

Downstream hydraulic geometry of alluvial rivers

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Abstract This article presents a three-level approach to the analysis of downstream hydraulic geometry. First, empirical concepts based on field observations of ‘poised’ conditions in irrigation canals are examined. Second, theoretical developments have been made possible by combining basic relationships for the description of flow and sediment transport in alluvial rivers. Third, a relatively new concept of equivalent channel widths is presented. The assumption of equilibrium may describe a perpetual state of change and adjustments. The new concepts define the trade-offs between some hydraulic geometry parameters such as width and slope. The adjustment of river widths and slope typically follows a decreasing exponential function and recent developments indicate how the adjustment time scale can be quantified. Some examples are also presented to illustrate the new concepts presented and the realm of complex river systems.

Key words alluvial channels; downstream hydraulic geometry; river morphology