

## **Effects of Relief on Headwater Catchment Landscapes**



1. Introduction: How the physical nature of headwater catchment varies with diverse relief conditions?



Fig 1. Contrasting headwater catchments with rounded hilly landscape in a low-relief area versus with sharp ridges and steep linear slopes in a high-relief area.

В



valley head

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Research Questions

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- Headwater catchments, primarily composed of hillslopes, valley heads, and colluvial valleys, are vital source areas
- 1. How valley head locations, often approximated as channel head positions, vary with relief?
- 2. How does relief influence the lower boundary of headwater catchment, defined by the onset of the dominance of fluvial processes?



ram for valley head location (top) and he relationship between relief and

Low - relief

43.3

136

3232

87.4

8.7

Mean relie

Number of alley head

Mean A<sub>s</sub> (m<sup>2</sup>)

Mean L<sub>s</sub> (m/m)

density (km/km<sup>2</sup>

'n.

fHC,

High - relie

72.2

46

9506

165.6

3.9

Relief R (m)







Fig 13. The relationship betwee nd topographic relief





Fig 17. Schematic diagram of headwater catchment landscapes across high- and low-relief areas

**Relief controls on the** 

Fig 16. Comparison of areas affected by landslides and debris flows between high- and low-relief areas The scatter plot in the upper left illustrates that the extent of headwater catchments increases with

hic relief. The two maps show pot

on and de

initial point

runout distance a debris flow travels from its