CHANNEL CHANGE IN SOUTHERN ARIZONA-- IMPLICATIONS FOR FLOODPLAIN MANAGEMENT

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Frequent changes in morphology and position of alluvial channels of ephemeral streams create uncertainties for floodplain management in the semi-arid southwestern United States. Federal floodplain management regulations, which form the basis for local floodplain management, are primarily concerned with overbank flooding. In the Southwest, however, channel bank erosion and lateral channel migration often present hazards of equal or greater magnitude than overbank flooding, yet they are not adequately addressed in the federal regulations nor often brought to the attention of communities enacting floodplain management programs. Frequent channel changes also lead to erroneous flood hazard delineation, when it is based on standard engineering procedures that utilize rigid channel boundary models. Instability of channel configurations leads to variability in the areal extent of inundation during the 100-year and lesser floods.

This study documents channel change along an alluvial stream system and presents steps taken by one community to regulate urban development adjacent to such stream systems. The Rillito Creek system of Pima County, Arizona, consisting of Rillito Creek and major tributaries Pantano Wash and Tanque Verde Creek, was chosen for study because of severe channel bank erosion in recent years within the rapidly expanding Tucson metropolitan area. Encroachment of urban development onto the floodplains of this stream system has resulted in widespread erosional damage to public facilities, commercial/ industrial structures, and private residences.

The Rillito Creek system drains approximately 934 square miles (2419 square kilometers) of southeastern Arizona (see Figure 1). The watershed consists of large lowland areas surrounded by mountains, with elevations ranging from 2200 feet (690 m) to 9450 feet (2880 m). Vegetal cover varies from the Sonoran Desert communities of creosote bush, desert saltbush, and cacti in the lower-lying basin and foothill areas, to evergreen forest at the