

DERIVE HYDROLOGICAL INFERENCES THROUGH GIS-BASED DRAINAGE MORPHOMETRIC ANALYSIS IN KEHELGAMU OYA DRAINAGE BASIN OF SRI LANKA

MGBK Jayarathna¹, RMGN Rajapaksha^{1*} and UDD Adhikari²

¹Department of Animal Science, Uva Wellassa University, Badulla, Sri Lanka

²Faculty of Graduate Studies, University of Sri Jayewardenapura, Sri Lanka

Abstract

Morphometric analysis of drainage basins are significant that inference the hydrologic features of that drainage basin. GIS is one of the effective tools that used for delineating the drainage basins and deriving stream networks and stream orders to facilitate analysis of drainage basin morphometry. Present study was focused to derive the stream network and extrapolate the hydrological characteristics of the drainage basin via morphometric characters of the Kehelgamu Oya. The Kehelgamu oya is one of the origin tributaries of Kelani river and main feeder channel of Castlereigh reservoir. The digitized contour based data published by the Survey department (2017) were used as the base data of the present study. This secondary data were re-projected to build the Digital Elevation Model (DEM) of the basin under the ArcGIS 10.8 platform. DEM was the base raster map with 10 x 10 m resolution was used to delineate the stream network and stream orders through the filled DEM, flow direction and flow accumulation raster maps. The morphometric characters including linear, aerial and relief parameters of the drainage basin were calculated referring established and previously published mathematical formula. Results revealed that the Kehelgamu oya is a 5th order river extending 27.3 kms of basin length covering 440.8 kms of total stream length distribute within the basin area of 208.96 km² showing dendritic drainage network illustrating the elongated basin shape as per the results of form factor (7.66) and circularity ratio (0.19). The maximum numbers of first order streams (518) and Drainage density (2.1) designate the high intensity of permeability and infiltration characteristics that indicates potentials of contribute to groundwater store in the basin. Kehelgamu oya basin yields a low but extended peak flow since having high bifurcation ratio value (6.4) and elongated basin shape. Further it indicates the presence of geological control on drainage. Moreover, indication of low flood risk and low soil erosion are potentially important since the river feeds two main hydro power reservoirs.

Keywords: GIS; morphometric analysis; drainage basin; hydrologic features