic 'commoditisation' of a region facilitate the rapid exploitation of natural resources on largely untrammelled landscapes.[20] Prior to the introduction of large-scale irrigation in the twentieth century, a sharp contrast between the stormy Colorado River and the vacuous Sonoran Desert characterised the landscape of present-day Yuma County. In contrast to the abundance of water in the Colorado River and along its riparian floodplain, lack of water and unreliable wells plagued travellers in the desert region for centuries. Large sand dunes, deposited over time by the Colorado River, dominated the horizon west of Yuma. Oceans of alkali-green creosote bushes, accented by intermittent clusters of saguaro cacti, covered the plateau east of Yuma County.

In contrast to the deprivations of the Sonoran Desert, the Colorado River enlivened its banks and flood plain. Tall brush and verdant grasses sustained a vibrant ecosystem close to the river's edge. For centuries the Quechan and Cocopah natives relied on the overflow from the river to irrigate their crops, which included cotton, watermelons, beans, and Bermuda seed.[21] The native

bands found that when they applied water from the Colorado to the desert sands, the dunes were transformed into rich alluvial soils.

In the 1880s and 1890s ambitious, but under-funded, private companies tried to supply irrigation services in Yuma Valley for capital-intensive agricultural production. After numerous failures, Mulford Winsor, Sr. oversaw the incorporation of the Yuma County Water Users Association (YCWUA) in 1903. The Association signed a contract with the Secretary of the Interior in 1904 for the construction of Laguna Dam, several miles above Yuma on the Colorado River. Construction of Laguna Dam would raise the riverbed several feet so that water could be channelled into man-made canals. USRS officials believed that these canals could provide water for some 120,000 acres of land in the Bard District of California's Imperial County and Arizona's Yuma County. Construction of the new irrigation infrastructure also symbolised the transfer in control over the region's most precious resource – water – from the Natives to Anglo-Americans. Ironically, 150 Quechan Indians helped construct Laguna Dam. As scholar Robert Bee observed:

> [The] Quechans were giving up the only natural source of fertility for their farmlands in exchange for perhaps a year's wages as common laborers, because when the dam was completed, it reduced the incidence of flooding and thus reduced the deposit of rich river silt on the Quechans' land.[22]

Thereafter, levees, dams, canals, and siphons of the Yuma Project were viewed by Anglos as the means to redeem Yuma Valley, yet the reduced overflow significantly undercut the Quechan's yearly harvest close to the river, forcing them onto government reservations.

In November 1912, Arizona Governor George W.P. Hunt travelled across the blighted lands between Phoenix and Yuma for the Jubilee Celebration of the underground siphon that linked the USRS irrigation works at Laguna Dam to Yuma Valley lands. The siphon, placed beneath the Colorado River, made it possible to transfer water from the dam's main canal in California into the canals of Yuma Valley farmers.[23] For residents in Yuma the siphon symbolised profound economic and environmental changes that accelerated the transformation of their town from a community built on mining and transportation to one focused on capital-intensive agriculture. In his speech, Governor Hunt stressed the intended moral benefits the siphon set in motion. 'The wonderful siphon is a home-builder, and the building of homes is the noblest work that can be performed by the greatest engineering skill in the country.'[24]

In addition the siphon greatly accelerated environmental change in Yuma Valley. With reference to the region's landscape prior to operation of the siphon, William J. Westover, local attorney and farmer, wrote, 'When I came to Yuma in 1909, there was little agriculture in the area. A little acreage west and south of Yuma was in cultivation, the water furnished by private canal companies. The balance of the valley was still rough, covered by mesquite and arrow weeds.'[25]

At the end of his speech, however, Governor Hunt predicted that by 'harnessing of the Colorado River', Yuma's citizens would 'soon make the Yuma valley blossom as the rose.'[26] Mulford Winsor, Jr., a state senator from Yuma, later told a campaign audience,

> I see my dreams of agricultural domain come true … as I witness the mesquite and the screw-bean, the chaparral, the catclaw and the grease-wood giving way to the sweet-scented purple alfalfa, the golden grain, [and] the whitening cotton.[27]

Soon after irrigation began in Yuma County, local boosters began to speak of the irrigated oasis with paradisiacal language similar to that Leopold and Orcutt used to describe the delta's natural fecundity. With reference to the Mexican delta, for example, one publication noted,

> Mexico on the south is an undiscovered country agriculturally. Naturally the eyes of land developers are turned to this region of unsurpassed climate, fertile soil, cheap labour, and low priced land. Here is the opportunity for men of capital and vision to take up a creative work similar to that which now nearing completion in our own West.'[28]

Integration to the emerging global economy exercised an astonishing impact on the landscape of the desert floor. Market conditions dictated what would be planted. Crops not only included foodstuffs, but also ornamental plants, such as palm trees. R.E. Blair, former superintendent of the USDA-run Yuma Reclamation Farm observed:

> As the greater part of the early development of the early development work of the Yuma Project has been accomplished, many residents of both towns and country are devoting more attention than during former years to establishing permanent plantings of ornamental trees and plants that may add comfort and beauty to the homes. Fertile soil, abundant water, long growing seasons, and mild winter temperatures afford great possibilities for the growth of many types of ornamental trees.[29]

Such developments linked the irrigated oasis to the mirage culture of the urban oases. As a result of this market-based growth, Yuma County, the Imperial Valley, and Mexicali Valley assumed a striking green façade. Subsequently, with the help of the urban oases upstream, the delta was gradually transformed from a series of salt and freshwater wetlands into one of nature's most notable ghostscapes.

