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Urbanization effects on the microclimate and vegetation structure of riparian areas along ephemeral streams

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Abstract Text:

The majority of streams in Arizona, particularly in Sonoran Basin and Range ecoregion, are ephemeral. Despite their prevalence, little is known or has been documented on the ecological functions of ephemeral riparian areas in Arizona's water-scarce regions. With Arizona's population continuing to grow rapidly, housing developments continue to be built along these ephemeral streams. Understanding the natural functions of ephemeral riparian reaches and how urbanization impacts them is essential for improving future land management practices. This study examines differences in climate, vegetation composition and density, and litter decomposition, between ephemeral riparian ecosystems within three levels of urban density: a) Heavy - average housing density 12 - 14 houses/hectare, b) Moderate - average housing density 4 - 7 houses/hectare, and c) Low - average housing density <1 house/hectare. Each level of urbanization has three replicated reaches. Microclimatic conditions that will be compared between urban treatments are: air temperature, relative humidity, rainfall, soil temperature, and soil moisture. Litter decomposition rates, as determined by total nitrogen and lignin, will be recorded using litter bags for the three dominate woody species from our reaches: creosote, palo verde and catclaw. Plant composition and structure will be recorded within designated vegetation transects for trees, shrubs, and herbaceous plants. All nine reaches selected are in Marana, Arizona, and are part of the broader Santa Cruz River Watershed. Each reach has a maximum discharge no greater than 1000 cfs, and all reaches are inside an area with a radius < 2.5 km. The data presented will be from the first three months of the project.

Impact Statement:

Data from this study will provide information for the prevalent ephemeral riparian ecosystems within the Sonora Basin and Range ecoregion that is not readily available. Data collected will also highlight impacts from modern housing developments on Sonoran ephemeral riparian ecosystems. Potentially, this study will also be used as a tool to augment future urban land-use decisions.