

Urban and rural perceptions of ecological risks to water environments in southern and eastern Nevada

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ABSTRACT

In this multidisciplinary study, we used an Internet-based tool to investigate perception of ecological risks to water environments due to most relevant hazards (urban development, drought, urban water consumption, interbasin water transfer from rural to urban areas, and water-intensive landscaping) in urban and rural Nevada. Rural participants' perception of risk was higher than urban participants for only "interbasin water transfer from rural to urban areas" while for the other four hazards the effect of residence location was not significant. The principal component analysis on fourteen scales identified three factors that we named Ecological Impact, Benefits & Equity due to Hazards, and Controllability of Hazards. Urban people perceived Ecological Impact due to the five hazards to water environments higher than rural people while rural people perceived Benefits & Equity due to Hazards higher than urban people. Participants' ratings in the survey represent their judgments of benefits and equity due to the hazards to water environments in urban Nevada (not in rural Nevada). Therefore, rural people seem to perceive that urban people benefit from the risky human activities of urban development, urban water consumption, interbasin water transfer, and water-intensive landscaping, yet rural people incur the costs. The two groups' risk judgments did not differ significantly in Controllability of Hazards. Participants who perceived higher ecological impact due to risks to water environments had less water-intensive (more desert-friendly) landscape in their gardens. And finally we found that rural laypeople perceived greater need to regulate risks to water environments than urban laypeople, urban experts, and rural experts, and the latter three groups were not significantly different from each other.

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1. Introduction

As human population and world economies continue to grow, the demand for potable water increases, further stressing freshwater systems (Gleick, 2004; Pimentel et al., 2004; Postel, Daily, & Ehrlich, 1996). Freshwater scarcity, exacerbated by climate change and disturbed water cycles, is especially severe in arid southwestern United States where the Colorado River's normal flow is fully allocated and there is a water deficit in parts of the region (Global Freshwater Programme, 2007; Libecap, 2005; National Research Council, 1992).

Heavy urbanization and increased demand for municipal water compound the difficult task of water resource management in the

Colorado River Basin, giving rise to water transfers from rural basins to urban areas (Libecap, 2005; Libecap, Glennon, & Ker, 2005; NRC, 1992). This practice further complicates the matter, especially while the region is in a longstanding drought for over a decade now (Dettinger, 2004; Kerr, 2007; Piechota, Timilsena, Tootle, & Hidalgo, 2004; SNWA, 2009a).

Due to "sustained and severe" water shortage in the region, Southern Nevada Water Authority (SNWA) has come up with the interbasin water transfer plan to bring groundwater from neighboring rural basins in eastern Nevada to Las Vegas Valley in Clark County (SNWA, 2009a). Concerned citizens, environmental groups, and scientists contend that SNWA's interbasin water transfer plan will impact the water regimes and interests in Lincoln and White Pine Counties in eastern Nevada, and in neighboring Millard, Juab, and Tooele Counties in western Utah (Fig. 1), resulting in adverse social, economic, ethical, and ecological implications (Deacon, Williams, Deacon Williams, & Williams, 2007; Great Basin Water Network, 2011; Sierra Club, 2006, 2008).