Ultimately, the consequences of geo-environmental disconnection were social as well as ecological. Control over the river by dams and intakes upstream left native bands along the river without sufficient water to farm. They were soon dependent on the national governments that had transformed this paradise into an irrigated oasis. Juan Grant, president of the Quechan tribe, framed his

complaints concerning the manner in which Indian land and water rights were taken in a brief statement that captured the impact of technological changes on his people. 'The Colorado River has been flowing from the Rocky Mountains to the sea for many generations, long before the white man come', he noted, 'We Indians were farming *along its shores*, raising corn, pumpkins, beans, and watermelons to support ourselves'.[30]

Each of these factors – revolutions in government organisation, economic and ecological values, and the persistence of Newtonian views of nature — provided a powerful impetus for viewing the resources of the river apart from the landform that carried them to the region. Concern for the delta and its inhabitants waned as agricultural projects and urban areas drank the river dry by the time it reached the Gulf of California. Together these factors contributed to geo-environmental disengagement with the Colorado River.

DISTANT EMPIRES AND URBAN OASES

The rise of urban oases in the lower Colorado River Basin, including Los Angeles, San Diego, Phoenix, Tucson, and Las Vegas, provided additional examples of geo-environmental disengagement. These disconnections occurred not only because engineers were able to create structures capable of carrying water to communities hundreds of miles inland from the river, but also because of the political and legal dynamics of urban water acquisition that emerged over the course of the twentieth century. As population increased in these communities, growing political power provided enough clout in state and federal circles to marshal water from ever-distant sources.[31]

While cultural and political history are often separated into distinctive categories, private patterns of water use in the arid Southwest cannot be understood without recognising the link between public policy and the ample supply of water to the urban and irrigated oases. Successful water policy in the American Southwest required two ingredients: (1) local and state politicians who could effectively push projects through the United States Congress that would bring water to a particular oasis and (2) assistance from the powerful US Bureau of Reclamation (USBR). Particularly after World War II, Congressmen and Senators from Western states dominated the Committees on Interior and Insular Affairs in the United States House of Representatives and the Senate. In return for concessions on bills of interest to officials from other states, powerful Western politicians steered massive projects, such as the Central Arizona Project, through Congress. No tandem better epitomised this process than Arizona Senator Carl Hayden (chairman of the Senate Appropriations and Interior and Insular Affairs Committees) and his close associate USBR Commissioner Floyd Dominy. Both men believed that the salvation of the Western

United States involved maximising the use of water from the Colorado River for agricultural, municipal, and domestic use. Dominy best illustrated this faith in the power of engineering to develop the river when he first laid eyes on the newly constructed Hoover Dam in 1937. Years later he reminisced, 'There she was …The first major river plug in the world. Joseph of Egypt learned to store food against famine. So we in the West had learned to store water.'[32] As the most powerful member of the Senate, Hayden enlisted the support of Dominy to convince members of Congress to support the Central Arizona Project, which would bring water to Phoenix and Tucson. Together they successfully spearheaded the passage of a project that had generated significant opposition, particularly from California, as well as other Basin states, and represented the largest USBR project to date (1968). Hayden and Dominy's synergistic relationship typified the way in which Western legislators and local politicians worked together with the USBR – which might have been renamed the USBW (United States Bureau of the West) – to bring abundant supplies of water to the urban and irrigated oases of the region throughout the twentieth century.[33]

The legal structure for surface water diversions throughout the Colorado River Basin also facilitated the alienation of water users towards their environmental stewardship of the river. In humid states east of the hundredth meridian, riparian water law permitted owners of land adjacent to a river full use of the water, as long as their diversions did not hinder the flow of the stream down river. In most Western states, however, the doctrine of prior appropriation was applied in determining water rights. Priority was established not by proximity to the river, but according to who held the earliest claim for diverting water from the river for beneficial purposes. The fact that such rights could be sold and enjoyed by people living at great distances from the river encouraged regional development. As engineers perfected dam and canal structures that allowed the owners of water rights to transport water over great distances, the incidence of geo-environmental disconnection increased. This linkage between water rights and technology allowed individuals such as William Mulholland and the Los Angeles Metropolitan Water District (MWD) to purchase water rights in the Owens River Valley and then divert the river's water several hundred miles to Los Angeles where land developers hoped to build an empire.

