

Project Title: River dynamics and Flood risk evaluation of the Kosi river, north Bihar plains: an integrated approach

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The project used an integrated approach for understanding river dynamics and flood risk evaluation of the Kosi river in north Bihar. A large scale (>100 km) avulsion of the Kosi river took place on August 18, 2008 following a breach in the eastern afflux bund at Kusaha in Nepal. This resulted in inundation of very large areas in Nepal as well as in north Bihar and was one of the biggest human tragedies in recent years on a global scale affecting 35-40 lakhs of people. Massive engineering efforts were needed to bring the river back to its original course although it is debatable if this would provide a long-term solution to the recurrent migration and flooding in this region. This project has focused on identifying the reaches prone to avulsion using an integrated approach of slope ratios and planform dynamics. We have also investigated the connectivity structure of the fan surface before and after the avulsion and have developed a model to predict the pathway of the avulsion channel. Another important contribution of this project has been to characterize the disconnectivity caused by rail-road network on the fan surface and this has been identified as one of the important reasons of extensive waterlogging and prolonged inundation in the region. Modern techniques of kinematic GPS, Total Station and echo-sounding have been used to map the channel profile and topography of the adjoining floodplain and we have demonstrated that several reaches of the Kosi are super-elevated and that this is a major cause of frequent breaches and avulsion of the Kosi including the August 2008 event. Finally, we have used a number of thematic data sets including rainfall, topography, geomorphology, population density, rail-road network, and land use /landcover to produce a flood risk map of the region using a GIS based approach. Results of this project should benefit the river managers to develop plans for an integrated flood management programme in this region.