

A RIVER EVOLUTION COMPARISON OF ADJACENT STABLE AND UNSTABLE URBAN WATERSHEDS IN SAN JOSE, CALIFORNIA

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Abstract: Berryessa Creek, located at the base of the Diablo mountain range on the east side of San Jose, California, has experienced significant channel instability and sedimentation problems over the past 40 years of urban sprawl. As late as the early 1900s, a defined stream channel was not present throughout the entire watershed, as overland flow infiltrated into alluvial fan deposits upon reaching the Santa Clara Valley. By 1943, a constructed channel was developed by farmers to increase agricultural productivity and was later altered for residential development along the valley floor. As urbanization proceeded in the San Jose area, the channel has undergone a series of realignments, catchment alterations and channelization practices, resulting in an aggrading man-made canal at the downstream end of the watershed and severe erosion problems in the middle and upper reaches.

Conversely, the adjacent watershed of Upper Penitencia Creek has a similar watershed area, land use, geology and relief and has undergone comparable urbanization over the same time period, and a stable channel planform and outlet condition has persisted since the early 1900s. This study examines the comparative geomorphic, river mechanics and hydraulic processes occurring in these two urbanizing watersheds resulting in an understanding of the processes governing channel stability and instability of two adjacent watersheds with vastly differing morphological response to urbanization. Methods of investigation include: morphometric analysis, time trend urbanization analysis, storm sewer network characterization, and hydraulic and sediment transport analysis by both numerical modeling and field investigations (including longitudinal profiles, cross-section erosion surveys, discharge measurement, bed load and suspended load sediment transport sampling and bed material sedimentological analysis).