Furthermore, domestic and international treaties, including the Colorado River Compact (1922), which divided the waters of the river between the seven basin states, and the Mexican Water Treaty (1944), which granted Mexico 1.5 million acre feet from the river, underscored the scarcity of water resources in the basin. Ironically, these binding treaties inadvertently encouraged accelerated use of assigned water rights during the balance of the twentieth century. As a result, the emphasis on economic development of the river's water largely overshadowed the relationship of those living in the basin to the river itself. The treaties also indirectly led to the construction of structures such as the Glen Canyon Dam, whose purpose was to retain as much water as possible for users

in the United States portion of the river basin.[34]

Southern California offers the premiere example of an empire that conquered distant bodies of water for local growth. The metropolitan area not only severely depleted water resources from the Owens Valley and Mono Lake, but also dipped its hands into the Colorado River for a large portion of its water. Instead of possessing its own natural resources with which to lure investment to the region, the MWD amassed enough water from elsewhere to convince the rest of the nation to move to Southern California.[35] As the metropolis continued to grow after World War II, more fanciful schemes for maintaining the ocean-side oasis were set on the table by policy makers. Planners even considered bringing in water from as far away as Alaska, the Columbia River, and Canada to sustain the greatest empire in the twentieth century American West.[36]

The dream of developing the Colorado River for use in Central Arizona was born after World War I in the midst of discussions related to the Colorado River Compact. In large part, Arizona's push for an internal empire developed in response to California's ability to attract both tourists and new residents. Tension between the two empires was most evident in 1934 when Governor Mouer sent out the Arizona National Guard to try and prevent the City of Los Angeles and the USBR from building Parker Dam, which would divert water to Los Angeles. The inter-state tension reached a litigious climax in 1962, when the Supreme Court ruled in favor of Arizona's contention that California did not have rights to water it had been using beyond the bounds set by the Colorado River Compact.[37]

Las Vegas, or 'The Meadows', represented the third major urban oasis in the lower Colorado River basin. From a humble population of approximately 30,000 in 1946, the town grew exponentially in the 1980s and 1990s, reaching a population in excess of 1.1 million by 1997. Attractive tax rates made the move even more enticing for those from the Rustbelt, Midwest, and California. Explosive growth quickly rendered the state's allotment of 300,000 acre-feet from the Colorado River insufficient to fuel additional development. As in Los Angeles and Phoenix, increased population in Las Vegas equated to greater political power in commanding resources from areas with less representation. By the early 1990s, the Las Vegas Valley Water District had devised plans to import desalinated water via a pipeline from Santa Barbara, California. Another plan proposed draining the aquifers beneath Death Valley and rural Nevada. Political opposition to such plans demanded that Las Vegas focus on conservation. Nevertheless, creators of the artificial paradises of the Strip and residential areas fought back to preserve their oases in the desert.[38] Continued growth and maintenance of its claim as entertainment capital of the United States garnered Las Vegas the dubious distinction of being the most profligate urban consumer of water in the American Southwest. [39]

One of the true ironies of the lower Colorado River Basin involved the type of development that flourished there. In an effort to recreate paradise, the mirage

culture represented the collective efforts of homeowners, resort owners, and tourists to create, sustain, and enjoy an artificial sense of the sublime with water from the Colorado River, even as the ecological viability of the river's delta remained in limbo. Manicured lawns, man-made lakes, golf courses and exotic flora all required large amounts of water to sustain the myth of paradise. Ultimately, the way these venues promoted themselves raised questions as to which paradise deserved society's collective attention: a public one, represented by the delta, or a private paradise groomed to provide the mirage culture? As historian Robert Sheridan aptly noted, 'The dead rivers and sprawling metropolises are not the result of some conspiratorial power elite but the actions of a monstrous economic democracy of ordinary people who vote with their chequebooks and their feet, cars, and recreational vehicles.' In essence, Sheridan argued that culture, as well as politics and diplomacy, helps explain the political ecology of the delta.[40]

MIRAGE CULTURE

The mirage culture diverged philosophically from the more utilitarian purposes of the urban oases. While the urban oases had grown in response to the attraction of military bases, industrial factories and technological corporations during and after 1940, the mirage culture fulfilled practically no useful purpose beyond sensory stimulation. Historian David Nye considered America's fascination with the technological and natural sublime as an outgrowth of a national tradition that esteemed technological stimulants of the senses as an extension of, and not apart from, nature's wonders. 'Like the Jacksonians who mingled their awe for nature and man-made wonders', Nye wrote in reference to the massive influx of tourists to Las Vegas, 'late twentieth-century Americans seem oblivious to the logical impasses [such as geo-environmental disconnections] posed by the technological sublime …'[41] Ultimately, the mirage culture was merely a regional extension of that larger national trend.

The mirage culture also fit another important characteristic of American culture: belief in the linear progression of society towards national and technological greatness. As Las Vegas epitomised best, and Palm Springs and Scottsdale frantically attempted to emulate, 'the logic [of the mirage culture] demanded that each object exceed its precursors'. What one Las Vegas nightclub owner said about the tourist drawing capacity of atomic bomb blasts in the 1950s held true for the elaborate oases of the mirage culture: 'Bigger bombs, that's what we're waiting for, Americans have to have their kicks.' [42]

Five elements defined the mirage culture: the swimming pool, the lawn, the golf course, man-made lakes, and fountains. Each of these constructions fulfilled a human longing to experience nature, or at least a representation of it. In the modern Southwest, nearly every upscale home built since the 1960s substituted

a lawn for a 'paradise garden' and a swimming pool for the body of water that complemented the garden. Man-made lakes served an aesthetic function on a landscape scale. Finally, fountains and advanced water technologies carried the worship of the mirage culture past functionality and into a pure form of aquatic acclamation.