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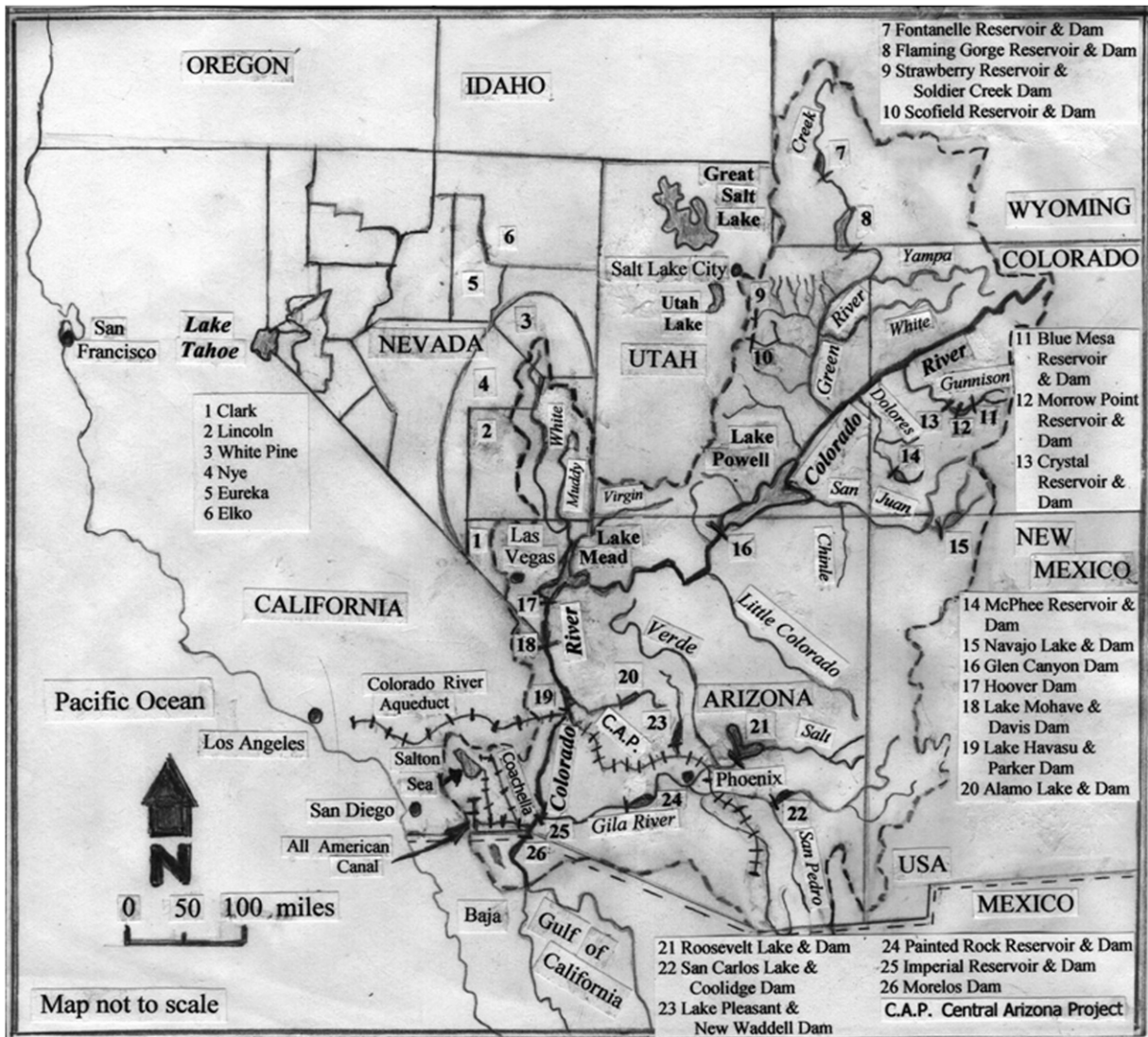


Fig. 1. Map of the Colorado River Basin showing the study area (within the oval arc in Nevada) of the proposed Clark, Lincoln, and White Pine Counties groundwater development project.

This article examines urban and rural perceptions of ecological risks to water environments in southern and eastern Nevada due to water-related hazards in general, and interbasin water transfer in particular. In this study we adapted the psychometric paradigm on perception of risks based on cognitive risk studies dating back to 1970s. One of the earliest studies in this field was the pioneering work of Fischhoff, Slovic, Lichtenstein, Read, and Combs (1978) that used rating scales to assess people's perceived risks and benefits of "risky activities" on several "attributes" such as controllability, reversibility, observability, and availability of alternatives. This approach eventually led to the use of a variety of psychometric scaling methods to produce quantifiable and predictable measures of perceived risk, perceived benefit, and other aspects of perceptions for different types of hazards (Slovic, 1987, 1992, 2000; Slovic, Fischhoff, & Lichtenstein, 1985, 1986).

Fischhoff (1985) explains why understanding perception of risks is important to risk management and risk communication. According to Fischhoff, one cannot predict how people will respond to an issue without knowing how they perceive the issue to shape their opinions and attitudes. Since Fischhoff et al. study in 1978, several risk scientists utilized the psychometric paradigm to

examine risk judgments in general, and expert and layperson perceptions of risk in particular.

McDaniels, Axelrod, and Slovic (1995) study investigating people's perception of ecological risks, and later McDaniels, Axelrod, Cavanagh, and Slovic (1997) study investigating people's perception of ecological risks to "water environments" were the two pioneering studies that examined and found differences between lay and expert perceptions to ecological risks. McDaniels et al. (1997) found that laypeople generally perceive ecological risks higher than experts. Lazo, Kinnell, and Fisher (2000), too, confirmed that in general laypeople's perception of ecological risks were higher than the experts'. Current risk judgment studies focus mostly on identifying differences in expert and lay judgments, yet there is a growing need to understand the differences in perception of risks between "urban" and "rural" people.

Due to water-related hazards and concerns over the proposed interbasin water transfer plan in the study area, we believe it is important to investigate people's perception of ecological risks to water environments in both the urban and rural settings in southern and eastern Nevada while taking into account the differences between expert and lay risk judgments. It is also

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