

Introduction

“There is no lack of water in the Mojave Desert unless you try to establish a city where no city should be.”

—Edward Abbey

“WHAT HAPPENS IN Vegas stays in Vegas,” teases the city’s risqué advertising slogan as it invites visitors to lose their inhibitions, violate their moral principles, forget about their spouses, and ignore their credit card balances. A metropolitan area of 1.8 million people in the Mojave Desert, Sin City encourages irresponsible behavior about everything from sex to water.

During the 1980s and 1990s, garishness characterized development in Las Vegas. Extravagant homeowners built Bavarian châteaux with Italian marble and gilded fixtures. Excess was first a goal, then a standard. Ornate and lavish fountains, rococo entrances, manicured emerald green lawns, lush landscapes, swimming pools, and spas dominated many subdivisions. Lake Las Vegas, a subdivision seventeen miles east of the Strip, boasts a 320-acre privately owned lake, three golf courses, and homes built for only the most upscale tastes. Celine Dion maintains a home at Lake Las Vegas and for five years traveled via helicopter to and from her nightly show at Caesars Palace. The fastest-growing city in the United States, Las Vegas welcomed growth with open arms. But, in 2001, the city of illusion and fantasy stumbled upon a stark reality. It had run out of water.

DURING THE 1920S, no one worried about Nevada needing water. With a population of roughly 5,000, Las Vegas was merely a whistle-stop on the Union Pacific Railroad. Its prospects for growth seemed minuscule until the construction of Hoover Dam provided a water supply—Lake Mead—and hydroelectric power to run air conditioners. In the 1930s, Benjamin Siegelbaum, a.k.a. Bugsy Siegel, part of the East Coast mob's bootlegging and gambling operations, arrived in Vegas. As a hit man, Bugsy had been sent to Los Angeles, where he killed a police informant and escaped conviction. But rather than head back East, Bugsy then turned his attention to Las Vegas, which he envisioned as a gambling mecca run by the mob. Gambling had been legal in Nevada since 1931, when construction workers poured into town to build Hoover Dam. With funding from his New York bosses, Bugsy oversaw construction of the Flamingo casino, which opened in 1946. When the Flamingo lost money, the mob suspected Bugsy of skimming off the top and had him killed in Beverly Hills in 1947. But the seed had been planted. Meyer Lansky and other figures in organized crime soon recognized Las Vegas' gambling potential and an opportunity to launder money. The mob went on to open several casinos on the Strip in the 1950s, including the Sahara, the Sands, and the Tropicana. In addition to gambling, these casinos also featured entertainment by celebrities, including Elvis Presley, Frank Sinatra, Dean Martin, and Bing Crosby.

Today, as if in homage to the sacred gift from Lake Mead, water features at casinos on the Strip create the illusion that the city of Las Vegas has an abundance of water. In the late 1990s, when Steve Wynn developed the Bellagio hotel and casino, an architect and an artist created a \$40 million water feature with an eight-acre pond that holds 27 million gallons of water. With a computer-choreographed musical score and light show, it sends water as high as 244 feet through more than 1,200 individually controlled water jets.

Since 1989, the Mirage Hotel and Casino has featured a volcano set on a three-acre pool; the volcano erupts hourly, sending smoke



Figure I.1. Bellagio fountain.

Photograph courtesy of Myles Davidson.

and fire spray 100 feet into the night sky. At the entrance, terraced waterfalls and a rain forest greet tourists as though they've arrived on an island in the South Pacific rather than at a casino in the Mojave Desert. Every evening, the Treasure Island Hotel and Casino uses a lagoon to stage a naval battle between pirates and the British Royal Navy, accompanied by fireworks and scantily clad women—the latter a departure from historical fidelity. Down the Strip, at the Mandalay Bay Resort and Casino, a 1.6-million-gallon “wave pool” provides six-foot-high waves for surfers. But my favorite, for kitsch, is the Venetian Resort Hotel Casino, where, fittingly, tourists ride gondolas poled by gondoliers in striped shirts. Unlike the canals in the real Venice, these are indoors, on the second floor of the casino, beneath a roof painted to resemble someone's sense of a Venetian sky.