The swimming pool has contradictory cultural meanings and purposes. As early as the thirteenth century Muslim philosopher Obadiah Maimonides defined a 'pool' as a receptacle where the sacred nature of water could be experienced. As historian Thomas A.P. van Leeuwen observed, 'The cleanliness of the pool and the purity of the water led to a series of religious meditations on the ways to God.' Later interpretations of the pool emphasised its emulation of nature and profane, as well as spiritual, purposes. A *piscine*, the French word from which 'swimming pool' is derived, functioned as a fishpond in Roman and European gardens. Yet, much like Maimonides' interpretation of 'pool', Christian doctrine viewed the *piscine* as a baptismal font, where nature, humanity, and the heavens merged to provide a sense of rebirth and renewal.

In the mirage culture of the twentieth century Southwest, the swimming pool and man-made lake retained a secularised sense of spirituality, reflecting the ability of humanity to redeem desert landscapes. Nevertheless, the *piscine* of the mirage culture also quenched a need for leisure in the desert. The proliferation of swimming pools and suburban subdivisions in the Pacific Southwest after the 1960s promised a pond of pleasure in many backyards. This 'hydro-vulgarity', as Van Leeuwen termed it, not only represented the democratisation of water supplies in the region, but also reinforced a regional preference for private versus public oases. No locality illustrated this trend better than Southern California, where 'the swimming pool and its hydro-opportunistic attractions became the center of family life'. The Los Angeles metropolitan area amassed the highest density of swimming pools in the world by the early 1960s. As one chronicler of sport noted, 'The post-war increase in swimming pools alone had been fantastic. In 1947, there were 11,000 pools in the United States. Now [1962–1963] there are more than 310,000, of which 113,500 are in California.' By that time, the mirage culture also defined an often elusive feature of the barren desert floor, the U.S.-Mexican border: 'A passenger flying over the Mexican desert can tell when he has crossed the United States border by the swimming pools that suddenly appear below.' The number of pools in Southern California increased throughout the balance of the century, as well as throughout the rest of the Pacific Southwest. By 1997 there were 280,000 swimming residential swimming pools in the Phoenix area alone.[43]

Secretary of the Interior Bruce Babbitt recently noted in a speech to the Natural Resource Law Center at the University of Colorado, Boulder, that 'Conservation should begin by recognising that western cities were not meant to resemble Brazilian rainforests or suburbs of Minneapolis'.[44] Unfortunately, the use of manmade lakes and swimming pools as ponds became a fixture on the

regional landscape.[45] The combined toll of insurance liabilities for diving boards, a fetish to recreate the natural in a domestic setting, and an economy that supported a highly sophisticated cadre of professional water artists, enticed suburbanites across the region to use their pools for aesthetic purposes instead of for recreation. As one journalist in Phoenix noted,

> Here in the Valley we're 2,600 miles from the famous Walden Pond. But almost any backyard can have its own little Walden that will give the homeowner years of pleasure without the work of maintaining a pool.[46]

Waterlilies and goldfish provided more window-dressing in this attempt to recreate nature. As the owner of Paradise Ponds in Scottsdale noted, 'It's a little oasis in your back yard.'[47] Fountains and artificial waterfalls completed the landscape makeover. The importance of geographic mobility in the mirage culture was not lost on one marketer of waterfalls, who noted, 'If you move, you can pick it up and move the waterfall.'[48]

Fountains were also an important component of the mirage culture, serving as an artificial spring that soothed parched onlookers with an illusory reassurance of plenty. Like Roman emperors who transported large amounts of water across the empire via aqueducts and 'dumped [them] into fountains with no holding capacity', modern day developers and homeowners displayed fountains as symbols of prosperity and power over nature.[49] The demand for fountains facilitated the emergence of sophisticated companies such as WET (Water Entertainment Technologies) Design Company. Since the early 1980s, WET has transformed streams of water into cultural focal points in the Pacific Southwest and throughout the world. Less high profile corporations performed the same service in residential oases throughout the region. While most of these fountains used recycled water, they created the impression of plentiful water resources (a key characteristic of the mirage culture).[50]

While the pool, man-made lake, and high-tech fountains represented the unadulterated celebration of water in the mirage culture, the exotic landscaping of the urban oases in lush, verdant hues reinforced the illusion of a post-modern paradise in the arid West. Ironically, the use of water-hungry exotic flora in the urban oases inadvertently drew water away from the delta, where invasive species replaced natural ones and the welfare of those living there stood in stark contrast to the lifestyle enjoyed under the mirage culture.[51]

The lawn emerged as a middle-class status symbol in the United States during the mid-nineteenth century. Prior to that time, upper and middle class homes were largely situated on the street with little floral ornamentation. The desire for private lawns and gardens replaced the fascination with public gardens and parks during the late nineteenth and early twentieth century. Post-World War II America witnessed the emergence of the front lawn as a suburban fixture. Much like a paradise garden, the lawn separated a family from the world. The grass-seed and chemical industries contributed to make lawn care a high art. In the

