

PLAUSIBLE ADAPTIVE TECHNOLOGIES FOR ADDRESSING SEDIMENT IMPEDIMENTS IN INCESSANT FLOW OF RIVER GANGA

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Abstract

The human interventions for various infrastructural and developmental activities are changing the land use land cover of river catchments and in turn disturbing the hydrological regimes of fluvial systems. This results into the instability of sediment laden flow in alluvial rivers causing erosion and sedimentation at various places along the river course. The presence of hydraulic structures along with hydrological uncertainty and climate change aggravate the problems associated with increased sedimentation/erosion in the upstream and downstream of hydraulic structures. The presence of Farakka Barrage has resulted into a number of problems such as high sedimentation, erosion of new areas, flooding and damages to riverine eco-systems. The sedimentation is also impeding in fulfilling the objectives of the Farakka Barrage Project, navigability of Bhagirathi-Hoogly river system and Haldia-Allahabad Inland Waterway. This study presents a number of plausible adaptive technologies that can be pursued or tested for addressing problems arising out because of high sedimentation in river Ganga which is also becoming an impediment in the incessant flow of river Ganga. These adaptive technologies include mathematical models, high resolution satellite data based techniques, silt management policies and engineering measures. This can further help in detailing the design guidelines and policies that could be evolved for structural and non-structural measures to reduce the erosion, control the siltation and reduce the probability and severity of flooding and ecosystem damages. The study reveals significant changes in the bedform configurations and bar formations in Ganga river which changes the river geomorphology and subsurface structure, and interactions between stream and adjoining aquifer. The processing of multirate high resolution satellite images enables to decipher bedform configurations and point bar formations. Results show that the river flow's stability is disturbed in several river stretches which has caused imbalances in the hydrological regime and ecosystem services. The study shows that there is need to have comprehensive scientific study for the Ganga basin as a whole including its major tributaries to assess the water and sediment fluxes and channel stability against these fluxes, interactions of hydraulic structures with the streamflow and its impact on the hydrological regimes, changes in the river bank, bedform configurations and bar formations and its impact on the groundwater systems, and consequences to ecosystem services.

Keywords: *River equilibrium, Hydrology, Sedimentation, Erosion, Remote Sensing, Groundwater*