An engineering marvel, Las Vegas has repeatedly demonstrated an uncanny and unmatched ability to reinvent itself. In the 1950s, the mob transformed a sleepy cow town into a shady operation, financed with Teamsters Union pension funds, that laundered

money and promoted prostitution. Casinos offered all-you-can-eat buffets, cheap booze, free lounge acts, and low-cost, dingy rooms to draw hordes of down-and-out transients hoping for a little change in their luck. The cleanup process began with the arrival of Howard Hughes in 1966, when he bought the Desert Inn casino and then the Sands. He paid \$14.6 million for the Sands and 183 acres of prime real estate that eventually became the Hughes Center. At the time, this acquisition confirmed most people's suspicions that the reclusive billionaire was certifiably insane. When he told the managers of the casinos that he expected the restaurants to make money and not merely serve as loss leaders to attract gamblers, that confirmed his reputation.

In the 1980s, Steve Wynn ushered in the next phase in Las Vegas by building flamboyant, glitzy hotels on the sites of dull old casinos. At an unheard-of construction cost of \$630 million, the 3,000-room Mirage opened in 1989, with French restaurants and museum-quality artwork on display. Elegance had arrived in Las Vegas. Imitators quickly enlarged Caesars Palace and built the 4,000-room Excalibur and 5,000-room MGM Grand. All four projects baffled naysayers when they quickly turned hefty profits.

In the 1990s, as competition from Atlantic City and Indian reservations began to eat into profits, Las Vegas embarked on another expansion. Hoping to attract families to the Strip, the city created Disneyland-like attractions with amusement-park rides, video arcades, dragons, and water-park features. This effort fizzled; by 2007, only 10 percent of visitors arrived with children under the age of twenty-one. Las Vegas stopped trying to be something it wasn't and returned to its naughty roots.

In 1998, Steve Wynn set a new standard for opulence when he opened the \$1.6 billion Bellagio, which stressed elegance, sophistication, and even high culture. The Venetian followed suit in 1999 with more than 4,000 luxury suites (even the regular rooms have a three-room bathroom area with thirteen light fixtures); seventeen restaurants featuring famous chefs such as Thomas Keller, Emeril Lagasse,

and Wolfgang Puck; an opulent spa; high-end designer shops; 1.5 million square feet of meeting space; a 1,720-seat theater where Blue Man Group performs; and the Guggenheim Hermitage Museum, with original works by Picasso, Rubens, and Van Gogh. The era of the full-service, five-diamond, internationally recognized destination resort had descended on Las Vegas. Yet, in 2005, Wynn again raised the stakes when he opened Wynn Las Vegas, a 2,800-room casino-hotel that cost \$2.8 billion—a whopping \$1 million per room. Others have already called the bet and raised him. Current expansion plans shock even Wynn, who describes them as “the most outrageous, over-the-top expansion ever.”

By 2005, Las Vegas had fifteen of the twenty largest hotels in the *world*, yet several are expanding, including the Venetian, which in 2008 added a 3,200-suite tower of hotel rooms and condominiums, making it the world’s largest hotel, with 7,200 rooms. The granddaddy of them all, an MGM Mirage project called CityCenter, will cost \$9.3 billion. The costliest privately financed development in American history, CityCenter will cover seventy-six acres on the Strip and include seven towers as high as sixty-one stories. Most developments have a construction trailer for supervisors; CityCenter has a \$40 million two-building complex. The concrete required to build CityCenter could make a four-foot-wide sidewalk from Las Vegas to New York City and back again. At completion, CityCenter’s population may reach 70,000.

Surprisingly, of the seven towers, only the ARIA Resort and Casino will have gaming. The others will feature condominium-hotels or simply residences. To many people around the United States, it will come as a shock to discover that some people actually want to spend serious money to buy a condo on the Las Vegas Strip. Lots of people. And for lots of money. The Mandarin Oriental, one of the seven towers within CityCenter, offers 227 condominiums on the upper floors, oversized hotel rooms and suites on the lower floors, a private owner’s lobby, and a sky lounge at the very top. It began selling condos in January 2007. With units starting at \$1.5



Figure 1.2. Artist's rendering of CityCenter.
Sketch courtesy of Gordon Absher, MGM Mirage.

million and reaching an eye-popping \$10 million, 90 percent of the condos sold in the first fourteen days. While the company refuses to release a profile of its buyers, more than a third come from outside the United States. What's driving them, along with our fellow Americans, to plunk down so much money for a piece of the Las Vegas Strip? How can Las Vegas possibly need more hotel rooms?

