

Different phase of Solani River rejuvenation at Himalayan foothills: Implication of Himalayan Tectonics and climate change

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The Solani River in north India originates from the Himalayan foothills, near Dehradun. It runs about 145 km cutting across the Himalayan piedmont, consisting of boulders, pebbles and massive sandstones of Mio-Pliocene age and sandy to loamy Quaternary soils of the Ganga plain, before meeting the Ganga River. Frequent course change of this river leaves many paleochannels in the Ganga plain. This foothills-fed river covers a basin area of about 1750 km².

The Solani River records neotectonic activities and Holocene climate changes in the Ganga plain along its course. Unpaired tectonic terraces at Roorkee and Toda Kalyanpur at the right bank of the river are the evidence of neotectonism. At Roorkee, three terraces have been identified having riser of 1, 1.5 and 3m height and tread of 50, 40 and 70 m width, respectively. These E-W aligned terraces are 1.5 km away from the present river course. Generally, different generations of river terraces in the Ganga plain are distinguished by their respective degree of soil development. However, the presently studied terraces have no signature of soil development indicating very recent in nature and were developed in a very close time interval. These terraces were formed by upliftment of the Ganga plain due to compression along the Himalayan front and subsequent river shifting.

Climatic fluctuation of the region is evident by deeper level river bed scouring at different time interval and subsequent filling. The wet and dry climate deposits are well distinguished by distinct sediment characteristics. Three distinct phases of river bed scouring have been identified at Gadharauna. The relatively wet-climate is evident by deposition of abundant clay balls within sand. High population of clay balls indicates flood plain scouring. These deposits are well distinguished from their relatively dry-climate counter part by distinct scour surfaces and sand deposits. The Ganga plain is tectonically active by its coupled nature with the Himalaya. River courses in the Ganga plain are continuously shifting in one direction due to compression and upliftment of the area. The results allow reconstructing the Holocene evolution of the river valley and correlating the processes that led to the formation of the terrace system.

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