

ECONOMIC AND ENVIRONMENTAL IMPACTS OF CLIMATE CHANGE IN NEVADA

by ROBERT REPETTO, PhD

Climate change will cause shifts in temperature and weather patterns that will significantly impact Nevada's tourist industry and further stress its critical water supplies. 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 also promote development of Nevada's abundant renewable energy resources.

According to a nation-wide Gallup poll on economic confidence in August 2011, Nevadans rank sixth most pessimistic about economic conditions in their state and with good reason.¹ The real estate and financial collapse that began in 2007 hit the state particularly hard and Nevada has been among the slowest to recover. By mid-2011, it remained the last state to escape the recession.

The sluggish economic recovery will soon face another challenge. A changing climate will impact the state's economic engines, particularly the tourist industry, through disruptions in water supply and increases in temperatures. Without swift and bold action to mitigate climate change, Nevada will grow more and more vulnerable to potentially severe economic impacts.

CLIMATE CHANGE'S IMPACT ON NEVADA'S WATER SUPPLY

Currently, southern Nevada faces an increasingly dire scarcity of water supplies that render past trends of use unsustainable.² Local groundwater resources were long ago depleted and the water use in 2010, 520,000 acre feet per year, in the supply area of the Southern Nevada Water Authority (SNWA) greatly exceeded the entire state's guaranteed Colorado River allocation of 300,000. The SNWA projects that, despite current strong conservation measures, demand in its domain will rise by 30 percent to 739,000 acre feet per year in 2035 and to 860,000 in 2060.³

The consequences of the water shortage are significant. The SNWA has already announced that it will no longer automatically commit water to serve proposed future real estate developments. It also considered 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 billion⁴ and devastating environmental impacts on a large area within the state.

Such projects would produce additional water supplies only at drastically higher costs, not to mention doubts and uncertainty regarding feasibility. The groundwater development project requires permits from many state and federal agencies and is already being 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 found that the SNWA's proposed pumping would draw down the water table over a large area.⁵ The impacts on springs, streams, riparian areas, and associated plant and animal communities, including protected species, would be extensive and severe. 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 21st 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 only nominally takes climate change into account during the 50 year development period of the proposed project.⁶ Climate change will increase the impacts of the project 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.⁷

The region will continue to suffer significant 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 of Reclamation predict lower overall precipitation in the River Basin as a whole.⁸ The uncertainty of precipitation and water supply make this option risky. The SNWA proposes to deal with the risks through "adaptive management," a handy euphemism meaning that they plan to build the multi-billion dollar infrastructure and begin to pump water and then see what happens.

Compounding River Basin precipitation concerns, flows through the Colorado River system are projected to diminish because of climate change. 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.⁹ This represents a reduction in stream flow of approximately seven percent compared to the period 1950-1999 (14.6 million acre feet), or approximately nine percent when compared to the long-term period 1906-2007 (15.0 million acre feet).

There are similar results for neighboring rivers and streams. 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 risk 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.¹⁰ According to some experts, continuing climate change would ensure high probability of a drought in this century that will be more severe and prolonged than any in the historical record.¹¹ One study estimated that with continued growth in water demand and climate change'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 2021.¹²

A related study of climate change risks by researchers at the Sandia National Laboratory found a very high probability of water 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.¹³ Their study found significant economic damages to water-intensive sectors -- agriculture, mining, power generation and utilities -- from higher water costs. This finding came despite an assumption that their future water acquisition costs would be much lower than those that the SNWA must already pay and 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 climate change.

CLIMATE CHANGE'S IMPACT ON TOURISM IN NEVADA

Much of Nevada's tourist income comes from attractions that will be vulnerable to climate impacts. For instance, Las Vegas's 45 golf courses, which are used by one-third of all visitors, could see a sharp decline in golfers due to rising temperatures and decreased water supplies. Golfing in Nevada generates more than a billion dollars in annual revenues and employs more than 4,000 people.¹⁴ Fewer rounds of golf could be played due to the unpleasantness of the heat and turf that has browned. The decline in quality of experience could

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lead to decreased membership and golf course real estate developments will be affected. For example, the massive new Coyote Springs golf and real estate development project that encompasses several golf courses and artificial lakes and hundreds of residences 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. 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.¹⁵ Drought and heat waves also depress visits to the national parks and recreation areas. Controlling for other influences, drought reduced visits New Mexico's Bandelier National Monument by seven percent.¹⁶ Higher temperatures will also depress trout populations and increase forest mortality from bark beetles and fires.

HEALTH AND ENVIRONMENTAL IMPACTS

The health impacts of climate change are particularly acute in Nevada. The Las Vegas region was ruled to be in compliance with the 1997 national ozone air quality standard only starting from March 2011.¹⁷ Higher summer temperatures, which promote ozone formation, are likely to push the region back into non-compliance, especially if considerably tighter ozone standards are implemented. In order to be in compliance with any proposed new standard, the state will have 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.¹⁸ Small particles from wildfires and desert dust will exacerbate the problem as the region dries out.

The impacts of climate change on public health will lead illnesses and disease to thrive, physical well-being to plummet, and health care costs to soar. The state will be poorer and sicker as climate change adversely affects human health. Among the negative health impacts, asthma attacks and allergies will be more severe due to higher levels of air pollution, 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 will seek medical care in hospital emergency rooms.¹⁹

Higher ozone and particulate levels are reliably linked to increased mortality and morbidity. Among the elderly, stroke and heart attack increase with rising heat.²⁰ 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.²¹ In the past decade, a six percent increase in heat-related mortality was observed for every one degree F rise in the heat index and mortality also rose with the duration of the heat wave.²² Unless climate change is brought under control, Nevada's health care costs will rise more rapidly and its citizens will suffer.

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THE WAY FORWARD

A strong national climate policy that rapidly stabilizes atmospheric greenhouse gas concentrations will enable Nevada to avoid the worst of these impacts. It will also allow Nevada to benefit significantly 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.²³ There is a Renewable Portfolio Standard in place that mandates a 25 percent share for renewables by 2025, including six percent from solar power, but the potential for renewable electricity generation goes far beyond this minimum requirement. 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.²⁴ 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 significantly lower negative environmental impacts. The resulting surge in clean energy would be a strong boost to Nevada's rural economies.

ENDNOTES

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