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Use of GIS for Hypsometric Analysis for Determining Erosion Proneness of Mandakini Watershed, Lesser Himalaya, Uttarakhand, North India

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Abstract

An attempt has been made for the assessment of erosion proneness which is quite essential in tectonically active, highly fragile and environmentally sensitive hilly regions. The assessment will not only help in knowing erosion proneness but also supports in adopting the best practices for integrated watershed management. The hypsometric analysis was performed to know the geological stages of the development of erosional landscapes that reveal the health or condition of a watershed. The hypsometric integral was estimated from the graphical representation of the measured contour height and enclosed area, and using the empirical formula. The study was carried out to assess erosion susceptible areas of the Mandakini River watershed, which forms a tributary of the Alaknanda River catchment of Lesser Himalaya, Uttarakhand. Six sub-watersheds were delineated from the Mandakini Watershed for performing the hypsometric analysis using contours generated from the DEM in a GIS environment. The hypsometric integral values were quantified by the elevation-relief method for all the sub-watersheds and are ranging between 0.46 (B3) and 0.50 (B4). Further, it was found out that almost all the sub-watersheds are comparatively matured and erosional processes are in the course of stabilization. The study reveals that the sub-watershed primarily B1 of the Mandakini Watershed are susceptible to erosion. Moreover, the past Earthquakes occurred near by area can also lead to the instability of the zones. Therefore, suitable remedial measures such as structural and non-structural methods may be adopted to mitigate soil erosion and also in enhancing sustainable conservation and management practices.

Keywords: Hypsometric analysis, Lesser Himalaya, Erosion proneness, Mandakini watershed, GIS