

Study of Morphological Changes of the River Ganga in Patna District, Bihar Using Remote Sensing and GIS Techniques

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Abstract : There are continuous changes upon earth's surface by a variety of natural and anthropogenic agents cut, carry away and depositing of minerals from land. Running water has higher capacity of erosion than other geomorphologic agents. This research work has been carried out on Ganga River, whose channel is continuously changing under the influence of geomorphic agents and human activities in the surrounding regions. The main focus is to study morphological characteristics and sand dynamics of Ganga River with particular emphasis on bank lines and width changes using remote sensing and GIS techniques. The advance remote sensing data and topographical data were interpreted for obtaining 52 years of changes. For this, remote sensing data of different years (LANDSAT TM 1975, 1988, 1993, ETM 2005 and ETM 2012) and toposheet of SOI for the year 1960 were used as base maps for this study. Sinuosity ratio, braiding index and migratory activity index were also established. It was found to be 1.16 in 1975 and in 1988, 1993, 2005 and 2005 it was 1.09, 1.11, 1.1, 1.09 respectively. The analysis also shows that the minimum value found in 1960 was in reach 1 and maximum value is 4.8806 in 2012 found in reach 4 which suggests creation of number of islands in reach 4 for the year 2012. Migratory activity index (MAI), which is a standardized function of both length and time, was computed for the 8 representative reaches. MAI shows that maximum migration was in 1975-1988 in reach 6 and 7 and minimum migration was in 1993-2005. From the channel change analysis, it was found that the shifting of bank line was cyclic and the river Ganges showed a trend of southward maximum values. The advanced remote sensing data and topographical data helped in obtaining 52 years changes in the river due to various natural and manmade activities like flood, water velocity and excavation, removal of vegetation cover and fertile soil excavation for the various purposes of surrounding regions.

Keywords : braided index, migratory activity index (MAI), Ganga river, river morphology

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