

**Nevada's Political Leadership  
Should Support Strong Policies  
To Prevent Further Climate Change**

**Global warming is likely to put a brake on Nevada's population and economic expansion by exacerbating the state's already critical water shortages and without continuing population growth, the state's economy will stagnate and probably decline. To prevent even more extensive and rapid climate change, Nevada's leaders and voters should support state, regional, national and international policies to reduce emissions of greenhouse gases. Such policies will not only help prevent serious damages but will also promote development of Nevada's abundant renewable energy resources.**

According to a nation-wide Gallup poll on economic confidence in August 2011, only in 5 states out of 50 are people more pessimistic about economic conditions and prospects than are the people of Nevada<sup>1</sup>. There is good reason for this pessimism. The real estate and financial collapse that began in 2007 hit the state harder than almost anywhere else and the state is among the slowest to recover. In mid-2011 Nevada remained the last state to escape the recession.

The main reason is that Nevada's prosperity has been built on continuing population growth, which for decades has been the fastest in the nation. Construction and real estate activities, which directly accounted for 20 percent of state employment and 25 percent of Nevada's GDP even in the recession year of 2009, also fosters a wide range of ancillary businesses in manufacturing, legal and financial services, wholesale and retail trade, among others. Without continuing population growth all this business activity will be curtailed with serious repercussions for Nevada's economy.

The population boom of the previous decades may never resume because the water to support it will not be available. Even without considering climate change, southern Nevada faces an increasingly desperate water scarcity that makes past trends unsustainable.<sup>2</sup> The state faces a worsening water deficit. Local groundwater resources were long ago depleted and water use in 2010 of 520,000 acre feet per year in the supply area of the Southern Nevada Water Authority greatly exceeded

the entire state's guaranteed Colorado River allocation of 300,000. Yet, the SNWA authority projects that despite strong conservation measures, demand in its domain will rise by 30% to 739,000 acre feet per year in 2035 and to 860,000 in 2060.

In order to help meet these shortfalls, the SNWA has already had to announce that it will no longer automatically commit water to serve proposed future real estate developments. It has also had to consider highly costly and controversial measures to tap additional supplies, including a) a desalinization plant in Mexico, b) a pipeline to divert water from as far away as the Mississippi and c) a groundwater development project drawing 200,000 acre feet per year from upstate Nevada, enough to supply an additional 100,000 households. This option would have a capital cost exceeding \$15 billion<sup>3</sup> and devastating environmental impacts on a large area within the state.

Such projects would produce additional supplies only at drastically higher costs. Whether these measures are feasible at all is highly uncertain. The groundwater development project requires permits from many state and federal agencies and is already challenged in the courts because of its potential impacts on existing groundwater and surface water rights and on biological resources under federal stewardship. The draft environmental impact statement released by the Bureau of Land Management in June 2011 finds that the SNWA's proposed pumping would draw down the water table over a large area, by 10, 20, 50 and, in some areas, more than one or two hundred feet. The impacts on springs, streams, riparian areas, and associated plant and animal communities would be extensive and severe, including impacts on many protected species. There would be land subsidence in some areas and the loss of vegetation would promote dust storms. These environmental effects would persist and increase throughout the 21<sup>st</sup> century. This proposed diversion pits the growing urban area of Las Vegas against the traditional agricultural, ranching and natural areas in the rest of the state.

Moreover, the BLM's draft Environment Impact Statement analyzing the right of way for this groundwater extraction project does not take into account climate change during the 50 year development period of the proposed project.<sup>4</sup> Climate change will increase the impacts and may make proposed extraction rates infeasible. A parallel study by the Bureau of Reclamation, also released in June 2011, projects that in the Lower Colorado River Basin there will be significant

increases in temperature and decreases in precipitation, soil moisture and evapotranspiration, which will be limited by available moisture. In other words, the region will suffer significant further drying. Runoff from the mountains in the north is expected to be more concentrated in the winter and early spring because of earlier loss of snowpack, with adverse implications for infiltration and groundwater recharge. Half the global climate models considered by the Bureau predict lower overall precipitation in the Basin as a whole.<sup>5</sup> Climate change may make the proposed extraction rates infeasible and will certainly make the impacts more severe. This supply option is risky. The SNWA proposes to deal with the risks through “adaptive management”, which amounts to building the multi-billion dollar infrastructure and beginning to pump and then seeing what happens.

In addition, flows through the Colorado River system are projected to diminish because of global warming. According to the Bureau of Reclamation Study, mean annual flows at Lees Ferry for the 50-year period of the Study (2011-2060) are projected to be approximately 13.6 million acre feet. This represents a reduction in stream flow of approximately 7 percent compared to the period 1950-1999 (14.6 million acre feet), or approximately 9 percent when compared to the long-term period 1906-2007 (15.0 million acre feet). There are similar results for Green River at Green River, Utah; Colorado River at Cisco; San Juan near Bluff; and Colorado River above Imperial Dam. At each of these locations, flows are projected to decrease. These reductions would make Nevada’s allocation of 300,000 acre feet per year and any water rights it acquires in Arizona and Utah less secure and would also exacerbate tensions among parties to the Colorado River Compact, which was predicated on long-term stream flows exceeding 15 million acre feet per year.