Las Vegas has become the premier convention destination in the United States. The city already has 151,000 hotel rooms and more than 9 million square feet of meeting space. And developers aren't finished: 11,000 hotel rooms are under construction, with another 35,000 on the drawing board. In 2006, an astonishing 39 million tourists visited Las Vegas. That's more than the combined population of New York, Pennsylvania, and New Jersey. (Disney World, the most popular entertainment destination on the earth, attracts 25 million visitors a year.) Las Vegas hosts conventions, fairs, expositions, rodeos, conferences, and trade shows. In 2006, it hosted 23,825 events, an average of 460 per week. Perhaps the best known is the annual Consumer Electronics Show, which draws roughly 150,000 people to see the latest electronic gizmos and hear Bill Gates spar with Google's founders. It seems as though every group

in the country meets in Las Vegas, including funeral directors, celebrity impersonators, and pizzeria operators, who learn about the latest crusts, ingredients, and toppings. The World of Concrete Exposition attracted 85,000 people, but Magic International topped that with 120,000.

By no means are all gatherings large groups. The Alpaca Owners and Breeders Association had 700 delegates and the National Network of Embroidery Professionals 2,000. It's hard to tell whether the size of the gathering is an accurate gauge of public interest in the subject, but the Evangelical Lutheran Church in America managed to draw only 100 people, while the Adult Entertainment Expo attracted 37,000. Thanks to conventions such as these, Las Vegas' hotel room occupancy rate exceeded 93 percent in 2007, compared with a nationwide average of 63 percent.

But it's not just the numbers of people who descend upon Vegas, it's what they do while they're there: consume. Las Vegas visitors still gamble, but an increasing number are searching for other leisure-time activities, especially fine dining, top-drawer entertainment, indulgent spas, haute couture boutiques, and impeccable accommodations with every conceivable amenity. And let's not ignore the club scene, the latest example of Las Vegas reinventing itself. Groups of friends, whether sorority sisters from USC or lawyers from San Francisco, travel to Las Vegas for the weekend to go clubbing at night and recuperate at fashionable pool parties during the day. From all over the country, people descend on Las Vegas for bachelor parties, bridal showers, and divorce parties. One currently hot venue, known as Rehab, rents private cabanas on Sunday afternoons for \$2,000 to \$5,000. On a recent Sunday, forty people were on the waiting list. To compete, casinos have begun to offer what they call "European sunbathing." The Mirage's top-optional pool club is called Bare.

The epitome of trendiness is Tao Las Vegas. In 2006, its first full year of operation, the restaurant did a startling \$55 million in business, making it the highest-grossing restaurant in the United States.

Photographs of fashionable celebrities visiting Tao Las Vegas regularly adorn the pages of *People* magazine. Its nightclub attracts those who need only a single name, such as Bono and Madonna, as well as Paris Hilton, Chelsea Clinton, and Tom Brady. For the opportunity to hobnob with such personalities, the club charges \$300 to \$5,000 for bottle service. When asked what you get for \$5,000, co-owner Noah Tepperberg replied, "A table on the dance floor on a busy holiday weekend."

LAS VEGAS HAS GROWN AS though water weren't a problem, as if the city weren't in a desert. Meanwhile, it has exhausted its rights to Colorado River water from Lake Mead. Even though Sin City's tourists don't dwell on the city's dwindling water supply, Patricia Mulroy thinks about it every day. She's the general manager of the Southern Nevada Water Authority. An anomaly in a male-dominated, good-old-boy water world, Pat Mulroy more than holds her own. She is a physically fit, energetic, well-coiffed woman in her fifties who wears tasteful jewelry, silk blouses, and finely tailored jackets. Not exactly a pushover, Mulroy is known for her fiery disposition, her take-no-prisoners attitude, and her propensity to dismiss those who disagree with her as "brain-dead." Oh, yes, and she has unapologetically defended water use in Las Vegas, particularly on the Strip.

