Urban Water Availability and Sustainability in the United States

Urban growth places increasingly concentrated demand pressures on local and regional water supplies. As a result, water managers must continually evaluate the limits of water supply systems, both in terms of human and environmental needs, to ensure that management decisions are based on the best knowledge available to manage across multiple spatial and temporal domains. However, quantifying water resources at these scales can present challenges for managers, as comprehensive assessments of national urban water availability and vulnerability do not currently exist. This issue was highlighted in a 2008 survey of the U.S. water industry, which concluded that the primary concern among water managers was maintaining adequate quantities of treatable water for current and prospective needs in an uncertain future.

In this work, water availability and sustainability are assessed in the 251 urban areas in the United States with populations over 100,000. Traditional methods for estimating water availability are extended here by incorporating previously unaccounted-for estimates of renewable and total storages. Availability measurements derived using the modified metric were found to more closely match observations, suggesting the new metric may be more appropriate for identifying urban water availability. Indices of urban water sustainability are a useful correlate to urban water availability, as they describe not only how much water exists, but how water supplies change with time. A simple metric to calculate urban water sustainability was used to compare differences across urban areas and between water sources. Finally, these two metrics were used to examine the effects of projected changes in demand on issues of management and resource conflict.

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