

## THE SOUTHWEST: GROUND-ZERO FOR GLOBAL WARMING

### An NPG Forum Paper

By Kathleene Parker

Experts warn that the American Southwest will be the part of the nation hit first, worst and hardest by global warming. But the desert Southwest—what author Wallace Stegner called “the dry core of the West”—could face a civilization-breaking water crisis even without global warming. There is insufficient water for the current population, much less a population that might well double by mid-century or shortly thereafter, if recent trends hold.

There is no acknowledgement or discussion of population—regionally or nationally—even though the Southwest is the fastest growing area of this the world’s third most populated nation, behind only China and India.<sup>1</sup> Half of all growth globally in recent years occurred in just eight nations: India, Pakistan, Nigeria, China, *the United States*, Bangladesh, Ethiopia and the Democratic Republic of Congo, in that order.<sup>2</sup> We are by many definitions a population supergiant, yet refuse to openly acknowledge that fact or its carrying-capacity implications.

While growth has slowed to .9 percent with the recession<sup>3</sup>, the nation until recently grew by 1.1 percent a year, wrongly touted as a low growth rate but representing population doubling times of 65 years or less. (The .9 percent rate represents doublings of about 71 years.) Immigration (immigrants and births to recent immigrants) fueled 82 percent of growth between 2000 and 2010 and could add another 100 million people in 50 years unless immigration—legal and illegal—is quickly returned to lower norms.<sup>4</sup>

The Southwest, post-1900, changed from one of the most sparsely populated regions in the world to one holding over 45 million people and the nation’s second largest city (Los Angeles).

Post 1950, the region saw growth at between 2 percent and 3 percent a year—rates more typical of population-crisis spots in Africa—and representing population doubling times of only 35-to-23) years.<sup>5</sup>

The United States—with a population of a mere 100 million in 1915, 200 million in 1967—reached a hallmark 300 million in 2006, but just six years later we approach 314 million, with 438 million likely by 2050.<sup>6</sup> Even if the Southwest receives only one-third of that 138 million increase over 2006 numbers, it would double its current population.

In the Southwest, warnings about water shortages are ignored by leaders and boom-booster, increasingly indistinguishable from one another. This spring, for example, the groundbreaking on a 37,000-home development in drought-seared Albuquerque was greeted with no discussion about a worsening drought.

Most of the roughly 45 million people living in the Southwest—up from a mere 3 million in 1900—have no understanding of the vast network of reservoirs and trans-basin diversions on the Colorado River that provide their water. (For the purposes of this paper, the Southwest is defined as those areas, including Wyoming, served by the

Colorado River.) There are 17 diversions in the state of Colorado alone, most diverting Colorado River water, originally bound for the Pacific Ocean, under the Continental Divide, to instead flow into the Atlantic watershed to cities along Colorado's Front Range. Other originally Pacific-bound Colorado River water is diverted to flow into Albuquerque on the Atlantic watershed. Most other diversions remain within the Colorado River Basin, but take waters originally bound for the Sea of Cortez and Pacific into Los Angeles, San Diego, Phoenix, Tucson, Las Vegas, and hundreds of communities between.

The region's economy centers on construction and real estate, making growth a sacred cow. The assumption is that the explosive growth of the last century that turned dusty cow towns into megacities can continue. (For example, Las Vegas, a mere 2,000 people living around a desert spring in 1920, is 2 million people today; Los Angeles, 102,000 in 1900, is now 18 million.) Such thinking is shockingly similar to bankers' assumptions, pre-2008, that real estate could only grow in value.

### **ONLY ONE SIDE OF THE COIN**

Water in the Southwest is only viewed from the perspective of "supply side," or finding more water for growth. What this writer views as "demand side," or how many people demand the resource or matching growth to provable water supplies, is simply never acknowledged or considered.

The only possible "solution" seems to be to somehow find "more" water by diverting existing supplies from old uses to fuel more growth (robbing Peter to pay Paul) via:

- More diversions from an already over-taxed Colorado River.
- "Techno-fixes" such as briny-aquifer or sea water desalting. Ignored are looming "peak energy," rising energy-costs, and that as reservoirs shrink, hydroelectric production—such as the 10,000 gigawatts generated at Lake Mead and Lake Powell—is threatened.
- Water reuse, or "toilet to tap," through which

citizens drink their own processed sewage.