American West this trend was reinforced by the lack of natural verdure and the desire of immigrating Midwesterners and easterners to transform the desert floor into a domestic microcosm of the natural landscapes they left behind.[52] Neighbourhood covenants and peer pressure bound residents with formal and informal commitments to take care of their lawns. The ecological transformation was significant enough to garner attention from the popular press in the post-World War II era. In 1962 The *Saturday Evening Post* noted that prosperity after the war brought on

> the biggest lawn boom of all time – a phenomenon of this suburban age. With everything else exploding – population, culture, fashion – so has grass. It is literally spreading all over and has become, in fact, much more than a ground cover. It is an emotion that has blossomed into a status symbol.[53]

Not surprisingly, golf courses and lawns remain one of the top consumers of water in the Pacific Southwest.[54]

Perhaps the most striking examples of geo-environmental disconnection in the mirage culture was the movement to create 'microclimates' from lawns, fountains, misting systems, and swimming pools. Misting systems promised to cool the air from ten to twenty five degrees per hour.[55] Swimming pools provided the potential for even greater manipulation of residential environs. As one climatologist noted, 'if the pool consumed half your back yard, you could lower the entire backyard temperature five degrees immediately'.[56] Despite the beneficial impact of swimming pools, lakes and misters on local climates, the liabilities included greater humidity within the surrounding landscape. Unfortunately, the debate over microclimates focused mainly on whether they were economically – and not ecologically — viable. The issue of saving money on energy versus the cost of the water needed to create a microclimate took precedence over issues related to the morality of the action.[57]

Like the swimming pool, golf courses were useful for recreation as well as for aesthetic pleasure. Additionally, golf course owners drastically reinforced the private nature of the mirage culture, demanding expensive green fees often in excess of two hundred dollars. These fees not only paid for the privilege of playing on a lush landscape in the desert, but also for exorbitant water bills and maintenance fees. Developers emphasised their ability to sculpt nature by adding lakes, hills, and sand bunkers (perhaps the ultimate paradox of the mirage culture) to courses. One developer noted,

> We are even very careful to save natural rock outcropping, drainage features, and vegetation. We really want the two (golf courses and desert habitat) to work very well together.

Despite these efforts to retain natural features on golf courses, developers pushed ahead with plans to create even more golf courses in the Pacific Southwest. Demand from tourists for manicured greens and fairways reinforced

the aspirations of developers. Arizona, for example, in 1993, derived close to one billion dollars from golf related activities alone. The efforts of conservationists and environmentalists to limit the number of golf courses throughout the region received little attention.[58]

Competition between golf resorts in Scottsdale, Las Vegas, and Southern California contributed to the proliferation of courses across the Pacific Southwest and inadvertently placed greater strain on available water resources. By 1999 the Scottsdale area assumed the title of 'Golf Capital of the World'. By 1998 the Phoenix area boasted 187 golf courses, with officials from the Arizona Golf Association planning for as many as 400 by 2010. Despite measures taken in the early 1990s to require the use of reclaimed water instead of groundwater for use on golf courses, the number of courses increased by approximately seventy between 1990 and 1999. Las Vegas, ever anxious to add more high-profile attractions, lagged behind Phoenix in terms of golf courses, but remained the second most popular tourist spot in the world, thanks in part to the waterscapes featured in many of its hotels. San Diego and Palm Springs also competed with these urban oases for golfers during the late twentieth century.[59]

The growth of golfing in the mirage culture reflected the type of city-state intrigue that characterised the use of water as a developmental tool in the Lower Colorado River Basin. Once a suitable water supply was secured during the early part of the century, concern in these urban oases shifted from the river to the creation of plans to outdo competing communities for tourist dollars, industry and new residents. Ironically, greater environmental awareness during the late twentieth century did little beyond the local level to encourage a greater sense of regional ecological inter-dependence. The American penchant for political independence and continued economic prosperity prolonged the effects of geo-environmental disengagement.[60]

MIRAGE CULTURE REDEFINED IN THE LATE TWENTIETH-CENTURY

While the mirage culture had its precedents in Los Angeles, Palm Springs, and Scottsdale, it was epitomised by the vision that developer Steve Wynn brought to the Las Vegas desert during the 1980s. In an effort to elevate the offerings of the Strip beyond darkly lit casinos, Wynn's Mirage Resort helped re-define the mirage culture in the late twentieth century. Catering to tourists looking for the most appealing sensory stimulation, Wynn created a South Sea's environment complete with dolphins (in a 1,500,000-gallon pool) and a rainforest-theme lobby with an exotic aquarium behind the registration desk. His architects perpetuated the mirage culture by making it 'acceptable to completely ignore the natural setting'. 'The contrast with reality', they rightly believed, '[made] the fantasy stronger.' Highly sophisticated water technology, subtle lighting that

'accented' the beauty of exotic species, and extensive landscape architecture created an artificial paradise in strong contrast to the declining delta in the late 1980s.[61]

In order to maintain the illusionary culture of the South Seas at the Mirage, the hotel's extensive horticulture department sought to emulate the division's objective to 'dispense with the guests' belief that they are in the middle of a desert'. There were seven acres of outdoor landscapes, 17,000-square feet of interior plant space, and an extensive atrium covered with palm trees and exotic flowers. While plants were brought in from Hawaii and California, members of the staff hailed from as far as Costa Rica, the Philippines, and Mexico. In addition to the grounds, the staff maintained a 'jungle' landscape for Siegfried and Roy's tigers. 25,000 visitors to the hotel each day transformed annual flowers into 'weeklies'. The signature volcano outside the hotel rested inside a 2,000,000-gallon pond, with a waterfall that used 47,000 gallons per minute. This marriage of technology and exotic flora remains one of the most striking examples of a paradise in the desert. [62]