Mulroy has been scrambling to find additional water since she became general manager in 1989. She began by having the Water Authority file claims to groundwater located in aquifers scattered around the state, but these claims lay dormant until 2003. Then she began to look for water outside Nevada because she had run out of in-state options. Unlike its neighbors, California and Arizona, Nevada has few farmers who could fallow their land during drought emergencies.

So Mulroy has her hands full. Las Vegas is expected to add another 1.2 million people, equivalent to a city the size of Dallas, by 2020. "These people are going to come," she notes matter-of-factly.

“It is our job as the authority to make sure that there’s an adequate water supply for them. And that is a delicate jigsaw puzzle.”

Mulroy is desperate to find new sources of water. In 2005, she approached the cities of San Diego and Tijuana with an offer to build them treatment plants to desalinate Pacific Ocean water in exchange for a portion of their Colorado River allocation. Mulroy notes that if Las Vegas had its own coastal property, “we would be building our own desalter. But we don’t.” Instead, she sees the Colorado River as Las Vegas’ best bet.

In 2007, when the Colorado River Basin states (California, Nevada, Arizona, New Mexico, Colorado, Utah, and Wyoming) finally accepted sweeping revisions to the allocation of Colorado River water that gave greater flexibility to Nevada, Mulroy exclaimed, “This is it!” One change allows Nevada to fund water conservation projects in other states and use the conserved water. Mulroy has moved aggressively to take advantage of these opportunities. For example, during the closing hours of the 109th Congress, she partnered with Nevada senator Harry Reid to persuade Congress to construct a new reservoir in Southern California. The water collected in this reservoir would come from managing the Colorado River system more efficiently.

It would work this way. If a farmer in Southern California’s Imperial Valley orders water from the U.S. Bureau of Reclamation, that water is released from Hoover Dam. It takes three days for the water to reach the intake point for the canal that will carry it to the Imperial Valley. If it rains in the meantime, the farmer no longer needs to irrigate his fields, and the water is not diverted from the river to the canal. When that happens, the water flows down the Colorado River, unused by U.S. or Mexican farmers, into the Sea of Cortés, where it nourishes the Colorado River Delta estuary. But from the perspective of municipal water providers, that water is wasted. So Mulroy and Reid devised something called the Drop 2 Storage Reservoir, a structure designed to capture the water the farmer no longer needs and keep it from flowing into the Sea of Cortés. The

new reservoir will be located in southeastern California, about twenty-five miles west of the Colorado River, alongside the All-American Canal. Mulroy agreed to fund it, to the tune of \$172 million, in exchange for rights to 40,000 acre-feet of water per year for seven years. (An acre-foot is roughly 325,000 gallons.)

When I suggested to Mulroy that she seemed willing to sign a blank check in order to get water, she did not disagree. "Money goes a long way toward solving Colorado River water problems," she said. Rita Maguire, the former head of the Arizona Department of Water Resources, agrees. "They have more money than water . . . and they're using that money to bring more water."

As a seven-year drought in the Colorado River Basin continued into 2006, Mulroy turned her attention to the dormant applications for groundwater in central and eastern Nevada. The Southern Nevada Water Authority spent tens of millions of dollars purchasing ranches and water rights in Spring and Snake valleys, which extend into Utah. The Water Authority eventually hopes to transport 91,000 acre-feet of water to Las Vegas through a pipeline estimated to cost \$2 billion.

The pipeline project involves a clash of lifestyles. Spring and Snake valleys, dotted with cattle ranches and alfalfa farms, cover a region bigger than Connecticut but have a population of only 10,000. And while some ranchers were ready to cash out and profit from Las Vegas' offers, others were not, including Dean Baker and his sons, who have been ranching in Snake Valley for fifty years.

Baker rejected Las Vegas' \$20 million offer for his family's 12,000-acre cattle operation. "If it was just about the money, we'd sell to the Southern Nevada Water Authority." "But," he continues, "my family, particularly the boys, love farming. They enjoy the livestock, they like raising their family here and the children, so it's the values of here and not the money." Baker fears that Las Vegas will simply pump the water anyway, from neighboring ranches and other locations within the watershed, lowering the water table and ulti-

mately destroying his ranch, which depends on a shallow water table for irrigation.

