# Morpho-dynamic characteristics and their controls, Bagmati River of Central Nepal Himalaya

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The Bagmati River has unique geological characteristics of terrains, diverse climatic regime, and topographic variations from the head to the mouth, which give rise to various patterns of the river along its course. The main stem Bagmati River that originates at the eastern hills of the Kathmandu Valley is the eighth order perennial river that stretches for about 206 km with an elongated catchment of area 3761 $km^2$ within different geological terrains as the Kathmandu Valley sediments, the Lesser Himalaya, the Siwalik Group and the Indogangatic Plains.

Seven representative segments from upstream to downstream are classified based on geomorphological characteristics in to C2, F2, F2, B2a, F3, D4 and F3 stream types. Morphological characteristics and river dynamics of the segments at different geological terrains are variable and are controlled by topography and local geology. The C2 stream-type developed at the Kathmandu Valley sediment is stable, the F2 and B2a stream-types developed at the Lesser Himalaya are potentially degradational and those of F3, D4 and C3 stream-types at the Siwaliks are potentially aggradational. The dimensionless shear stresses in F2, B2a and F3 stream-types exceed the corresponding critical dimensionless shear stresses, and the existing bankfull depths and water surface slopes exeed the corresponding required mean depths and bankfull water surface slopes. The stream powers at these segments are conspicuously higher compared to the rest of the study segments. Hence, the F2, B2a streams in the Lesser Himalayan terrain and the F3 streams in the Siwalik terrain are competent enough to transport their available bed materials load probably due to change in topography, slopes, and morphology.

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