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Neotectonically controlled block tilting and its influence on drainage and soil characteristics of the Sone megafan: A study of the Himalayan tectonics to the south of the Ganga River

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Abstract

A handful of literature is available describing tectonic tilting of fault bounded blocks with respect to the Himalayan neotectonics, and its influence on the drainage geomorphology and soil characteristics in the Ganga plain [1]. The present study describes the influence of neo-tectonism on the drainage evolution and soil characteristics of the Sone megafan, south of the Ganga River. The fault bounded Sone megafan shows change in drainage characteristics in three distinct phases corresponding to three surfaces of distinct soil-characteristics. The earliest phase shows a wide channel network in the west-central part of the fan, during which most part of the fan was formed. This drainage network is characterized by well-defined braided sandy palaeochannels [2]. Soils in the inter-channel areas are very well developed showing 0.5 to 3 m solum thickness. Well-developed pedo-features in this region too correspond to any older soils in the Ganga plain. Due to lower slope, widespread sand deposit on this plain with thin intervening silt and clay characteristics of flood plain deposit are well present. In the second phase of drainage evolution, the channel network of the river was mainly confined in the eastern part of the fan. By the population and size of individual abandoned ponds and palaeochannels, the channel network can be well reconstructed. This area is mainly characterized by moderately developed soils with solum thickness vary from 0.3 to 0.6 m and that of the B-horizon from 0.7 to 1.5 m. In the third phase (present) the river again confines itself in the central part of the fan. Therefore, in the central part of the fan, the palaeochannels do not show their existence due to the influence of the present day channels and the older soils are overlain by the recent floodplain sediments.

This change of course is attributed to the tilting of the tectonic block bounded by the east and west Patna faults on which the whole fan lies. Two distinct phases of tilting are characterized by the gradual channel shift evidenced by lateral spreading of sand and silt on the fan similar to the Gandak megafan just north of it [1]. These two distinct phases of tilting can be well correlated to the response of the fault bounded block to the episodic nature of the Himalayan neotectonics.

[1].Mohindra et al. (1992) Earth Surf. Process. Land., 17: 643–662
[2].Sahoo et al. (2015) Geomorphology. 250: 349-369