Wynn's most recent venture, the Bellagio Hotel, not only boasted a collection of art worth three-hundred million dollars, but also one of the most technologically advanced fountain shows in the world. The hotel is fronted by an eight-acre artificial lake with hundreds of fountains which are choreographed to music and

FIGURE 2. A swimming pool in a paradise-like garden, the Bellagio Hotel, Las Vegas, 1998 (Photograph by P. Rumler, Leiden, The Netherlands).

shoot streams of water as high as two hundred feet in the air. The $40,000,000 extravaganza mixed technology and ornamentation to a level only Las Vegas tourists and developers could appreciate. Computer programs determined how much water each stream would carry and how high each stream would go during the show. The large computer that ran the fountains filled several boxes in eight-foot tall containers behind the lake and underneath the hotel. The impact of this natural manifestation of water was not lost on spectators, who considered it to be the grandest water show in the city. As one onlooker noted, 'Its very spiritual … it puts me in a trance.' However, the words of one journalist on this version of paradise ring true: 'The city is built on simulation, quotation, weird unconvincing displacements, in which cultural [and natural] icons are endlessly but never convincingly quoted.' [63]

Bellagio is also home to *Cirque de Soleil's* exclusive production, entitled 'O' – an Americanized translation of the French word for water, *eau*. In short, the production and the stage are the zenith of water worship. The 1,400,000-gallon water stage permit the actors, dressed in anything from clown to penguin outfits, to perform death-defying feats in an aquatic setting. The soundtrack includes songs entitled, '*Terre Aride*', '*Desert*', '*O*', '*Jeux D'eau*', and '*Mer Noire'*. The ninety to one hundred dollar tickets also emphasised another distinction between the delta paradise and the private paradise of the mirage culture: one only exacted the price of arriving, while the other charged for each manifestation of illusion and pleasure.[64]

As one writer wryly noted of these facets of the mirage culture: 'The key to all this is water, whose conspicuous display and consumption is as important a sign of luxury, of control over Nature, to Vegas entrepreneurs as it was to Umayyad caliphs who began building the fountains of the Alhambra on a dry hillside near Granada 12 centuries ago … To install performing dolphins in huge saltwater tanks in a hotel in the Nevada desert seems, on the face of it, about as rationale as filling a cruise ship with sand and camels, but it has its own value as spectacle.'[65]

While Scottsdale lacked many of the garish electrical trappings of Las Vegas, its opulence met if not exceeded its neighbour to the north. Tropical pleasure islands cloaked the desert in deceptive, yet seductive, greens and azure blues. Described by one travel editor as 'an incredible fantasy of a water playland that surely defies the gods of the desert', The Hyatt Regency at Gainey Ranch, for example, incorporated exotic flowers as accents to the natural landscape, intricate canal systems that were co-ordinated with fountains on a half-acre pool paradise, and a beach composed of 500,000 pounds of sand imported from Monterey, California. In all the resort housed twenty-eight fountains, forty-seven waterfalls, and used 857,000 gallons of water for these amenities.[66]

Like many landscapes of the mirage culture the Hyatt Regency blended natural features, including saguaro cactus and a red-rock backdrop, with appealing exotic features, such as the lavish swimming pools and waterfalls. Ironically,

the main building was inspired by the work of Frank Lloyd Wright, who had worked in the Sonoran desert for some time. Wright taught his students at Taliesin West in Scottsdale the importance of 'organic architecture', or 'using the desert to dictate the design and materials'. Before his death he observed, 'Our new desert camp belonged to the Arizona desert as though it had stood there during creation.' For Wright, Dr. Orcutt and Aldo Leopold, the desert was the paradise to be emulated by civilisation.[67]

In contrast to the Hyatt's imagined tropical landscape, the Hilton at Tapatio Cliffs in Phoenix offered a resort-sized replica of Havasu Falls in the Grand Canyon. A 130-foot water slide descended twenty-four feet into a pool area and a tram carried visitors from the hotel to the falls. The Falls consisted of a 40-foot waterfall in a 'natural mountain formation that cascades into twelve travertine pools and poolside terrace gardens'. To dress the falls, over 10,000 flowers and plants were used to 'create a feeling of tranquillity'. As one company executive noted, 'The Falls is a project inspired by one of Mother Nature's most awesome creations.' Despite imagined ties to nature, these representations of paradise revealed the high degree of geo-environmental disconnection with the landscape that made these playscapes possible.[68]

