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VULNERABILITY OF COMMUNITY WATER SYSTEMS TO URBANIZATION AND CLIMATE CHANGE IN PHOENIX, AZ AND PORTLAND, OR

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ABSTRACT: Climatic variability and uncertainty, coupled with population growth and urbanization, introduce challenges to the long-term sustainability of community water systems (CWS). Previous work has explained how distintictive places exhibit particular capabilities for coping with social and environmental changes even if exposed to the same stresses. Yet few studies have comparatively examined the conditions and processes leading to these variations in vulnerability across U.S. cities. This paper compares the vulnerabilities of metropolitan Phoenix, Arizona and Portland, Oregon to the combined stressors of land change and climate variability, specifically as a function of: (1) exposure to population growth, land change, and increases in water demand, (2) the sensitivity of water systems based on land-use/cover configurations and demand-management strategies, and (3) the adaptive capacity of local municipalities in anticipating, mitigating, and adjusting to environmental change given available resources and planning initiatives. With a case study approach, our quantitative and qualitative assessment relies on a survey of town water managers and land planners along with secondary information from modeling studies and other sources. For the Portland region, vulnerability is heightened by reliance on local surface water flows, relatively few demand management strategies, and minimal attention to climate change among water managers. In Phoenix, rapid growth and comparatively weak land use planning increase vulnerability, as do loopholes in groundwater laws. Since water demands in both regions are more sensitive to land cover than climate conditions, preparing to maintain vegetative cover in a warmer, drier future is a critical consdideration for adaptation strategies. Overall, the comparative results reveal the importance of integrated land-water planning to address resource stressors, interactions, and tradeoffs in urban water systems. .

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