

Resilience in an urban socioecological system: exploring the dynamic interactions between water policy, residential water usage, the urban landscape, and plant and bird diversity

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Ecological theory has begun to incorporate humans as part of coupled socio-ecological systems. Modern urban development provides an excellent laboratory to examine the interplay among socio-ecological relationships. Urban land and water management decisions result from dynamic interactions between institutional, individual and ecological factors. Landscaping and irrigation at any particular residence, for example, is a product of geography, hydrology, soil, and other local environmental conditions, the homeowners' cultural preferences, socioeconomic status, identity construction, neighborhood dynamics, as well as zoning laws, market conditions, city policies, and county/state/federal government regulations. Since land and water management are key determinants of habitat for other species, urban biodiversity is strongly driven by the outcome of interactions between these variables. This study addresses the significance of water as a key variable in the Fresno-Clovis Metropolitan Area (FCMA), shaping current patterns of landscape and water use, at a time when the city of Fresno is installing meters as a regulatory tool to conserve water. A recent study from the Fresno Bird Count found that bird species richness and functional group diversity are both strongly correlated with residential irrigation and neighborhood income levels. Tree species diversity shows a similar pattern. Water usage in the FCMA is also directly linked to socioeconomic status, but what exactly are the social behaviors entailed by socioeconomic status? How will water use behaviors change across the socioeconomic spectrum with changes in the cost of water due to metering? In turn, how will plant and bird diversity change in the aftermath of metering? We examine several theoretical models explaining outdoor water use behaviors, with the aim of assessing the resilience of such behaviors with the introduction of water metering in Fresno, and the resilience of urban plant and bird communities to resulting changes in water use in the landscape. We argue that socioeconomic status results from a complex interplay of cultural, economic, structural, and social-psychological factors, influencing institutional policies regarding the governance of water resources, and in turn impacts biodiversity within the urban landscape through spatial and temporal variations in water usage. This study is part of a long-term research project that examines the impacts of human water usage and water use policies on biodiversity within an urban environment.