In the late 1990s the City of Tempe brought to fruition a thirty-year old dream to turn the dry riverbed of the Salt River near Tempe's upscale downtown tourist area into a lake. The city hoped that such a waterscape would fuel greater tourism, shopping, and economic development in the area. As one journalist noted, 'Think of San Antonio's Riverwalk, the Boston Waterfront, or San Diego's Balboa Park, and you have just a glimmer of an idea of the potential the Rio Salado brings to the East Valley.' True to the mirage culture, this attempt to recreate a waterscape in the bed of a river previously emptied for municipal and agricultural growth in the early 1900s, illustrated how local empires looked elsewhere to conjure up local growth in a desert setting. Developments along the waterway included names such as 'Ciudad del Lago', or 'City of the Lake', and Rio Salado Landing', or 'Salt River Landing'. Despite the fact that much of the water being used to fill the two-mile river has been recycled, one report suggested that as much as 500,000,000-gallons or 1,388 acre-feet of water would evaporate each year. Questions remained as to whether the city would be willing, in a time of need, to buy water from the Central Arizona Project to fill the lake. Ultimately, these plans for development epitomised the ways in which water has been seen as a magical panacea for economic growth in the Pacific Southwest.[69]

While millions of residents throughout the region have adapted to the constraints of the desert landscape, the mirage culture continued to boom on the residential front, providing additional examples of geo-environmental disengagement. Perhaps the most striking manifestation was the creation of Lake Las Vegas, a massive residential and hotel complex in Henderson, Nevada, ten miles from Las Vegas. The two-mile long, 320-acre lake appeared to be yet another

'natural' reservoir backed up behind dam on or near the Colorado River.[70] Filled with water procured from the City of Henderson (with options to use up to 7,000-acre feet per year for lake levels and grounds maintenance), the landscape underwent a powerful marketing and ecological transformation, becoming the 'largest privately owned lake in Nevada'. Lake Las Vegas promised a 'Mediterranean' setting, with neighbourhoods bearing the names of Monaco, Barcelona, Sorento, Portofino, Southshore, and Monte Lago. Advertisements enjoined readers to 'Look around this natural wonderland. Birds of all types that many people only see in natural history magazines are there to be enjoyed and photographed.' Nature and the mirage culture inter-mingled ever so subtly, as the developers promised 'breathtaking views of lake and desert, as well as the spectacular Las Vegas skyline and majestic mountains beyond.' Cybersurfers were introduced to the Lake Las Vegas Resort website with the simple affirmation, 'The wonder of nature, the imagination of man'.[71]

Residential developments in the Palm Springs area also illustrated the effects of geo-environmental disengagement. Indian Lakes Estates consisted of a series of man-made lakes suitable for water-skiing. Private lots surrounded the four lakes. Shadowlake Estates surrounded a forty-two acre lake, also designed for water-skiing. Advertisements invited readers: 'Play in the Desert, Live at the Lake'. Prospective residents were enticed: 'Wake up to a mountain vista reflected in the crystal depths of the lake at your doorstep. Breathe the fresh morning air as you gaze across the glassy water from your private dock … You're a part of an oasis.' Buyers were tempted with 'unique and stellar surroundings', 'verdant landscaping' and 'panoramic views of the Coachella Valley'. These residential projects provided ideal settings for upscale living, yet potential customers were rarely confronted with the social and environmental consequences of developing water-ski parks in the middle of the desert.[72]

To be sure, the urban oases have taken steps towards recognising the fragility of the water supply that keeps these visions of paradise alive. By the late 1990s most water fountains and man-made lakes in California, Arizona and Nevada were required to use recycled water in order to conserve potable water and limit groundwater overdraft. These efforts, however, did not address the impact of images and impressions that the mirage culture projected throughout the world. Many who came to the desert after World War II not only recreated the world they left behind, but also emulated the very culture that they found when they arrived in the Southwest.

Ultimately, legal and economic distinctions differentiated the private oases of the mirage culture from the paradise of the Colorado River Delta. In contrast to the delta, the mirage culture was built on the shoulders of an upsurge of affluence in the post-World War II era, particularly after 1960. While the delta paradise remained a largely public space, almost all of the aquatic oases of the Pacific Southwest were private and required money both to build and to use them – as well as lavish amounts of water to maintain them. Unfortunately, such

attitudes remained congruent with the feelings of many politicians and developers towards protection of the needs of the delta ecosystem. Although the Mexican government designated the lower delta region as a protected Biosphere Reserve in December 1992, rehabilitation of the ecosystem cannot be accomplished without the co-operation of US interests upstream, including individual water users. And while unusually high amounts of precipitation reinvigorated the delta during the early 1980s, the lack of water reaching the Gulf of California between 1961 and 1982 suggests that human efforts upstream hold the key to further improvement of ecological conditions in the delta downstream.

CONCLUSION

The most troubling aspect of development in the Western United States goes far beyond how water has been used in the irrigated and urban oases. As federal spending in the Pacific Southwest encouraged urban growth in the region after 1940, private industry and tourism reinforced the appeal of these urban oases. With exponential immigration to the region, however, political power became concentrated in regions that were highly isolated from the sources of natural resources that fed the seemingly endless growth. While technology allowed millions to make the desert their home or playground, canals, wells, and dams, failed to reinforce connections between the inhabitants of these urban areas and the river basin. Politicians and civic boosters used their power to make the urban oases flourish, regardless of the consequences for those living throughout the rest of the river basin. Such manifestations of geo-environmental disengagement were not unique to the delta, but had also been the fate of places like Owens Valley and Mono Lake.[73]

While many of the problems threatening the delta throughout the century required a joint solution by peoples and governments in the United States and Mexico, others involved developments unique to one nation or the other. Economic prosperity, unparalleled geographic mobility, technological advances, public policy, and the artistic appeal of the mirage culture encouraged the emergence of the urban and irrigated oases in the Southwest. As this article has illustrated, however, the largely unregulated use of water in the profligate civilisation of the arid West exercised a significant influence over those living in the delta. Private consumption contributed to this seemingly impersonal process of decline within a highly complex ecological system.

