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**Role of Vegetation in Levee Slope Stability and Revetment Durability**

ABSTRACT

Effects of vegetation on slope stability of sandy levees were investigated. Six sites on the river side of the Sacramento River levee supporting various types of vegetation were intensively studied during the summer of 1987. Information on levee geometry, soils, vegetative cover, and root sizes and distributions was collected. These data were then used in seepage and slope stability analyses. Roots reinforced the levee soil and increased factors of safety for infinite slope and circular arc-type analyses of slope stability. Seepage analyses indicated no problems related to vegetation except under the most extreme (and unlikely conditions). These findings were confirmed using a recently developed numerical bank stability model, which predicted failure of the riverside levee slope without vegetation during extreme hydrologic conditions but stability with either bunch grass or large tree cover. Effects of woody vegetation on the ability of Sacramento River revetments to withstand forces created by high flows were examined by documenting vegetative cover on revetments before and after the 1986 flood using inspection records and aerial photographs. Revetment damage rates were significantly higher for older revetments, but differences based on vegetation cover were not significant.

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Doug has been a research hydraulic engineer at the National Sedimentation Laboratory of the USDA Agricultural Research Service since 1990. Prior to coming to NSL, he worked ten years in the Environmental Laboratory of the US Army Engineer Waterways Experiment Station, and he spent two years with the Nashville District of the Corps of Engineers. He earned a M.S. in environmental and water resources engineering from Vanderbilt (1977) and a Ph.D. in hydraulic engineering from Colorado State (1987). Research interests include stream corridor habitat rehabilitation in incising streams, role of woody debris in fluvial systems, riverine backwater rehabilitation and the influence of vegetation on sedimentation and erosion. During the late 1980s he conducted studies of the effects of woody vegetation on Sacramento River revetments and levees. Doug is a member of the American Society of Civil Engineers and co-edited the book *River Channel Restoration* (John Wiley and Sons, 1996). He also was a contributor to the document, "Stream Corridor Restoration: Principles, Processes, and Practices", jointly published by 14 federal agencies. He is a registered professional engineer in Mississippi.