

Chapter 4

STUDY AREA

The Ganga river is one of the most important rivers in the Indian subcontinent. It is a snow fed Himalayan river, heavily laden with detritus and flows sluggishly from west to east. The Ganga river has numerous large and small tributaries, of which the important ones are the Yamuna, the Gandak, the Kosi and the Mahananda. Together they comprise the Ganga river basin which covers the States of Uttar Pradesh, Bihar, West Bengal and parts of Haryana, Rajasthan, Madhya Pradesh and the Union territory of Delhi. The total length of the river Ganga is 2,506 km and its catchment area is 10,73,070 km². The average gradient of the river Ganga is 9.5 cm per km in the upstream reaches and slows down to 6 cm per km in Bihar. The normal annual rainfall of Ganga basin varies from about 600 mm to 1900 mm of which more than 80 percent occurs during the South-West monsoon. The rainfall increases from west to east and from south to north.

The flood problem in the Ganga basin is mostly confined to the areas on the northern bank of the river. The damage is caused by the northern tributaries of the Ganga by spilling over their banks and changing their courses. Though the Ganga carries huge discharges, the inundation and erosion problems are confined to some specific places only. In general, the flood problem increases from west to east and from south to north. In the north-western parts of the basin, there is the problem of drainage congestion. The drainage problem also exists in the southern parts of West Bengal. The problem becomes acute when the main river, in which the water is to be drained, already has high water level. The flooding and erosion problem is serious in Uttar Pradesh, Bihar and West Bengal. In Bihar, the floods are largely confined to the rivers of North Bihar and are an annual feature. Most of the rivers (e.g. the Burhi Gandak, the Bagmati, the Kamla Balan, other small rivers of the Adhwara group, the Kosi in the lower reaches and the Mahananda at the eastern end) spill over their banks causing considerable damage to crops and dislocating traffic. High floods occur in the Ganga occasionally causing considerable inundation of the marginal areas in Bihar. Further, the middle Ganga basin in Bihar is especially prone to river migration. For this reason, the river Ganga from Ara to Patna in the middle Ganga basin in Bihar was selected for river migration studies. In this stretch, the river course changes considerably in magnitude as well as direction.

Geographical extent of the study area lies between 84°40' E to 85°14' E longitude and 25°36' N to 25°19' N latitude. It covers Ganga river from Chhapra to Hajipur on its left bank and Ghazipur in Ara district to Patna City on its right bank. The reach of river Ganga between Ara to Patna is about 66 km long. In this stretch, river shows meandering channel characteristics. The river changes its course considerably in magnitude as well as direction depending upon the

discharge in the river. The banks on either sides of the river are almost flat and of alluvial soil formation. This makes the land very fertile. In absence of any industrial developments in the nearby area and it being one of the densely populated regions of the country, the pressure on land for sustaining life is very high.

Large chunks of land, locally known as Diara, can be easily seen on either side of the river, which have history of submergence during monsoon seasons. A number of villages and other settlements exist in these Diara land and agriculture practices are common during non monsoon season. These areas are very much prone to erosion and in course of time, river has shifted to such an extent that many of these places are now washed away and form part of the river course even in post monsoon periods.

Three major rivers meet the river Ganga in this stretch. River Ghaghara meets it at Chhapra and Gandak at Hajipur on its left bank while river Sone meets it near Suratpur on its right bank. Before confluence, Sone river bifurcates into a number of channels which flow parallel to Ganga between Sherpur and Danapur. During course of time these Sone channels have merged into main Ganga river course affecting the settlements living between these small river channels.

From Chhapra to Nayagaon, the river flows mainly from west to east and after that it takes almost a right turn in south direction to flow upto Sonapur where it again flows eastward up to Hajipur. The major township on the left bank of the river are Chhapra, Dighwara, Sonapur and Hajipur and river runs almost parallel to national highway upto Sonapur. On the right bank of the river major townships are Danapur, Patna and Patna City. From downstream of Danapur, the right bank is almost embanked for flood protection of township area viz. Danapur and Patna and therefore, shifting of the river has not been observed. Fig. 4 shows the index map of the study area showing the course of river Ganga between Ara to Patna as delineated from SOI toposheet of 1974-76.

