Evolution of Drainage and Morphology of Upper Bhagirathi-Ganga Interfluve Region of West Bengal with Special Reference to Palaeochannels

Sayantan Das

Abstract of the thesis submitted for the degree of
Doctor of Philosophy (Science) in Geography to the University of Calcutta. 2017

Located in India and Bangladesh, the composite delta of the Ganga and Brahmaputra is the largest in the world. Defined as the Upper Bhagirathi–Ganga Interfluve (UBGI), the southwestern part of this region is dealt in this work. The UBGI is bounded by the Bhagirathi–Hugli in the west, the Ganga in the north, international boundary between India and Bangladesh in the east, and the Jamuna in the south (22.84°–24.51° N, 88.04°–88.99° E; 7,893 km²). The main objective of the study is to trace the evolution of the river systems of the UBGI.

The database for this study consists of maps and satellite images of 28 different survey / imaging years between 1767 and 2016. The work is complemented by analysis of available hydrological data and field surveys using total-station and echo-sounder across the channels and floodplains.

The existing distributaries of the UBGI are the Bhagirathi–Hugli, Bhairab, Jalangi, Mathabhanga, Churni and Ichhamati. Due to sedimentation at headwaters, most of these do not receive discharge from the Ganga during lean seasons and are in various states of degeneration. All are characterized by intense meandering.

The palaeochannels of the UBGI include the Gobra Nala, Chhota Bhairab, Salmari, Upper Jalangi and Anjana; with their courses almost merged with the accretion topography. The distributaries and palaeodistributaries were quite active in the past, as indicated by the greater dimensions of most of the oxbows and cut-offs compared to their proximal channels.

Most distributaries of the UBGI are periodically unable to contain the monsoon discharge. Consequently, 89% of the region has become susceptible to flood hazard. However, despite the large floods, channel planform alterations are minimal in recent times. The topography of the region mainly consists of floodplains, natural levees and cutoffs.

Amongst all the rivers of the UBGI, only the Bhagirathi–Hugli is managed through the Farakka Barrage Project. The other distributaries of the study area continue to suffer from sedimentation of their off-takes. This has significantly affected landscape development. With no convincing method of resuscitating the other distributaries, adjustment to the altered flow conditions would be the best management alternative.

Contains 10 chapters in 4 parts, xx+ 350 pages, 49 tables, 155 figures, 64 plates & 373 references