

GEOMORPHIC CHANGE AND CONTROLLING VARIABLES IN AN EPHEMERAL ALLUVIAL CHANNEL

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Abstract: Channel form and adjustment are the result of complex interactions among bed sediment, geologic and vegetative controls, and flow hydraulics. In semiarid regions, where spatially varied thunderstorm rainfall produces discrete, high velocity flow events, temporal trends in flow characteristics, such as volume, peak runoff rate, and duration play a role in channel evolution. Channel geometry and patterns of spatially distributed channel vegetation were analyzed with respect to measured runoff on the main channel within the USDA-ARS Walnut Gulch Experimental Watershed in southeastern Arizona. Analyses of measured rainfall and runoff collected since 1956 on the WGEW reveal an increase in the proportion of winter rainfall and a decrease in annual runoff volume and annual peak. Cross sections measured in the 1960s were compared to those from 2004. In general changes in cross sections revealed aggradation as well as segments characterized by constricted low flow channel widths. Between 1935 and 1974 the spatial coverage of vegetation within the channel increased approximately 30% and increased an additional 150% from 1974 to 2003. Much of the vegetation has established on coarse sediment deposits. These changes in channel morphology indicate that sediment is currently being stored in the channel which may have an impact of sediment delivery to downstream receiving waters.