- Taking agriculture out of production (as we increasingly compete against developing nations for food), not to reduce water shortages, but to "grow" larger cities.
- Conservation, again, not to solve anything, but to require each household to use less so that the freed-up water can fuel more growth.
- Or, grandiose schemes, such as one to possibly divert 650,000 acre-feet of the Mississippi River, 775 miles under the Continental Divide into the upper Colorado River drainage area in northwestern New Mexico.<sup>7</sup>

"Demand side," for the purposes of this paper, population growth and the rapidly increasing numbers of people demanding the resource, is ignored, a point increasingly criticized by highly credible voices—the Scripps Institute of Oceanography<sup>8</sup>, the National Academy of Sciences<sup>9</sup>, the University of Colorado's Western Water Assessment<sup>10</sup>, the Pacific Institute<sup>11</sup>, and no few weather-wise cowboys and farmers.

### **WATER FLOWS UPHILL**

The Colorado River and its tributaries are no longer rivers but an elaborate plumbing system to provide water for cities and power generation, the basis for the regional adage that "water flows uphill towards money."

Critical is that in average precipitation years more water is used from reservoirs—the equivalent of water banking accounts—than flows into them. The system has worked, until now, because wet years were adequate to replenish reservoirs against dry years. But post-1995, wet years grew infrequent, and with higher demand (a factor of population, not just per-person consumption), the quicker reservoirs draw down and the slower they recharge, especially in drought.

Population, in turn, is linked not just to migrations to the Sunbelt, but to national population dynamics and population policies, or lack thereof. The nation welcomes unfettered immigration absent any consideration of carrying

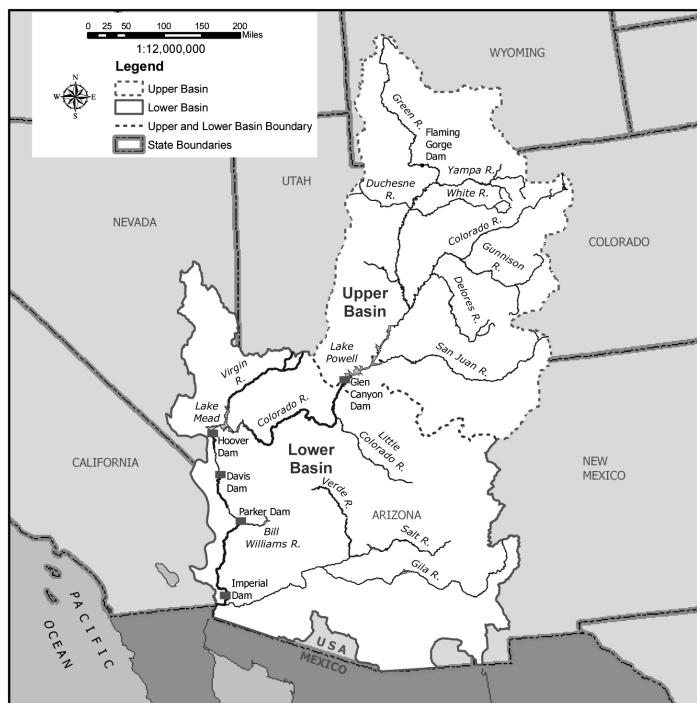
capacity, even though:

- In 1972, the bi-partisan Presidential Commission on Population Growth and the American Future warned that as we reached 300 million (as happened in 2006), among other challenges, resources would be stretched. They recommended a policy to guide decisions (like immigration) affecting population.<sup>12</sup>
- In the 1990s, President Clinton’s Council on Sustainable Development, as it voiced concerns about a likely U.S. population of 350 million by 2030, advised that immigration be reduced sufficiently for population stabilization.<sup>13</sup>

Instead, immigration has hovered near 1.2 million a year, with one-third to one-quarter of those initially coming here illegally. That 1.2 million a year is roughly five times historical norms. We welcome more legal immigrants annually than all other nations in the world combined, absent consideration of carrying capacity or other consequences.

According to an April 2012 Department of Homeland Security report, 1,062,040 immigrants were admitted to legal residency in 2011.<sup>14</sup> The number from all sources needed to stabilize U.S. population would be no more than 200,000 a year.<sup>15</sup> Illegal immigration which, despite decreases associated with the economic slowdown and efforts against illegal border crossings in states like Arizona, is likely not declining significantly, an argument bolstered by data showing no decline in resident legal population.<sup>16</sup>

Our fertility rate, now at 1.9—down from 2.1— is below replacement level, but while women are having fewer children, more women than ever are having children, especially first-generation immigrants. Ours remains one of the highest birth rates in the developed world and births still exceed deaths by roughly two million a year. For perspective, 2007 births exceeded those at the 1957 peak of the baby boom.<sup>17</sup> And, almost universally ignored by the press as it ballyhoos a “falling growth rate” is that growth rate is not just births, but births and immigration. Fifty percent



Source: U.S. Department of the Interior, Bureau of Reclamation of all growth in the Southwest and effectively all growth in California was fueled by immigration in recent years.<sup>18</sup>

## PAPER WATER VERSUS REAL WATER

Regional leaders depict—through hubris, ignorance or deliberate deception—that because their states “have rights on the Colorado” the water actually exists at levels long known to be wrong. This speaks volumes as to the negligence of the federal government in not correcting, decades ago, a recognized water-allocation error.