These shortfalls also increase the risks of drought. The prolonged severe drought of the past decade nearly necessitated cuts in water released from the huge reservoirs at Lake Mead and Lake Powell, and precipitated the water authorities’ decision to commit approximately \$800 million to construct a third intake at a lower level into Lake Mead. According to some experts, with continuing climate change there would be a high probability of a drought in this century that will be more severe and prolonged than any in the historical record.<sup>6</sup> Even though Nevada and other Lower Basin states have senior water rights in the river, they are at risk from severe droughts. Hydrologic simulations imply that there is sufficient storage in the system to withstand droughts comparable to those on record but climate change

drastically increases the risks of more extreme droughts with severe consequences. One attention-getting study estimated that with continued growth in water demands and global warming's effects on runoff into the Colorado River system, there would be a 10 percent chance that live storage in Lake Mead would be exhausted by 2013 and a 50 percent chance in 2021.<sup>7</sup> A reworking of that study using somewhat different assumptions merely pushed those dates back by one or two decades, leaving the main conclusion unaffected that climate change significantly exacerbates drought risks, including the loss of hydroelectric power capacity at those dams.

A related study of climate change risks by researchers at the Sandia National Laboratory found a very high probability of supply shortfalls in coming decades. Even without considering the direct implications for continued population growth, Sandia scientists concluded that Nevada was one of the states most at risk for economic and employment losses.<sup>8</sup> Their study found economic damages to water-intensive sectors --agriculture, mining, power generation and utilities -- from higher water costs, though they assumed future water acquisition costs are much lower than those that the SNWA must already pay and their study ignored any possibility of actual supply shortfalls. Such shortfalls might be obstacles, for example, to the three new coal-fired power plants now being planned in eastern Nevada. This study reinforces the conclusion that Nevada is a state at great risk from global warming.

Nevada's main industry is casino gambling. Even though Nevada resorts only account for about 16 percent of the state's employment base, the industry is by far the state's largest taxpayer, supporting almost half of the state's general revenues. Consequently, Nevada residents and other businesses do not have to pay a state personal or corporate income tax. Casino gambling also attracts many tourists and other visitors to the state and has significant spillover effects to the rest of the state economy. Las Vegas is the nation's number one destination for business conventions and trade shows, which co-exist with casino gambling. Casinos derive only about half their revenues from the gaming tables, the rest coming from room rents, drinking, eating and entertainment.

Casino gambling is not particularly sensitive to climate change, because gambling takes place in a carefully controlled indoor environment and the industry has high

enough margins to bear significantly higher water costs. Neither is it immune, however. Nevada casinos face competition from other online and actual gambling sites. Casino resorts are also sensitive to economic downturns and would feel the effects of a slowdown in the state's or region's economy. Efforts to promote the Nevada casino resort "experience" can be compromised by more frequent heat waves and deteriorating air quality. The city's attractiveness as a business and tourist destination will also be impaired by more unpleasant and unhealthy weather. Las Vegas is already suffering a worsening heat island effect, since the area of concrete has doubled since the 1980s and city's tree canopy is only 9 percent. Temperatures downtown average 4-6 degrees Fahrenheit higher than in the surrounding countryside, which is also short of vegetation, and minimal temperatures have been rising for decades as heat trapped in concrete during the day is re-radiated back into the air at night.

Las Vegas's 45 golf courses, which are used by one-third of all visitors, will also suffer. Golfing in Nevada generates more than a billion dollars in annual revenues and employs more than 4,000 people. Fewer rounds are played when the turf has browned and withered and the weather is unpleasantly hot. Membership is discouraged and golf course real estate developments are affected. One example is the massive new Coyote Springs golf and real estate development project, encompassing several golf courses and artificial lakes and hundreds of residences, which would have to draw 80,000 acre feet per year from groundwater underlying rural Nevada, using the same pipeline that the SNWA is seeking to construct. Its current pumping within the Springs valley is already controversial because of its impact on threatened freshwater fish.

Other tourist attractions are also climate-sensitive. Lower water levels in Lake Mead significantly reduced recreational visitors, especially boaters, as marinas and docks were left high and dry. Drought and heat waves also depress visits to the national parks and recreation areas. Controlling for other influences, drought reduces visits to national parks by 7 percent.<sup>9</sup> Higher temperatures will also depress trout populations and increase forest mortality from bark beetles and fires.

Global warming will worsen some of Nevada's other environmental problems as well. Only in March 2011 was the Las Vegas region ruled to be in compliance with the 1997 national ozone air quality standard. Higher summer temperatures are

likely to push the region back into non-compliance, especially when the considerably tighter ozone standards are promulgated. This will require the state to impose further restrictions on power plants and other fossil fuel burners as well as on vehicular traffic. Nevada also has a problem with emissions of particulates that reduce visibility in national parks and other protected areas in the region. Small particles from wildfires and desert dust will exacerbate the problem as the region dries out, requiring further controls by the state on power plants and other emitting sources.

