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Valuing Ecosystem Services of an Impacted Waterway in the Southwestern US

While many studies of ecosystem services focus on unaltered areas such as wilderness, management insight is also needed for those more impacted. This case study values ecosystem services of the Santa Cruz River, an effluent-dominated waterway in southern Arizona. Wastewater treatment outfalls along the Santa Cruz currently re-create, to some degree, the riparian ecosystems that were prevalent in the Sonoran Desert region before large scale groundwater mining began in the 1940's. Due to water scarcity in the area, society is presented with management questions for waterways containing effluent, such as whether they have recreational potential, and whether water consumed by riparian ecosystems is a worthwhile use of a precious resource.

To investigate public preferences on this topic, a stated preference valuation survey was developed by an interdisciplinary team, with funding by the US EPA and the National Science Foundation. The team established baseline perennial river flow length and associated acres of cottonwood-willow gallery forest, as well as diminished levels that would be associated with scenarios of reduced flow volume. Furthermore, improved water quality conditions allowing safe full body recreation in the river were included in scenario options. These ecological and recreational attributes were then incorporated into a choice experiment mail survey instrument with a willingness-to-pay elicitation framework. Background text as well as photos were used to describe the influence treated wastewater has on the ecosystem. Statistically designed tradeoff questions, with options to maintain flow length and forest, or increase effluent water quality, are posed along with increases in a yearly household tax. The questions collect information on the public value regarding these options as if they were being raised for a public vote. Each choice question allows a zero cost "opt out" option. The choice experiment methodology allows isolating the value of each specific marginal change considered.

The instrument was pretested and refined through focus groups and individual interviews with residents of Tucson and Phoenix, the two major metropolitan areas of southern Arizona. Results of a mail survey conducted on these same populations allow comparison of public interest in river reaches at varying distances of the household from the river, river reaches of varying riparian forest quality, and ecological versus safe water contact attributes. Additional questions to further understand resident knowledge of the Santa Cruz River, their river-related recreation behavior, as well as general motivations for their valuation responses are included. Limited sociodemographic questions allow comparing sample respondent sociodemographics with the target urban populations. The project contributes to US EPA research on community sustainability and ecosystem service identification and valuation.