The American West and the bi-national delta face a similar dilemma. While numerous water conservation measures have been taken in Los Angeles, Las Vegas, Phoenix, Tucson, and Palm Springs, many believe that these savings should be used to fuel additional growth. Under the Rooseveltian model of conservation and development, this may have been true. However, the West of the late twentieth and early twenty-first centuries is a region that neither the ex-

president nor many other early visionaries would recognise.[74] Accordingly, the political culture of the American West demands scrutiny. The policies and legal structures that have been favourable to the laissez-faire development of urban areas and natural resources are in need of reform. The mentality of 'don't tell me what to do on my property', must be reconsidered, not only because of the needs of Mexico, but also because United States citizens have chosen to make the West the most urbanised region in the country.[75] Instead of asking how much more growth can be sustained by acting more responsibly, developers, tourists, residents, and politicians need to reconsider the ties of their 'empires' to the rest of the river basin. Despite recent signs of ecological renewal in the delta, steps must be taken not only to educate communities of their linkages to the Colorado River Basin, but as well to assure sufficient water to meet the needs of all the communities and landscapes that rely on the river for sustenance.[76]

In 1895 United States Attorney General Judson Harmon, decreed that the United States did not have to give Mexico any of the water flowing in the Rio Grande River because the headwaters originated in the United States. In public, this doctrine was soundly repudiated during the 1940s as Mexico and the United States celebrated a water treaty that divided the waters from the Colorado and Rio Grande Rivers between the two nations. While Harmon's view remains publicly reprehensible, some tourists, residents, farmers, politicians, and diplomats throughout the Colorado River Basin in the United States unknowingly carry on the spirit of the Harmon Doctrine by attempting to use as much water as possible for pleasure or economic gain. Until the basin states can agree that maintaining the integrity of the river, as well as the bi-national delta is important, the economic rationalisation of the river and its attendant socio-economic issues will continue. While many argue that the United States has no obligation to protect the lower delta since it lies outside of US boundaries, it is equally true that the United States has enjoyed the lion's share of economic development associated with the river's use throughout the century.[77]

Therefore, only a shift in values amongst those living in the river basin will ensure that the river has the water it needs to renew itself as a natural paradise worthy of adulation by the distant empires.[78] An ecological rationale linking the responsibility of urban areas and agricultural oases throughout the Pacific Southwest with the needs of the river basin offers the surest solution for protecting the health of all involved. As Aldo Leopold observed,

> Your true modern [person] is separated from the land by many middlemen, and by innumerable physical gadgets. He has no vital relation to it; to him it is the space between cities on which crops grow.[79]

Transforming values and laws offers the surest formula for altering environmental ethics and turning public and private attention to the natural paradise of the delta.

NOTES

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[4] Aldo Leopold, *A Sand County Almanac: With Essays on Conservation from Round River* (New York: Ballantine Books, 1970) 150–156.
[5] Evan Eisenberg, *The Ecology of Eden: An Inquiry Into the Dream of Paradise and a New Vision of Our Role in Nature* (New York: Vintage Books, 1998) 170–171.
[6] Leopold, 157–158.
[7] Philip L. Fradkin discusses the demise of water resources in the Delta in *A River No More: The Colorado River and the West* (New York: Knopf, 1981), 319–341.
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[9] Anita Alvarez Williams, 'People and the River', *Journal of the Southwest*, volume 39, 1997, 331–351.
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[78] There are several educational and political solutions that could be applied in order to increase the consciousness of those living in the Southwest and borderlands region of their reliance on the Colorado River. Policy makers should create public service messages and school curriculum that emphasise the social — as well as economic — impact of profligate water use throughout the basin on the delta and its inhabitants. Policy makers might also look into graduated water pricing structures that charge greater rates per unit as water use exceeds certain levels. For a discussion of water pricing see Peter H. Gleick, *The World's Water 1998–1999: The Biennial Report on Fresh Water* (Washington D.C.: Island Press, 1998), 24–28. While such a plan would not abolish the mirage culture, it might be the first step towards transforming the way Westerners, particularly homeowners, think about water usage. The ultimate (although currently politically unfeasible)

solution would be to add a diplomatic minute to The Mexican Water Treaty (1944) that increases the amount of water apportioned to Mexico in order to renew the Delta. See W. J. Snape, III, 'Adding an Environmental Minute to the 1944 Water Treaty: Impossible or Inevitable?' http://www.sci.sdsu.edu/salton/Snape1998EnvironMinute.html. Politically, however, nearly any measure that threatens the autonomy of water users will face stiff opposition. Hopefully education – and not long droughts – will turn the minds of Westerners towards more responsible patterns of water use.

[79] Leopold, 261.