STUDY ON MORPHOLOGICAL AND MEANDERING CHARACTERISTICS OF BHAGIRATHI-HOOGHLY RIVER SYSTEM

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1. ABSTRACT

Meandering rivers, characterized by their natural inclination for alluvial streams, pose challenges in river mechanics and bank erosion. Current management attempts are ineffective due to a lack of knowledge about fluid/sediment interaction. Predicting and estimating meandering tendencies is crucial for engineering, geological applications, and agricultural land management. Meandering has become a severe problem for many of the world's main rivers that carry substantial loads of sediment, such as the Yangtze and Amazon rivers, the Brahmaputra, the Ganga River system, and several other alluvial riverine habitats. The Hooghly River, a major river in India, is primarily supplied by the Farakka Feeder Canal, a barrage diverting Ganges water from Giria to Murshidabad. The river flows through various cities and enters an old Ganges channel at Nurpur before emptying into the Bay of Bengal. The study analyzes bank shifting in the project area, affecting the economy, lives, and infrastructure development in post barrage condition. It focuses on river meandering dynamics and the challenges of establishing hydrological and ~~civil~~ hydraulic structures. The project aims to understand river course changes, induce bank protection, and reduce vulnerability to meander formation in urban area and villages.

2. INTRODUCTION

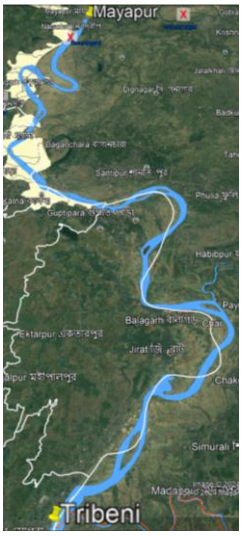

Fig.-1: Study area of the River Hooghly from Mayapur(Nadia)[23°24'44.64"N; 88°22'49.66"E] to Tribeni (Hooghly)[22°59'22.75"N; 88°24'13.26"E]

Meandering rivers have such a tortuous course that, despite their proximity to the river's expected relocation margin, adjacent properties frequently sustain unexpected damage due to the river's unpredictable movements. Due to the rivers' unpredictable courses, bridges and

diversion structures have been avoided on multiple occasions. Since these issues affect rivers everywhere in the globe, many geologists and engineers are interested in learning more about the causes and solutions of these issues. In the past, geologists explained the meandering features as the Coriolis force brought on by the earth's rotation. It is now acknowledged that the force produced by the earth has very little effect on meandering in an average stream.

The Bhagirathy-Hooghly River water is primarily supplied by the artificial Farakka Feeder Canal, a barrage that diverts Ganges water into the Bhagirathi Hoogly river system. This agreement between India and Bangladesh ensures the river's water supply, passing through Dhulian and Jahangirpur during lean period. The river, once forming the border between Bardhaman, Hoogly, Howrah, Nadia and South 24 Parganas districts, now flows south past various towns and cities before turning southwest before entering Kolkata. It enters an old Ganges channel at Nurpur and empties into the Bay of Bengal through an estuary about 40Km wide. The Hooghly River experiences a tidal bore, a rapid tide that can reach heights of 2.1 m.

The main objectives of this study are

- To draw a map of the existing river system, highlighting any flow channels or obstacles from Mayapur to Tribeni of the river Hooghly.
- Primary and secondary data collection like; topographic and bathymetric survey to evaluate the rivers' hydro-morphological state, channel migration, discharge, sediment load, water level.
- To build a physical model that will be used to depict a section of the Hooghly River and mathematical model of the whole study area as shown in Fig.-1.
- To analysis of the model results and adopt a nature-based solution or a grey-green intervention for engineering solution.

3. RESULTS AND CONCLUSION

A portion of the Bhagirathi-Hooghly River from Mayapur/ Swarupganj in the north to Tribeni in the south will be included in the research area. The river reach is 85.7 km long as shown in Fig.-1. The river has a tendency to carry silt, which has lowered its water level and made it less navigable over time. Silting has also played a significant role in the path of the river's transformation throughout time. Between the dry and monsoon seasons, there is a noticeable difference in the river's flow and water level. Topographic, hydrographic and hydrological data on flood plains and river cross-sections and gauge were collected form concerned departments. The internet program come2patra.pythonwhere.com was used to process and create the river's cross-sectional graphic. The HEC model will be used for one-D hydrodynamic analysis of the river. From the results a sustainable river bank erosion problem may be addressed for engineering activity.

4. REFERENCES

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