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Shashi Shekhar Shukla* • **Padmini Pani**

Jawaharlal Nehru University, New Delhi, India, Centre for the Study of Regional Development

E-mail: **shashishekharno1@gmail.com*

Insights from the palaeo-geomorphic features of the Central Ganga Plain, India: past to present

The Ganga Plain is one of the largest alluvial tracts of the world consisting of rivers of different types and sizes. The domination of the fluvial process has evolved the different kinds of fluvial landforms on this plain. The palaeo-fluvial features have a significant presence in the region but are less explored/mapped. Palaeo-fluvial features are remanent of the past that are disconnected from the process that forms them. The palaeo-fluvial landforms on distant interfluve surfaces of the Central Ganga Plain are disconnected from the present rivers. The major palaeo-fluvial landforms observed in this region are palaeo-channel and associated oxbow lakes, meander scars *etc*. The evolution of such features is still not understood properly. These palaeo-fluvial features are a possible result of changing past climatic and geologic conditions in the region. The landscape memory of such features could be very important to understand the climatic and tectonic changes of the past. Apart from that, they do control several physical-cultural aspects of the region. The large-scale mapping of such features is very important to locate the old path of flow, the direction of channel changes, events of river capturing, and the evolution of contemporary rivers. The study of such features is required to understand the past evolution of the Ganga plain and to understand the impact of such features on the present physio-cultural setting.

Although the palaeo landforms of the region are buried or in the process of burial, still they show different kinds of signatures that can be traced for identifying and mapping them. The available high-resolution remote sensing datasets are very helpful for identifying and studying them. It is found that automatic extraction techniques are not useful for the selected study area due to diverse surface conditions. The mapping of these palaeo-fluvial features has been done using visual image interpretation and manual onscreen digitization on the moderate to high-resolution datasets. Mainly Landsat MSS images are used along with the high-resolution Google Earth imageries available on the Google Earth Pro platform. The sedimentological and geochronological analysis is also important along with mapping to understand the history of the past.

The several networks of palaeo-channel with associated landforms are mapped in the study. It is found that there are signatures of lost rivers on the interfluve surfaces of the Ganga Plain. This mapping has also solved the problem of the presence of large lakes in the study area. The dense network of palaeo-fluvial features suggests that in the recent geological past, the fluvial activity was very active and rivers have frequently changed their paths. Some river capturing events also have been identified in the study. This study is very important in highlighting the influence of these remanent landscapes of the past on the present physio-cultural setting.