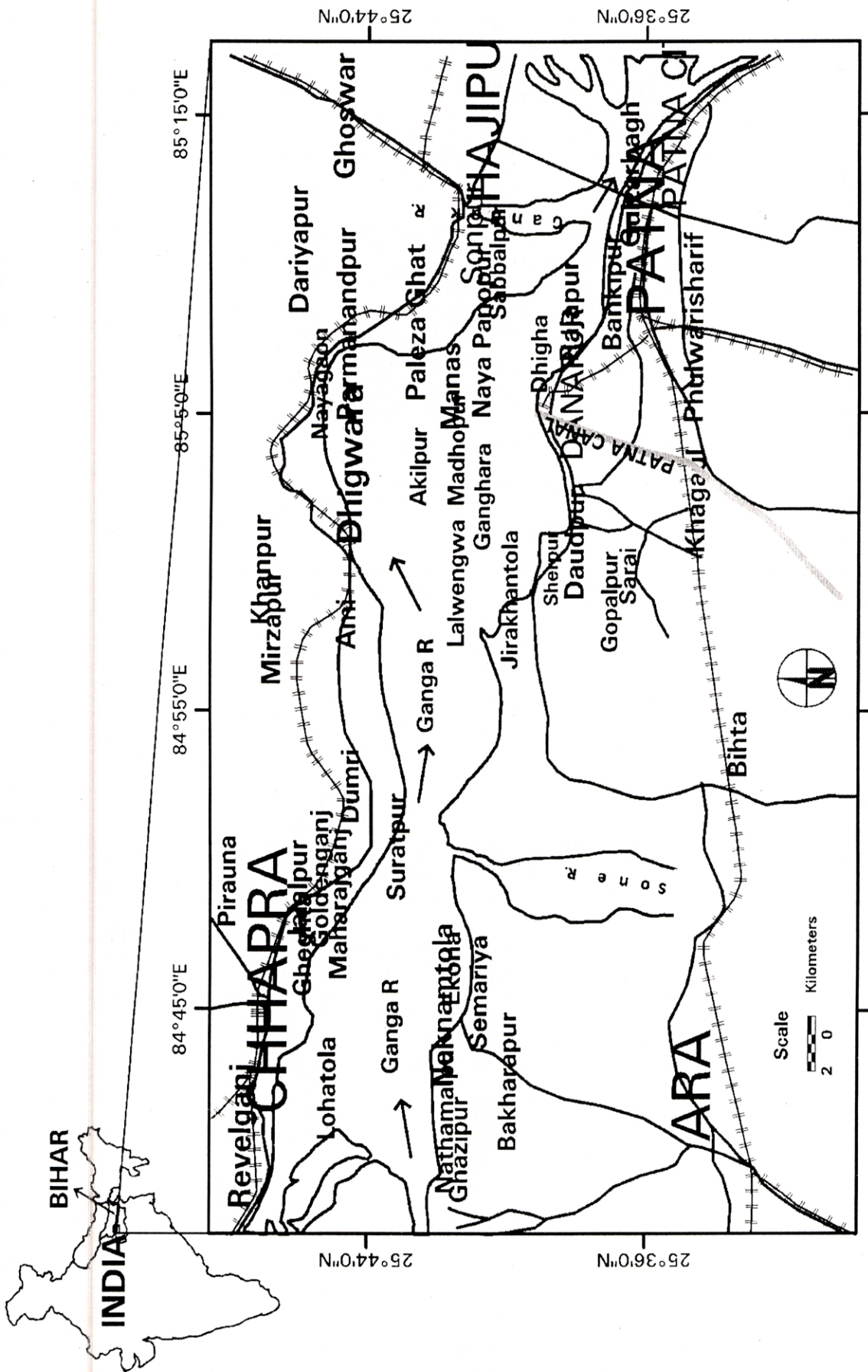


Fig. 4: Index map of the study area showing course of river Ganga between Ara and Patna (as delineated from SOI toposheets, 1974-76)