



Sedimentary Facies and their possible significance in Holocene paleoclimate reconstruction: Example of Baraila Tal, Central Ganga Plains

Pavani Misra, Rajiv Sinha, and Sampat Kumar Tandon

Indian Institute of Technology Kanpur, Kanpur 208 016, India (pavanim@iitk.ac.in; rsinha@iitk.ac.in; sktand@iitk.ac.in)

To seek insights into natural climate variability on decadal/ centennial or half-millennial scale, we need to examine Holocene stratigraphic records. Due to the paucity of high-resolution Holocene continental records in India, Holocene climate change has mostly been studied from the marine sediments. Since agricultural communities are sustained by the resources of large river basins, it is important to understand the response of these systems directly to any climate change. The fluvial archive itself offers a relatively low resolution record, but the ox-bows and meander cut-offs in these basins act as semi-closed systems and hence offer the possibility of obtaining better time resolved stratigraphic data. Therefore, lakes from Central Ganga Plains can be regarded as good terrestrial archives; these have been inadequately investigated as compared to the lakes in western India which have been studied with multi-proxy approaches and show major abrupt climatic disruptions.

Previous work on some of the lakes in the Central Ganga Plains is largely based on fossil pollen and commonly shows an alternating increase in tree pollen and grassland pollen representing a shifting trend of warm and humid conditions (from 12,500 to 6,400 and 4,800 to 2000 cal yrs BP), to cold and dry spells, respectively. Lake organic facies from Sanai Tal follow an increasing trend of $\delta^{13}C$ values from 15,000 to 5,800 14C yr BP, which indicate an enhanced aquatic productivity during that period, except between 11,500 to 10,500 14C yr BP when lighter $\delta^{13}C$ values are observed (Sharma et al., 2004), indicating a dry climate for this short period.

Against the above background of previous studies, the Baraila Tal, a lake in the Central Ganga Plains has been chosen to obtain a relatively better time-resolved stratigraphy and to characterize its lithofacies for assessing proxy-paleoclimatic data. We have carried out sedimentary facies analysis for three trenches in the Baraila Tal; the major sand, silt and clay facies are subdivided into 21 sub-facies. One of the trenches has been studied for its clay mineralogy, TOC and grain size distribution, using XRD, Rock Eval pyrolysis and the wet sieving method, respectively. High resolution chronology will be based on AMS C-14 dates. These data will then be assessed for their utility as proxy-indicators of past climate.

Reference: Sharma S., Joachimski M., Sharma M., Tobschall H.J., Singh I.B., Sharma C., Chauhan M.S., Morgenroth G., 2004. Lateglacial and Holocene environmental changes in Ganga plain, Northern India. *Quaternary Science Review*, 23: 145-159