More than 830 parties filed protests to the Water Authority's applications for groundwater in the valleys, including the Church of Jesus Christ of Latter-day Saints, which owns a 4,000-acre cattle ranch in Spring Valley. The collision of interests pits Sin City's showgirls and slot machines against the Mormon Church, whose members are forbidden to smoke cigarettes, drink alcohol, or gamble. "Gluttony, glitter, girls, and gambling are what Las Vegas is all about," grumbles Cecil Garland, an eighty-one-year-old rancher in Callao, Utah. "What it's all about here is children, cattle, country, and church."

But Pat Mulroy counters Garland's concerns: "Ninety percent of Nevada's water goes to agriculture and generates a total of 6,000 jobs, which is less than the Mirage Hotel generates," Mulroy argues. "The West was settled by the federal government as an agrarian economy, but it isn't that anymore. The West is becoming an urban area."

Mulroy's plans to acquire additional water are interesting, but maybe, as critics suggest, Las Vegas should get its own house in order before plundering other areas. In fact, Pat Mulroy has moved aggressively to do exactly that. With one caveat: limiting growth is not an option.

In 2001, Mulroy had an epiphany. The Colorado River Basin states had, ironically, spent the 1990s fighting over how to divide up *surplus* water. Nevada entered into a ten-year agreement with Arizona to "bank" 1.2 million acre-feet of Colorado River water in Arizona's underground storage aquifers at a cost to Nevada of \$330 million. Then, in 2001, as the Colorado River drought worsened and Arizona told Nevada that it no longer had excess water for Las Vegas, "overnight, the world changed," said Mulroy. "We were out of water."

Mulroy responded with an about-face that resembled a religious conversion. The unrepentant apologist for growth remade herself as

an apostle of water conservation. The combative advocate morphed into a kinder, gentler conciliator. She saw that the daunting task she faces will not be solved by legal, technical, or engineering solutions alone. The solutions are political and cultural. After twenty years at the helm of the Water Authority, this “European city girl,” as she describes herself, has learned that “nothing is more emotional and nothing is more political than water in the West.”

When Mulroy arrived in Las Vegas in the late 1980s, she found a city whose residents were, as she puts it, “living under the illusion that they were in a subtropical climate.” The city’s per capita water consumption of 350 gallons per day was double that of New York City, which gets ten times the rainfall of Las Vegas. Changing cultural assumptions about water use has proved a daunting task. In 2002, the Water Authority, faced with a worsening drought, implemented an ambitious conservation program targeting outdoor water use, which accounts for 70 percent of Las Vegas’ water usage. The authority banned water-thirsty grass in front yards, limited the number of hours and days people could water, imposed water budgets on golf courses, and instituted fines for people and businesses that didn’t comply. Quite innovatively, it encouraged homeowners to rip out lawns and install water-smart landscaping by offering them \$2 for each square foot of grass that they remove. The program has been spectacularly successful. Mulroy proudly notes, “We’ve removed 80 million square feet of turf.”

The Water Authority has also sponsored a publicity campaign to persuade citizens to conserve. My favorite, an ad that’s making the rounds on the Internet, involves a public service announcement run on Las Vegas television stations. In it, a little old lady hobbles down a sidewalk, aided by a cane, past a lawn with sprinklers watering the sidewalk as well as the lawn. She walks to the front door and rings the bell. A young man answers, looks puzzled, because the woman is a total stranger, and asks if he can help her. In response, she gives him a swift, hard kick in the groin. As he doubles over in pain, a voice-over threatens, “We warned you not to waste water.”

Mulroy faces challenges to conservation nonetheless, especially from the overuse of water to wash cars and to fill fountains. An exasperated Mulroy cautions, “Don’t ever get between senior citizens and their car washing schedule.” As a compromise, seniors can still wash their cars, but they must have a shutoff nozzle on the hose. When she proposed limits on fountains, to Mulroy’s complete amazement, “people went nuts.” She mockingly asks, “Are you going to stop banking with Wells Fargo because they shut their fountain off in front of the bank building?”

