Project Summary

Overview: Homelessness is one of the most significant human dynamics issues in Nevada. Over the past year, Nevada experienced the largest increase in homeless individuals in the nation—62% of whom are unsheltered. Among U.S. metropolitan areas, Las Vegas was 3rd with 8,326 homeless individuals and 4th with 2,488 unaccompanied homeless youths. In fact, the Clark County School District had to implement a "Homeless Outreach Program for Education" to ensure that the large number of homeless youths still had access to public education. Beyond the socioeconomic problems, there are also potential environmental consequences associated with homeless communities, particularly encampments located along waterways, due to inadequate waste disposal, sanitation practices, and facilities. This issue has reached a tipping point in areas of Northern California where agencies are taking legal action against municipalities for not mitigating the adverse impacts of these coupled human and natural systems. Therefore, policymakers and other stakeholders must become more familiar with the dynamics of homelessness and its coupling with water quality (within the context of a changing climate) in order to promote substantive change.

Intellectual Merit: In Southern Nevada, many homeless individuals live near the Las Vegas Wash or in flood channels that drain into the Las Vegas Wash. Because these encampments have limited access to sanitation facilities, public urination and defecation have become significant problems. Based on a recent 'point-in-time' count, unsheltered homeless in Southern Nevada could potentially contaminate Lake Mead with up to 33,000 kg of feces each year. However, no studies have fully characterized the problem or established a definitive link between homelessness and water quality. Using a mass-balance approach and advanced source-tracking tools, including persistent trace organic contaminants, human-specific molecular markers, and urinary metabolites, the project team will perform a comprehensive survey of the Las Vegas Valley watershed to determine whether the prevalence of homeless encampments adversely impacts water quality. The project team will also perform a survey of homeless individuals to identify the spatial, temporal, and cultural factors that impact a homeless individual's sheltering choices. These factors will serve as the foundation of a spatial model that can be used to evaluate the impacts of climate change and policy measures on these coupled natural (water quality) and human (homeless) systems.

Broader Impacts: This project will broaden and diversify the audiences reached through environmental education by targeting groups of learners not ordinarily educated about human health threats from water pollution. In addition to typical target groups (e.g., undergraduate civil engineering students), nursing students and lifelong learners at or near retirement age (55+) will receive formal instruction related to water quality in the Las Vegas Valley and hands-on experience with water quality monitoring techniques. In collaboration with the Southern Nevada Continuum of Care, the project team will also advocate for a 'Housing First' approach to reducing local homelessness. This may be possible with additional pressure from community advocacy groups, such as those focused on water quality, coupled with a clear message describing the promise of alternative housing models. The project also aims to increase retention among groups of students with historically high rates of attrition by engaging them early in their undergraduate career and providing a network of mentors to increase their probability of success. The project team will hire at least one lower division undergraduate each year to perform meaningful project-related research. Each year, the project team will also work with the Clark County School District's Homeless Outreach Program for Education to offer a summer research internship to a student in that program.