Health care costs and people's health will be affected. Asthma attacks and allergies will be exacerbated by higher air pollution levels, including ozone, particulates from dust and wildfires, and higher pollen counts that start earlier in the spring. Since about 20 percent of Nevada's population now is without health insurance, many of those affected, disproportionately from Hispanic or low-income households, will seek medical care in hospital emergency rooms. Higher ozone and particulate levels are reliably linked to increases mortality and morbidity. Among the elderly, stroke and heart attack increase with rising heat.<sup>10</sup> People with chronic heart or lung diseases are twice as likely to suffer heat stroke during a heat wave. Deaths from cardiovascular disease or stroke account for almost a third of Nevada's total mortality. In the past decade a 6 percent increase in heat-related mortality was observed for each 1 degree F rise in the heat index and mortality also rose with the duration of the heat wave.<sup>11</sup> Unless global warming is brought under control, Nevada's health care costs will rise more rapidly and her people will suffer.

A strong national climate policy that rapidly stabilizes atmospheric greenhouse gas concentrations will enable Nevada to avoid the worst of these increasing impacts. It will also allow Nevada to benefit greatly from its abundant endowment of geothermal, solar and wind resources. At present, 85 percent of the state's electricity is generated from coal or gas. There is a Renewable Portfolio Standard in place that mandates a 25 percent share for renewables by 2025, including 6 percent from solar power, but the potential is much greater than this. Already there is installed capacity of about 500 MW of geothermal power and the potential for further expansion is at least five times that amount in geothermal resources spread across 60 percent of the land area.<sup>12</sup> Moreover, among all the states Nevada is second only to neighboring Arizona in solar potential and there are also abundant

wind resources. Nevada could both meet its future needs with renewable energy and export clean power to neighboring California.

Regional and national cap-and-trade policies that establish a “price on carbon” and carve out a growing space in electricity markets for renewable power would make Nevada’s existing installations more profitable and secure and would raise the return on future investments in geothermal, solar and wind projects. Such policies would neutralize the cost advantage that fossil fuels now enjoy because of their unpenalized environmental impacts. The resulting surge in clean energy would be a strong boost to Nevada’s rural economies, not least to its Native American communities that now suffer high rates of poverty and unemployment.

The state’s political leadership and electoral candidates should carefully consider their positions on climate policy. Opposition to strong regional, national and international policies to stop global warming is not in the interest of their people’s wellbeing or their state’s prosperity. Business associations in tourism, resorts, real estate, agriculture, industry, utilities and health services should make their interests in climate stabilization known to candidates and office-holders, in cooperation with public interest groups. Nevada’s voters should require that their representatives support actions to ward off increasingly threatening risks from global warming.

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<sup>1</sup> New York Times, August 28, 2011.

<sup>2</sup> Roy, Sujoy B. et al., Evaluating the Sustainability of Projected Water Demands Under Future Climate Change Scenarios, Tetra Tech, Inc. , Lafayette, CA, July 2010.

<sup>3</sup> Great Basin Water Network, September 1, 2011: accessed at [http://www.greatbasinwater.net/news/news\\_display.php?id=555](http://www.greatbasinwater.net/news/news_display.php?id=555)

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<sup>4</sup> US Bureau of Land Management, "Clark, Lincoln and White Pine Counties Groundwater Development Project Draft Environmental Impact Statement, Nevada Office, June 10,2011.

<sup>5</sup> US, Bureau of Reclamation, Colorado River Basin Water Demand and Supply Study: Technical Report B: Water Supply Assessment; Interim Report No. 1, Washington DC, June, 2011.

<sup>6</sup> Cayan, Daniel et al., 2010, "Future Dryness in the Southwestern United States and the Hydrology of the Early 20<sup>th</sup> Century", Proceedings of the National Academy of Sciences, Vol 107:21271-21276.

<sup>7</sup> Barnett, T.P. & D.W. Pierce, 2008, "When Will Lake Mead Go Dry?", Water Resources Research, Vol. 44.

<sup>8</sup> Backus, George et al., Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies Among the US States, Sandia National Laboratory, Albuquerque, NM, April 2010,

<sup>9</sup> Owen, Gigi, 2008, Tourism and Recreation, Southwest Climate Change Network, accessed at <http://www.southwestclimatchange.org/impacts/people/tourism-and-recreation>.

<sup>10</sup> Glua, Alessandra, M. Abbas, N. Murgia, &F. Corea, 2010, "Climate and Stroke: A Controversial Association", International Journal of Biometeorology, Vol54(1-3)

<sup>11</sup> Yip, Fuyuen et al., 2008, "The Impact of Excess Heat Events in Maricopa County, Arizona: 2000-2005", International Journal of Biometeorology, Vol 52(8)

<sup>12</sup> National Renewable Energy Lab, accessed at <http://www.nrel.gov/docs/fy02osti/29214.pdf>