Las Vegas has also imposed tiered water rates to encourage conservation, but the rate increases were quite modest. The average Las Vegas household uses 17,000 gallons in a typical summer month but pays only \$37, or about two cents per 10 gallons. Las Vegas residents use more water per person than do residents of other western cities, such as Tucson and Albuquerque, that charge sharply higher rates. Mulroy is not convinced that higher rates would stimulate greater conservation. “Look at what’s happening with gasoline: people are not using less gas as a result of price hikes.” In contrast to Mulroy’s claim, sales of fuel-efficient cars, such as the Toyota Prius, are way up. Nevertheless, she deserves great credit for the progress the city has made. Between 2002 and 2006, Las Vegas slashed its water demand by more than 18 billion gallons a year, even though its population grew by 330,000.

Okay, so she’s taken on the seniors and the lawn lovers, but what about the Strip? How can Pat Mulroy justify the casinos’ fountains, ponds, volcanoes, rain forests, and canals? Quite easily, actually. The biggest misconception about Las Vegas’ water use is that the hotels waste water, says Mulroy. “The entire Las Vegas Strip uses three percent of our water. And they are the economic driver in Nevada, bar none. It’s just that their water use is visible and looks wasteful.”

Mulroy pitched water conservation to casino owners and developers as a business issue. If they didn’t conserve, the city would run out of water. No water, no tourists. The transformation began with

the Mirage and Treasure Island casinos in the late 1980s. She remembers Steve Wynn saying, “Pat, I just have to have a water feature. I just have to. Don’t tell me I can’t do it. Just tell me how I can do it.” So she challenged him: “Are you willing to tap the contaminated groundwater supply and double plumb the hotels?” He was. Wynn spent the extra money required to build a state-of-the-art reverse osmosis wastewater treatment system in the parking structure beneath Treasure Island. The dual plumbing system captures water from the casinos’ sinks and showers. After treatment, it’s used for the pirate lagoon and volcano.

Wynn set the standard for innovative water use on the Strip. Since then, the other casinos have followed suit by recycling their water, using low-flow fixtures, and installing drip irrigation. In the city of fantasy, shower aerators create the illusion of abundant water pressure while reducing water use. Each aerator saves 6,000 gallons per year. Some water-saving practices probably escape the attention of most tourists. On-demand water heaters magically provide hot water the moment hotel guests turn on a faucet, rather than taking upward of a minute as gallons of water go down the drain. With reused water and recirculating pumps, the Strip’s water features cater to tourists’ demand for a surreal world. The tourists don’t seem to mind. “Everything that hits the sewer system is recycled,” Mulroy boasts, “unlike the situation in San Diego, which just dumps it into the ocean. We recycle 100 percent of our water.” The fountains at Bellagio use water from wells beneath the Bellagio footprint that previously irrigated a golf course. Quite remarkably, the 3,933-room Bellagio uses less water than the golf course did. The largest consumptive use of water is to run the resorts’ immense air-conditioning systems.

Innovative water use planned for CityCenter includes water features that will be sealed to reduce evaporation. Ten percent of CityCenter’s electricity will come from its own on-site heat and power cogeneration plant, which will capture the heat by-product of producing energy and reuse it to heat water, thus reducing the amount of water needed to produce electricity.

Despite these grand conservation successes, Pat Mulroy is not yet finished searching for other ways to “augment” her supply, a euphemism for water importation. Las Vegas footed the bill for the consulting firms CH₂M HILL and Black & Veatch to explore all viable options for securing more water. Their report, released in 2008, explored some “crazy” ideas, says Kay Brothers, Mulroy’s chief deputy, such as shipping water from Alaska and building a pipeline to get water from the Columbia River, on the border of Washington and Oregon.

But the one that most fascinates Mulroy involves importing Mississippi River water. When I spoke with her in her nicely appointed corner office at the Southern Nevada Water Authority, she became very animated about the future. Asking me to look forward twenty years and to think outside the box, she focused on the junction of the Mississippi and Ohio rivers. Each year, some 436,000 million acre-feet of water flow by. Just imagine, she told me, a pipeline that diverted 6 million acre-feet per year and transported it west through Missouri, Kansas, and Colorado, then south across New Mexico and onto the Navajo Nation, then west across Arizona and into Nevada, where it would augment Las Vegas’ supply. This proposal took my breath away.

