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Multi-parameter based Channel Health Assessment for Reach Prioritization along the River Silabati in Eastern India for Stream Restoration

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The inclusion of the term 'Hydromorphology' in the Water Framework Directive by the European Union has altered earlier perspectives of stream health analysis. Rivers are now viewed from integrative standpoints of channel morphology, hydrology and ecology for framing and sustaining long-term restoration goals. The scant examples of such analyses, especially from the Indian subcontinent, has spurred on this study to be undertaken in an eastern Indian river along which the ambient stream geomorphic condition was examined using an integrated, multi-metric framework that places due importance on morphological functions and hydrological attributes while also considering the riparian ecological structure as an essential element in judging the overall stream health. The enumerated Morphological Quality Index (MQI) deftly highlighted the causes of geomorphic and hydrological disconnectivities within the stream reaches while the site-specific Horton's Water Quality Index (WQI) revealed the direct influence that channel morphology and water quality have on in-stream biota. These results were further validated using vegetation indices like the Qualitat del Bosc de Ribera (QBR), Riparian Strip Quality Index (RSQI) and Normalised Difference Vegetation Index (NDVI) to provide greater objectivity of assessment and to gain a holistic insight into the overall stream health status. With anthropogenic pressures being the main triggers of stream health deterioration along this river, all the above indices pointed towards mostly degraded channel conditions, except in some relatively inaccessible reaches. Finally, the overall channel quality rating obtained by combining all these indices, identified the middle and lower courses as experiencing the highest degree of impairment, which equates to just over one-fifth (21.37%) of the entire river course. The adopted methodology was proven to be a rational framework for addressing the hydromorphological disturbances faced by a channel, in addition to pointing out sites that need management and restoration on a priority basis.