

H52C-09 1540

The Distribution of Hillslope-Channel Interactions in a  
Rangeland Watershed

Leslie M. Reid (USES, Redwood Sciences Laboratory,  
1700 Bayview Drive, Arcata, C6 95521; 707-822-3691)

The distribution of erosion and deposition in a basin--and thus of the major controls on basin evolution--is dependent upon the local balance between sediment transport and sediment supply. This balance, in turn, reflects the nature, strength, and distribution of interactions between hillslope and channel processes. Because these interactions vary systematically with location in a watershed, different parts of a basin will evolve along different paths. The paths, however, are mutually interactive, since form at a particular location can influence strongly the processes active at adjacent sites or downstream.

Sediment budgets constructed for hillslopes and channels in part of the central California Coast Range allow evaluation of the distribution, rates, and interactions of hillslope and channel processes in a local watershed. Sediment is transported down hillslopes by landslides, soil creep, and sheetwash erosion, and is removed from toeslopes by the action of channelled and unchannelled surface flows. The present morphology of the basin largely determines the distribution and rates of sediment delivery by controlling the types and rates of processes active on hillslopes and in channels. High in the basin, hillslopes are adjacent to drainageways and sediment delivery ratios are high. Slopes in this area tend to be steep and straight, and landsliding is dominated by shallow debris flows. Lower in the watershed, the presence of large valley-fill terraces has divorced the channels from adjacent slopes, and long, concave toeslopes have formed on the terrace surface. Often earthflows in this area do not mobilize into debris flows, and those that do are trapped on terrace surfaces before contributing to streams. Terraces thus continue to aggrade, and are themselves an expression of hillslope-channel interactions.