In years past, such grandiose schemes have occasionally surfaced, usually dreamt up by wild-eyed government engineers, idly doodling designs while buried in obscure Washington, DC, offices. No one ever took them seriously. But Pat Mulroy is a major player, perhaps the most important figure in western water and an oft-rumored gubernatorial candidate. She gets things done. Mulroy argues that such a project could replenish the Ogallala Aquifer, help the Navajo Nation, reduce the flood threat to New Orleans, and, not coincidentally, provide water to Las Vegas. The day after our meeting, David Donnelly, an engineer for one of Las Vegas’ consulting firms, floated this idea at a conference about the Colorado River. He conceded that “the institutional issues are significant,” engineer-speak for a nightmare of environmental permitting, a political

bloodbath with the other states, sustained protests from environmentalists, daunting engineering challenges, and an initial price tag of \$11 billion. Among other obstacles is a physical one: the Rocky Mountains. The pipeline would need to move the water more than 6,000 feet in elevation—more than a mile straight up in the air—to get it over the Rockies.

As Las Vegas remakes itself again, it remains to be seen whether CityCenter paves the way for a new urban West that will grow up rather than out. Pat Mulroy sure hopes so. “I love high-rises,” she says. To Mulroy, their small footprint and minimal outdoor landscaping “are much more sustainable for southern Nevada.” Las Vegas is both attractive and repellent at the same time, even to the same people. Its rapacious, self-conscious ideology of growth, its love of all things glittery and banal, its boundless 24/7 energy, and its seductive allure ensure it will always have its boosters and detractors. For those of us watching from afar, it’s a sober lesson of a city that has run out of water yet charges ahead full of dreams for the future that would make Bugsy proud.

“WHEN THE WELL’S DRY, we know the worth of water,” observed Benjamin Franklin in 1774. But he was wrong. In the United States, we utterly fail to appreciate the value of water, even as we are running out. We Americans are spoiled. When we turn on the tap, out comes a limitless quantity of high-quality water for less money than we pay for our cell phone service or cable television. But as we’ll see, what is happening in Vegas is not staying in Vegas. It’s becoming a national epidemic.

Ignorance is bliss when it comes to water. In almost every state in the country, a landowner can drill a domestic well anywhere, anytime—no questions asked. Many states don’t even require permits for commercial wells unless the pumping will exceed 100,000 gallons a day (that’s 36 million gallons annually). For each well. We know so little about this pumping that the federal government cannot even estimate the total number of these wells across the country.

In many agricultural regions where the government does know the number of wells, such as California's Central Valley, it is still clueless as to how much water farmers pump out of those wells, because they're unmetered.

Water is a valuable, exhaustible resource, but as Las Vegas did until just a few years ago, we treat it as valueless and inexhaustible. Just as the energy crisis brought to the nation's consciousness an acute awareness of energy consumption, global warming, and carbon footprints, so too the impending national water crisis will inspire us to rethink how and why we use water.

My aim in this book is to explore the crisis and to stimulate that rethinking. Part of the problem is that water shortages in many parts of the country, lacking the exhibitionist tendencies of Las Vegas, are often hidden. This book will illustrate the true dimensions of the crisis and offer solutions to it. Alas, the dimensions are immense.

Water lubricates the American economy just as oil does. It is intimately linked to energy because it takes water to make energy, and it takes energy to divert, pump, move, and cleanse water. Water plays a critical role in virtually every segment of the economy, from heavy industry to food production, from making semiconductors to providing Internet service. A prosperous future depends on a secure and reliable water supply. And we don't have it. To be sure, water still flows from taps, but we're draining our reserves like gamblers at the craps table.

We tend to look at Las Vegas and think it's a unique case, perhaps a cautionary tale but barely relevant to where the rest of us live. But the truth is, when it comes to water, Vegas offers us a glimpse of our own future. The evidence is everywhere—though if it is noticed, it is forgotten with the next drenching rain. Consider the following events that have occurred since 2007:

- ♦ Colorado farmers watched their crops wither because of a lack of irrigation water.
- ♦ Atlanta, Georgia, came within three months of running out, so

