Study and Reconstruction of Quaternary Riverine Wetlands of Gangetic Plain through Systematic Approach

Thesis submitted in partial fulfillment for the
Award of Degree

Doctor of Philosophy

By

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Dedicated to my family

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Preface

Wetlands are hydrological landscape units which are permanently or seasonally flooded with water and have distinct flora and fauna. They perform multiple functions such as environment cleansing and maintaining water quality, improving retention of floodwater and controlling soil erosion, and providing habitat for wildlife. Since they provide a wide range of direct and indirect benefits (ecosystem service) to human well-being, they are ecologically more valuable and environmentally more sensitive, therefore an active conservation strategies and management planning becomes important. The wetland systems associated with the rivers or streams are considered as riverine wetlands and generally occur in the floodplain.

The floodplains of Ganges are the home of riverine wetlands. Several of these riverine wetlands are considered as Ramsar sites due to their ecological and environmental importance. To study and reconstruction of quaternary riverine wetlands in the Gangetic floodplain, the interfluvial zone of the Ganga and Sai Rivers has been selected as a representative study area. In the interfluvial zone of the Ganga and Sai Rivers of Gangetic Plain, there is a tract of riverine wetlands in the form of underfit rivers, traces of channels, meander scars and ox-bow lakes in the both upper and lower reaches of currently flowing ephemeral Bakulahi River. A detail investigation through spatio-temporal analyses of these riverine wetlands have not been carried out yet. The present work focuses on the identification, delineation and mapping of riverine wetlands allied with the Bakulahi River. The study also includes the analysis of the distribution and spatio-temporal variation in the areal extent of the riverine wetland in 20 years (2000 to 2019), and the Concurrent impact of degradation of Riverine wetland on the chemical characterisation of soils in the part of interfluve of the Ganga and Sai Rivers. Further a model has been Prepared for the reconstruction of riverine wetlands in the interfluvial zone of the Ganga and Sai Rivers.

The thesis is divided into nine chapters. The details are as follows:

Chapter 1 includes a general introduction to the riverine wetlands, their degradation and revival, and the objectives of the thesis.

Chapter 2 presents a detailed literature review of the work done on the riverine wetlands, their degradation at national and international levels, and the research gaps.

Chapter 3 provides detailed information about the geographic, geological, and geomorphological setting and the climatic conditions of the study area.

Chapter 4 discusses the detailed methodology followed in the thesis.

Chapter 5 deals with the identification, delineation and mapping of the Riverine wetlands of the study area.

Chapter 6 provides a detailed analysis of spatio-temporal changes in the riverine wetlands of the study area.

Chapter 7 deals with the chemical characterisation of the soils of the riverine wetlands and its adjoining area.

Chapter 8 discusses a model for reconstructing riverine wetlands in the study area. **Chapter 9** includes the summary and conclusions of the work.