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MORPHOMETRIC APPRAOCH USING REMOTE SENSING AND GIS IN WATERSHED MANAGEMENT

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Abstract

Geomorphology (particularly the relief and slope/gradient), geomorphic processes (fluvial) and climate (rainfall) have exerted a dominant control over the development of drainage. In the present study area, the watershed has two micro-watersheds (micro-watershed-1 and micro-watershed-II) of contrasting hydrological response. The development of drainage pattern is a result of geomorphological control (bifurcation ratio, Rb, Â 3). As compared to the micro-watershed-I (third-order), the micro-watershed-II (fourth-order) has higher values for the total stream numbers (“Nu) and their lengths (“Lu), basin area (a), drainage density (D), stream frequency (F), infiltration number (Di), drainage texture (Dt), relief (H), relief ratio (Rr), relative relief ratio (Rrf) and ruggedness number (Rn). Basin perimeter (p) and basin length (l) are almost the same for both the micro-watersheds, while the length of the overland flow (Lg) is lower in the micro-watershed-II. Basin shape parameters, i.e., circulatory ratio (Rc), elongation ratio (Re) and form factor (Ff) indicate that both the micro-watersheds are elongated. An evaluation of various morphometric parameters (“Nu, “Lu, a, D, F, Di and Dt) indicates that the micro-watershed-II contains more surface water resources (higher values for “Nu, “Lu and a) and the micro-watershed-I has greater potential for sub-surface water resources (lower values for D, F, Di and Dt). It is suggested that plain areas of the watershed especially those of the micro-watershed-I are ideal for augmenting the sub-surface waters, while the areas occupied by first- and second-order streams particularly those of the micro-watershed-II are potential zones for augmenting the surface water resources. Further, the surplus runoff during the rainy season can be harnessed through the construction of check dam/percolation, which helps in groundwater augmentation.

Keywords: Morphometric approach, Remote sensing, GIS, Watershed management