- it banned watering lawns, washing cars, and filling swimming pools.
- Orme, Tennessee, did run out and was forced to truck water in from Alabama.
 - Scientists at the Scripps Institution of Oceanography predicted that Lake Mead, which supplies water to Los Angeles and Phoenix, could dry up by 2021.
 - Hundreds of workers lost their jobs at Bowater, a South Carolina paper company, because low river flows prevented the plant from discharging its wastewater.
 - Lack of adequate water prompted the Nuclear Regulatory Commission to rebuff Southern Nuclear Operating Company's request to build two new reactors in Georgia.
 - Water shortages caused California farmers to cut the tops off hundreds of healthy, mature avocado trees in a desperate attempt to keep them alive.
 - Lake Superior, the earth's largest freshwater body, was too shallow to float fully loaded cargo ships.
 - Decimated salmon runs prompted cancellation of the commercial fishing season off the coasts of California and Oregon.
 - A lack of adequate water led regulators in Idaho, Arizona, and Montana to deny permits for new coal-fired power plants.
 - In Riverside County, California, water shortages forced a water district to put on hold seven proposed commercial and residential developments.

To understand the depth of the water crisis, consider that more than thirty-five of the lower forty-eight states are fighting with their neighbors over water.

Our existing supplies are stretched to the limit, yet demographers expect the U.S. population to grow by 120 million by midcentury. Before the crisis becomes a catastrophe, we must embark in a fundamentally new direction. Business as usual just won't cut it. We have traditionally engineered our way out of water shortages by

building dams, diverting rivers, and drilling wells. But proposals for new dams engender immense political and environmental opposition, diversions have already dried up many rivers and reduced the flow in others to a trickle, and groundwater tables are plummeting around the United States. Meanwhile, the environment suffers as excessive water use causes springs, creeks, rivers, and wetlands to go dry, salt water to contaminate potable supplies, the ground to collapse, and sinkholes to appear. Even lakes are not immune. Dozens in Florida have already gone dry.

Are there alternatives to business as usual? Some dreamers offer grandiose plans that include seeding clouds and towing icebergs from Alaska, but these are not viable options. We can expand the supply by reusing municipal effluent and by desalinating ocean water, but neither of these choices is a panacea. On the demand side, we can encourage water conservation. In some water-wasteful regions, conservation has great potential; however, many water-stressed communities have already implemented ambitious conservation programs but need to reduce demand even more. The reality is that reusing, desalinating, and conserving water may help to alleviate our crisis but will not solve it. We must find other ways to free up water. Las Vegas has pioneered very expensive solutions, but they can succeed only by taking water from other places. Is this sustainable?

In his 2005 book *Collapse*, Pulitzer Prize-winning author Jared Diamond describes how flourishing societies have precipitously collapsed. Examining spatially and temporally diverse cultures, such as those of Easter Island in the South Pacific, Norse settlements in Scandinavia, and the Anasazi in North America, Diamond finds a disturbing pattern, one that resembles contemporary conditions in the United States. As these societies grew and flourished, they mismanaged natural resources, eventually stretching the resources' carrying capacity to the breaking point. Still, the societies continued on in their customary practices, assuming that what they were familiar with was the norm. Then something happened—environmental damage, climate change, hostile neighbors, loss of trading partners,

or the culture's own response to its environmental problems—to change the familiar, but it was too late for the society to correct course and avert a catastrophe. With the Anasazi, a growing population depended on ever-increasing use of water and firewood. When a sustained drought hit in the twelfth century and lasted more than fifty years, the society collapsed.

We, however, still control our destiny. The United States is entering an era of water reallocation, when water for new uses will come from existing users who have incentives to use less. Sounds good, but how will this happen? One possible approach is for the government to target wasteful practices by simply prohibiting current water users from using so much. However, heavy-handed government mandates would generate bitter political controversy and endless litigation. What we can do, yet haven't done, in the United States is encourage water conservation by using price signals and market forces. Pricing water appropriately would stimulate all users to reexamine their uses and decide for themselves, on the basis of their own pocketbooks, which uses to curtail and which to continue. The government should encourage a voluntary reallocation of water between current and new users. The alternative is to fight over the water. Which do we prefer?

Water nourishes our bodies and our souls. Our lives are impoverished without the sight, sound, smell, and touch of bubbling brooks, cascading waterfalls, and quiet ponds. The terrifying future depicted in science fiction doomsday novels conspicuously features barren landscapes. Our future needn't be so bleak. Our water crisis should occasion grave concern but not panic. We have solutions available; now we need a national commitment to pursue them.