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Integrating channel form and processes in the Gangetic plains rivers: implications for geomorphic diversity

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Abstract

Geomorphic diversity at a variety of spatial and temporal scales has been studied in the western Ganga plains (WGP), India, to isolate the dominating factors at each scale that have the potential to cause major geomorphic change. The Ganga River and its major tributaries draining the WGP have been investigated in terms of longitudinal, cross-sectional, and planform morphology to assess the influence of potential controls such as climate, geology, topography, land use, hydrology, and sediment transport. These data were then compared with those from the rivers draining the eastern Ganga plains (EGP) to understand the geomorphic diversity across the Ganga plains and the causal factors. Our investigations suggest that in-channel geomorphic diversity over decadal scale in rivers with low width-to-depth (W/D) ratio is caused by periodic incision/aggradation, but it is driven by channel avulsion in rivers characterised by high W/D ratio. Similarly, planform (reach-scale) parameters such as sinuosity and braid-channel-ratio are influenced by intrinsic factors such as changes in hydrological conditions and morphodynamics (cutoffs, small-scale avulsion) that are in turn impacted by natural and human-induced factors. Finally, we have

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