

Title: Water use and scarcity in arid urban environments: finding long-term sustainability in southern California

Authors: Caroline M. Hermans, Eric Reichard, Zhen Li, Theodore A. Johnson

Abstract: Water use and scarcity is a critical issue facing regional and local government and residential, commercial, and industrial interests in urban centers of the Southwest United States. Against the backdrop of high population growth and the corresponding growth in commerce and industry are increasing water scarcity, increased subsidence and salt-water intrusion of aquifers, increased contamination of water sources, high probability of prolonged drought, threat of climate change, and changing intrastate and state water policies. In addition, extreme natural hazard events, such as earthquakes, add another layer of vulnerability to an already precarious system. Using Los Angeles County in southern California as an example, we look at the drivers of urban water use and the vulnerabilities of the current system. The relationship between water and urban systems in this region (as in many arid areas in the United States) is non-sustainable in the long-term under current management regimes under the best of conditions. When externalities such as climate change and natural hazards impact the system, it can break down completely.

The Metropolitan Water District (MWD) provides water to 17 million people in a 5,200 square-mile area in southern California. This area is subject to a 30% population increase between 2005 and 2030. In terms of natural hazards, there is a high probability of an earthquake in the next 30 years in northern or southern California. This event could cause extreme damage to water infrastructure, resulting in an extended and crippling disruption of water supplies to the region. Prolonged drought is another hazard that severely impacts water availability from local (aquifers) and regional sources. Also, evolving water policy and regulations regarding imported water supplies from distant sources has potential ramifications for sustained water delivery. Groundwater contamination from industrial, commercial, and residential pollutants is increasing. The increased presence of prescription and over-the-counter medications in the water supply is causing concerns about water safety. These complex and interdependent drivers of water use and availability need to be overhauled in order to achieve any measure of long term sustainability of this urban ecosystem.