The white-ringed shores of Lake Mead tell the story. Water levels at the lake have dropped more than 100 feet since 2000. The alkaline buildup along the lake’s rocky shoreline has come to graphically symbolize the drought currently plaguing the West and, with it, the uncertain future of the region’s water supply.

UNLV researchers are becoming increasingly involved in research on a variety of water issues, including both water quantity and quality. Their research, which is being conducted in collaboration with a number of government entities, comes at a crucial time.

According to a recent Brookings Institution report, of all major metropolitan areas in the Intermountain West, Southern Nevada may be the community most at risk of depleting its supply of water.

This is not surprising given that from 2000 to 2007, the population of greater Las Vegas jumped an astounding 31 percent to more than 2 million, creating a spurt of economic prosperity while at the same time straining the area’s limited water resources. It is estimated that by 2035, the greater Las Vegas area may have to conserve almost as much water as it currently uses just to meet demand.

The Brookings Institution report also indicates that the
area will need to provide water for an additional 2.4 million people by 2040, a prediction that, if accurate, will require creative and collaborative water agreements and focused investments in research and data collection.

“The water issues facing Las Vegas are quite serious,” says Robert Lang, non-resident senior fellow of the Brookings Institution’s Metropolitan Policy Program. “University research is needed to tackle the technical and policy challenges of managing limited resources.”

UNLV researchers are working to meet these challenges, according to Ron Smith, the university’s vice president for research and dean of the Graduate College. He says research teams are addressing issues ranging from the effects of global climate change on water resources to the impact of invasive species on the lake’s ecology.

“UNLV faculty and students are committed to researching issues that affect quality of life in our community, state, and the region,” says Smith, who also heads the university’s Office of Urban Sustainability Initiatives. “Water issues will certainly impact our entire region for generations to come, and our researchers are actively seeking to address the many challenges we face in this area.”

All told, dozens of UNLV faculty in many academic fields are currently engaged in research on water issues. Below are several of the water-related research projects under way.
Shawn Gerstenberger

Professor, Environmental and Occupational Health; Executive Associate Dean, School of Community Health Sciences

Shawn Gerstenberger is leading a team of UNLV researchers and graduate students examining the ecological impact of environmental toxins and invasive species in Lakes Mead and Mohave.

Gerstenberger and his team are tracking sport-harvested fish in Lake Mead for mercury and other environmental contaminants for what may lead to the first-ever fish consumption advisories for the lake. His team is also actively testing what shad, the primary food source for the lake’s game fish, are consuming. This will help lake managers determine how invasive species are displacing plankton, which could have implications for fish populations in Lake Mead.

Gerstenberger also developed the 100th Meridian Initiative in Nevada, a partnership with the U.S. Fish and Wildlife Service, to educate the general public about the dangers of invasive species in Lake Mead. A primary component of the initiative involves data collection and outreach for boaters who could unknowingly transport invasive species to lakes and rivers in the region.

David Wong

Associate Research Professor, School of Community Health Sciences and the Public Lands Institute

David Wong is one of the nation’s leading experts on the ecological impact of invasive zebra and quagga mussels on freshwater ecosystems.

Wong, who holds a joint appointment in the UNLV School of Community Health Sciences and the Public Lands Institute, conducts research on how quagga mussels – first found in Lake Mead in early 2007 – are impacting the water quality, fisheries, and infrastructures in the lake.

According to Wong, Nevada’s climate provides an ideal environment for quagga mussels to reproduce year-round, resulting in damage to Lake Mead’s ecosystem and millions of dollars in annual maintenance costs on boats, marina structures, and water intake equipment that supplies drinking water to the Las Vegas community.

To combat this growing problem, Wong and a team of UNLV faculty and graduate students have teamed with government agencies, including the National Park Service, the Bureau of Reclamation, and others to form the Interagency Monitoring Action Plan. Through this coordinated effort, researchers can closely track the environmental impacts of quaggas and better understand how they affect water quality and food webs in Lakes Mead and Mohave.

William James Smith, Jr.

Assistant Professor, Environmental Studies

William James Smith, Jr. leads the policy and outreach component of a $15 million project that seeks to determine how climate change impacts not only the state’s ecosystems and water resources, but also its diverse groups of stakeholders.

The project is being funded by a National Science Foundation grant awarded to UNLV and other Nevada System of Higher Education institutions.

In addition to collecting socio-economic data and developing modeling and visualization tools related to climate change in Nevada, Smith is tasked with making information on climate change understandable and accessible to researchers, students, decision makers, and the general public through creative outreach techniques.

