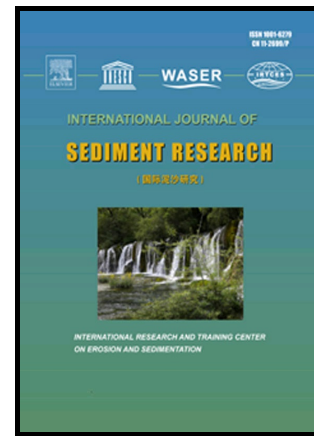


# Author's Accepted Manuscript

Graded and uniform bed load sediment transport in a degrading channel

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**Graded and uniform bed load sediment transport in a degrading channel**Zhijing Li<sup>1</sup>, Zhixian Cao<sup>2</sup>, Huaihan Liu<sup>3</sup> and Gareth Pender<sup>4</sup>

**Abstract:** Twenty runs of experiments are carried out to investigate non-equilibrium transport of graded and uniform bed load sediment in a degrading channel. Well sorted gravel and sand are employed to compose four kinds of sediment beds with different gravel/sand contents, i.e., uniform 100% gravel bed, uniform 100% sand bed, and two graded sediment beds respectively with 53% gravel and 47% sand as well as 22% gravel and 78% sand. For different sediment beds, the experiments are conducted under the same discharges, thereby allowing for the role of sediment composition in dictating the bed load transport rate to be identified. A new observed dataset is generated concerning the flow, sediment transport and evolution of bed elevation and composition, which can be exploited to underpin developments of mathematical river models. The data shows that in a degrading channel, the sand greatly promotes the transport of gravel, whilst the gravel considerably hinders the transport of sand. The promoting and hindering effects are evaluated by means of impact factors defined based on sediment transport rates. The impact factors are shown to vary with flow discharge by orders of magnitude, being most pronounced at the lowest discharge. It is characterized that variations in sand or gravel inputs as a result of human activities and climate change may lead to severe morphological changes in degrading channels.

**Key words:** *sediment transport; bed load; gravel; sand; promoting; hindering*

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