Chapter 3

PROBLEM DEFINITION

The manner in which rivers change the form and pattern of their channels has been a recurring theme in river studies for many years. Planform analysis helps us to understand the changes in channel pattern in both time and space. The Ganga river is one of the most important rivers in the Indian subcontinent. It has numerous large and small tributaries, of which the important ones are the Yamuna, the Gandak, the Kosi and the Mahananda. The total length of the river Ganga is 2,506 km and its catchment area is 10,73,070 km^2. 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 evaluation of its shifting course. In this stretch, the river course changes considerably in magnitude as well as direction. In the 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. The conventional approach to collect information regarding the shifting characteristics of the rivers is not only uneconomical but time consuming as well. Remote sensing data obtained through satellites may be effectively used to evaluate the shifting characteristics of rivers in a quick and cost effective manner. The objectives of the present study are:

(i)   To delineate the course of river Ganga between Ara to Patna along with the major roads, railways and important places from SOI toposheet (1974-76); from the FCC of IRS-1A LISS-II data for the year 1989 and digital data of IRS-1C LISS-III for the years 1996, 1998 and 2000; and from the digital data of IRS-1C PAN for the years 1996 and 2000.

(ii)   To study the shifting course of river Ganga between Ara to Patna from 1974-76 (SOI toposheet) to 1989 (FCC of IRS-1A LISS-II data); from 1989 to 1996 (digital data of IRS-1C LISS-III); and from 1996 to 2000 (digital data of IRS-1C LISS-III).

(iii)   To identify the critical locations along the river Ganga between Ara to Patna where major shifting has taken place.

(iv)   To study in detail the shifting characteristics of river Ganga at the critical locations using IRS-1C PAN data and also to identify the places which have been severely affected and the places which are likely to be affected in future.

(v)   To study the shifting pattern of river Ganga at the critical locations using the data of 1974-76, 1989, 1996, 1998 and 2000.