He is also gathering input from stakeholder groups, such as the business community, Native Americans, nongovernmental organizations, and political entities, in order to share it with scientists. His goal in this part of the project is to help scientists understand their audiences more fully and help them communicate their research more strategically.

Smith also hopes to launch a project examining the potential for demand-side management of water to help sustain human and natural systems in the Lower Colorado River Basin.

Smith also conducts research on water issues in the Federated States of Micronesia, focusing on mapping, capacity building, watersheds, and biodiversity.

Thomas Piechota

Professor, Civil and Environmental Engineering; Director, Office of Sustainability and Multidisciplinary Research

Thomas Piechota tracks how climate change and large-scale climate variability phenomena like El Nino cycles influence regional water supply.

Piechota recently found that increasing temperatures in the Colorado River Basin over the past 55 years have changed the timing and magnitude of the region’s streamflow. His research, which is funded by the National Science Foundation, revealed that streamflow is peaking earlier in the year each year now, creating challenges for water managers assessing resource availability. He is analyzing how this phenomenon is contributing to the current drought in the Southwest, which is the most severe in the region’s nearly 100-year historical record.

Piechota is also working with the National Weather Service’s River Forecast Center to improve the models used to manage water supply in the Colorado River Basin. By incorporating climate variability into the models, resource availability predictions will be more precise. More accurate modeling and climate forecasting contribute to a better understanding of the extent and cause of reductions in water supplies; this, in turn, enables urbanized areas to shift water demand strategies in response to limited supply.

Jaci Batista

Professor, Civil and Environmental Engineering

Jaci Batista leads a team of UNLV researchers working to help rid Las Vegas’ water supply of environmental and...
chemical contaminants.

Batista, who has received grant funding from the National Science Foundation and the U.S. Environmental Protection Agency, among other agencies, is researching many issues related to the quality of both wastewater and the municipal water supply.

She is developing techniques for the biological removal of phosphorous and nitrogen from wastewater flowing to Lake Mead; she also recently created a complete model of the fate and transport of the contaminant perchlorate through the Las Vegas Wash and into Lake Mead. The model has influenced environmental policy and has served as the basis for local clean-up efforts.

Batista, along with engineering professor Sajjad Ahmad, life sciences professor Dale Devitt, and graduate assistant Kamal Qaiser, is also developing an interactive water balance model for the Las Vegas valley that will provide extensive data on the transport of water from Lake Mead to Las Vegas. The model will track energy costs, water demand, and water supply for up to 50 years into the future and will facilitate water and wastewater resource planning.

Douglas Grant
Cord Foundation Professor of Law, Boyd School of Law

Douglas Grant examines water law issues and has written extensively on water resources law and water rights.

Grant recently authored an analysis of interim operating guidelines established by the Secretary of the Interior in 2007 to address water allocation in the seven Colorado River Basin states, including Nevada.

Western states are wrangling over their portions of the area’s diminishing water supplies as never before, with myriad issues already arising as the states anticipate future water supply and demand conditions after the guidelines expire in 2026.

According to Grant, the Colorado River Basin states and their growing cities need to collaborate on advanced strategies to solve looming water shortages and consider reallocating water from agricultural to urban use.

Grant also studies different legal approaches that western states are taking in their management of ground and surface water sources that are situated in border areas and are shared by different states. Though Nevada has yet to experience many of the issues associated with management of groundwater, Grant says it is important to learn from successful regional approaches as local ground water needs may soon exceed supplies.

Dale Devitt
Professor, School of Life Sciences; Director, Center for Urban Horticulture and Water Conservation

Dale Devitt conducts research on ways that both residential and business consumers can make more efficient use of available water supplies.

For example, he examines the use of satellite irrigation controllers for residential landscape watering and works with golf courses in Southern Nevada as they transition to recycled water to meet their irrigation needs.

For the past five years, Devitt and his team have traced the impact of recycled water on soil-turfgrass systems, equipment, water features, and additional landscaping at nine local golf courses in various stages of recycled water adoption. Researchers have tested for salt buildup in soils and plants and found the recycled water to be an acceptable alternative to the municipal water traditionally used for golf course irrigation.

During the last four years, Devitt has also been involved in a large study to assess water consumption of native plant communities in remote basins in east central Nevada. Additionally, he and his colleagues at the Desert Research Institute are currently investigating the fate and transport of pharmaceuticals in turfgrass systems irrigated with recycled water.