

Extent and Cause of the Shrinkage of Loktak Lake in Imphal Valley, NE India: Insights from Integrated Remote Sensing- and Field-Based Investigations

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Abstract: In this paper we discuss the extent and cause of the shrinkage of Loktak Lake of the tectonogenic Imphal intermontane valley that is located within the central part of the Manipur Hills in Indo-Myanmar Ranges of NE India. The present and past extent of the lake has been demarked on the basis of GIS assisted sedimentology- and remote sensing-based investigation, and cause of its shrinkage has been determined by analyzing the sedimentological data.

The Imphal valley is an elongated, irregular rectangular or rhomb shaped valley, having an area of ~ 1826 km², a maximum length of 68 km, width of 32 km, and elevation range of 760-900 m asml (average of ~ 798m asml). The valley is surrounded by up to ~2400m asml high hills. These hills occur as a series of straight or rectilinear ridges, trending N-S to NNE-SSW, which are deeply incised by stream/river with dendritic, sub-dendritic, semi-rectangular, and trellis patterns in different parts.

The Loktak Lake is developed in the south-western part of the valley. It covers an area of 287 km², with a surface elevation of 768m asml. Numerous stream/rivers fall directly into the lake, interestingly most of them mainly originate in the western hills. The lake is surrounded by marshy land which is usually flooded during the monsoon season. Detailed sedimentological investigations and subsequent remote sensing assisted mapping of sedimentary facies' distribution reveals that carbonaceous mud-dominated facies associations (with extensive peat facies in the upper part) of lacustrine affinity are developed over a vast area surrounding the Loktak Lake. This suggests shrinkage of the Loktak Lake by nearly 80% during the Recent past. Moreover, the presence of extensive peat deposits over the lacustrine mud suggests that the lake shrinkage, or the lakeshore regression, and development of vast swamps has been under humid climatic conditions. The regression under humid conditions could be a result of increased influx of finer sediments into the lake that outpaced the creation of accommodation space and ultimately led to fast infilling of the lake margins favouring development of vast swamps in due course of time.

Keywords: Lakeshore regression; Imphal valley, sedimentary facies; remote sensing