The Southwest—and Atlantic watershed cities like Denver and Albuquerque—is mostly dependent on the Colorado River and its tributaries and on aquifers, which are universally being drawn down faster than they can recharge. (Depression-era humorist Will Rogers quipped that the other “big” river, the Rio Grande, which provides water to New Mexico and Texas, was the only river he’d ever seen that looked like it needed to be irrigated.)

In 1922, the Colorado River was allocated, or divided up, under the federal Colorado River Compact. It was believed that most years the Colorado would carry 16.4 million acre-feet (m.a.f.) of water. The Upper Basin states (Colorado, Wyoming, Utah, New Mexico) were

allocated 7.5 m.a.f.; the Lower Basin states (California, Nevada, Arizona) were allocated 7.5 m.a.f., with the remainder to go to Mexico.

But the 16.4 m.a.f. was based on one of the wettest years in 400 years. The river was over-allocated by 1.3 m.a.f. because norms on the river were closer to 15.1 m.a.f. But more recent tree-ring studies show an even grimmer picture, or that flows will likely be only about 13.5 m.a.f., and that only outside of drought. The lower amount did not matter in 1950 when the population was only 14 million; it matters profoundly in a Southwest of roughly 45 million people. It matters even more in a region facing continued high growth rates and a return to the drier norms or perhaps global warming.

Drought hit the Southwest in the mid-1990s and worsened post-2000. Between 2000 and 2005, the Colorado averaged only 9.6 m.a.f., while 2001 to 2003 saw flows of a paltry 5.4 m.a.f. Reservoir levels plummeted, including at core Colorado River system reservoirs, Lake Mead, near Las Vegas, Nevada, and Lake Powell, sprawling amid desert bluffs of Arizona and Utah. The region watched aghast as a “fifty-year water supply” in storage disappeared in just 3 years.<sup>19</sup>

### **BUT IS THIS DROUGHT?**

The Southwest was hit hard by the 1930s and 1950s droughts, but with the region’s still small population, reservoirs easily met demand. (Lake Powell did not yet exist until the 1960s.)

But modern droughts pale next to historical droughts. The prolonged droughts of the 12th and 13<sup>th</sup> centuries—that likely wiped out ancient prehistoric Native American towns at Colorado’s Mesa Verde and Montezuma Valley; in central Arizona at Phoenix; at New Mexico’s Chaco Canyon and Aztec, and throughout the Southwest—triggered starvation, warfare and wholesale migrations. The 12<sup>th</sup> century drought lasted 60 years.<sup>20</sup> (Phoenix was named by 19<sup>th</sup>-century settlers who realized they were building on the ruins of the abandoned Hohokum cities, with their evidence of massive starvation and, incidentally,

once-impressive water-diversions into the Salt River Valley.) In the 1500s, another 40-year “mega” drought seared much of the nation, but the Southwest in particular.

In contrast, two centuries, 1800 to 2000, were much wetter than average for the region. Critically, 1976 to 2000—just as boom growth hit its stride—was the wettest quarter century in 2,000 years, perhaps creating a false perception of the region’s water reality.<sup>21</sup> And, as of this writing, huge fires burn in northern Colorado, and much of Colorado Springs is in flames from a new generation of wildfire, this one causing fatalities, through highly populated areas.

But then came the “Early 21<sup>st</sup> Century Drought,” especially in 2002, 2003, 2007, 2009 and 2011. The worst was the winter of 2001-2002 when snow essentially did not fall in the mountains of Colorado, Wyoming and Utah. Reservoir levels plummeted throughout the region and wildfires of apocalyptic size and intensity—partly drought, partly from a century of timber mismanagement—exploded in Arizona, New Mexico and Colorado. Hot, windy, surrealistic 2011 saw a half-million-acre fire blacken parts of Arizona and New Mexico, and a “super fire” of 156,600 acres burned near Los Alamos, New Mexico. The largest fire in New Mexico history, approaching 300,000 acres, is burning as of this writing. (Fires of 15,000 acres used to break regional records.) In 2012, a wildfire near Denver—in March, when snow should have been on the ground—killed three.

