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An entropy-based investigation on the river recovery potential in a regulated river basin

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River recovery is the process that describes the capacity of the river to adjust to the limiting boundary conditions. In the regulated rivers, altered flow-sediment regime controls the trajectory of adjustments along the geomorphic and vegetative attributes. The present study is focused on recovery potential assessment of Mahanadi River, which shows a gradual emergence of in-channel vegetation in the post-dam period. The study area encompasses (i) 10 km reach of Mahanadi River (M_1) having bedrock exposed, anabranching channel pattern and (ii) 102 km reach of Ong river (O_1) with alluvial, compound channel form. In this study, Google Earth Engine cloud computing platform is used to process the Landsat images (1980-2010) and vegetation, water, and floodplain geomorphic classes are derived by Normalized Difference Vegetation Index (NDVI) and modified Normalized Difference Water Index (mNDWI). Finally, the intensity disorder index (IDI) is computed to represent the 'system state' in the post-monsoon periods and the influence of vegetation growth on the channel recovery. The results show that M_1 is relatively stable, with cumulative vegetation area increased from 2% in 1980 to 8% in 2010. However, O_1 demonstrates an accelerated increase in vegetation area i.e., 10% in 1980 to 30% in 2010. The system state (IDI) varies between 0.2 and 0.6 and follows a decreasing trend along M_1 and O_1 . The findings establish that both regulated reaches may approach channel recovery in the near future, and prevailing boundary conditions indirectly influence the rate and direction of IDI.