

# Channel-reach morphology in mountain drainage basins

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## Abstract

A classification of channel-reach morphology in mountain drainage basins synthesizes stream morphologies into seven distinct reach types: colluvial, bedrock, and five alluvial channel types (cascade, step pool, plane bed, pool riffle, and dune ripple). Coupling reach-level channel processes with the spatial arrangement of reach morphologies, their links to hillslope processes, and external forcing by confinement, riparian vegetation, and woody debris defines a process-based framework within which to assess channel condition and response potential in mountain drainage basins. Field investigations demonstrate characteristic slope, grain size, shear stress, and roughness ranges for different reach types, observations consistent with our hypothesis that alluvial channel morphologies reflect specific roughness configurations adjusted to the relative magnitudes of sediment supply and transport capacity. Steep alluvial channels (cascade and step pool) have high ratios of transport capacity to sediment supply and are resilient to changes in discharge and sediment supply, whereas low-gradient alluvial channels (pool riffle and dune ripple) have lower transport capacity to supply ratios and thus exhibit significant and prolonged response to changes in sediment supply and discharge. General differences in the ratio of transport capacity to supply between channel types allow aggregation of reaches into source, transport, and response segments, the spatial distribution of which provides a watershed-level conceptual model linking reach morphology and channel processes. These two scales of channel network classification define a framework within which to investigate spatial and temporal patterns of channel response in mountain drainage basins.

## Footnotes

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## Articles citing this article

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