Scientists call this drought “the most extreme in over a century,” comparing only to the 1930s drought. Due to its exceptionally high temperatures, it might be “the most severe in history.” Undetermined is whether that is from global warming or natural climate variability.<sup>22</sup>

### **WHEN WILL LAKE MEAD RUN DRY?**

In 2008, the Scripps Institute of Oceanography, in a report bleakly named, “When Will Lake Mead Go Dry?,” warned that there is a 50-50 chance the reservoir—the largest in the nation and key

to water management for Lower Basin states Arizona, Nevada and California—could run dry in the 2020 decade. Key is that the projection was based not on drought, but on 15 m.a.f., or flows typical of 1960-to-1995, the wettest period in history. The critical variable was population.<sup>23</sup> Another study showed water usage increasing basically in lockstep with population.<sup>24</sup>

Scripps scientists determined in still another study that, with climate change, the Colorado might not be able to meet its Compact allocations 60 to 90 percent of the time by 2050 and could experience a 10- to 20-percent reduction in runoff.<sup>25</sup> The U.S. Bureau of Reclamation, the agency managing the river, set out to dispute the study, but came up with only somewhat less dire numbers, projecting the river will run short between 58 percent and 73 percent of the time by 2050.<sup>26</sup> And, after long scoffing at the possibility, it conceded that Lake Powell—just upstream from Lake Mead, the nation’s second largest reservoir and key to water management for the Upper Basin states—will never again reach the full mark after dramatic drawdowns post-2000. The Bureau pinpointed two reasons: new drought-management practices and the region’s rising population.<sup>27</sup>

Another study warns that “... a near perpetual state of drought will materialize in the coming decades as a consequence of increasing (global-warming) temperature, which mean(s) that the drought conditions of 2000-2003 could be a Southwest norm...” It added, that likely warming of 2.8 degrees C. (Critically, mostly in Colorado, a primary source of Colorado River snowpack), could mean “drought severity rarely seen in the 20<sup>th</sup> century.” It found that between 2036-to-2060, Colorado River flows could decline to an average of only 7 m.a.f., or severe drought year 2002 as a norm. It projected “a 25-percent decline in streamflow during 2006-2030, and a 45-percent decline 2035-2060,” or a drop of nearly half even as the region’s population might double.<sup>28</sup>

In November 2010, Lake Mead hovered just 7 feet above elevation 1075, the level that will

trigger the first-ever federal water emergency. That would trigger rationing throughout the Southwest and perhaps cuts in delivery to Arizona. Arizona accepted that vulnerability to get Central Arizona Project water, perhaps, like many pre-2000, believing severe shortages would never happen on the Colorado. A wet winter averted the 2010 emergency, but in this the 3<sup>rd</sup> driest year since 1965, reservoir levels in May 2012 were at 1122 and falling at a time of year when they should be rising with spring runoff.

Las Vegas scrambles—an existing intake could be useless by 2013—to complete a near-lake-bottom intake by 2014 (Cost: \$837 million) to allow it to draw water to the last bitter drop. The city, dependent on Lake Mead for 90 percent of its water, is eyeing a highly controversial diversion—seen by many as a threat to Utah aquifers—to import groundwater from northern Nevada.

## **TWICE THE PEOPLE, HALF THE WATER**

Well-known Western author William deBuys recently wrote, “If you live in the Southwest... you and your children and grandchildren could soon enough be facing the Age of Thirst, which may also prove to be the greatest water crisis in the history of civilization.”<sup>29</sup>

That is a perhaps not unrealistic summation considering that scientific evidence indicates that the Southwest faces the possibility of a future of half the water for perhaps twice the population.

Wall Street and other growth advocates—the people who brought us the banking crisis—wring their hands in despair over a recent miniscule decrease in national fertility rate, even as they ignore critical carrying capacity issues that could have catastrophic economic and other consequences. (Consider the economic peril to the nation of a water catastrophe in the Southwest.) Had we listened to the Rockefeller Commission and kept immigration low, we would be nearing population stabilization. Instead, we add 30 million a decade and face a population of 438 million by 2050.

The crisis on the Colorado River is just one of many imperatives speaking to the need to allow demographic and carrying capacity issues into the immigration debate. However, even if we significantly reduce legal and illegal immigration and continue a low birth rate, growth will take decades to stop—unless Nature intervenes catastrophically, as it well might in the desert Southwest.

It is a fool's errand to believe that enough "new" water will be created, particularly considering that dual problems of water and energy shortages and that water "production" is energy intensive. Nor should we gamble the region's future on the

assumption that controversial, environmentally harmful, energy-intensive and, likely, politically unacceptable diversions from distant drainages will happen.

Studies predicting future events are fallible, but the current water crisis in the Southwest is not a prediction, it is reality. That in turns inspires another defining quote, by a key researcher at the Scripps Institute of Oceanography.

"I heard somebody say that they were going to double the population of the State of California by 2050," said Tom Barnett, PhD. "I don't know what they're going to drink, but it's not going to be water."<sup>30</sup>



## NOTES

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