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**Paired Watershed Delineation and an Analysis to Identify Its Morphological Features in Yagirala Forest Reserve**

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**Abstract**

Watersheds are the basic hydrological unit for water resource management. Watershed morphological characteristics like shape, watersheds area, perimeter, axial length, form factor, compactness factor, circulatory ratio, elongation ratio, basin slope channel length, stream frequency, drainage density, stream texture and overland flow are important in understanding the hydrology of the watershed. Thus, computation of watershed morphological characteristics is a prerequisite for detailed hydrological studies. Therefore, this study focused delineation of paired watershed and identification of their morphological features in Yagirala Forest Reserve (YFR) (6°21' to 6°26' N and 80°06' to 80°11' E) a secondary lowland rainforest in southern Sri Lanka. Manual and automated approach based on Triangulated Irregular Network (TIN), Digital Elevation Model (DEM) was made for the delineation of paired watersheds. Two watersheds; Watershed one (WS1) located in forest enriched with *Pinus caribaea* and the second was in natural forest (WS2). Morphological characteristics were examined using ArcGIS and mathematical formulas. Morphometric analysis showed that the watersheds areas were 0.91 km<sup>2</sup> of WS1 and 1.60 km<sup>2</sup> of WS2 which both are smaller in size with elongated and oval in shape respectively. According to the results perimeter was 5.14 km, axial length 1.46 km and channel length 1.29 km of the delineated watershed in WS1 whereas perimeter was 5.16 km, axial length 1.62 km and channel length 3.34 km of the WS2. The present study computed that Form factor was 0.43, Compactness factor 1.50, Circulatory ratio 0.43, Elongation ratio 0.6 and Basin slope 2.70% in WS1 whereas with values 0.61, 1.14, 0.75, 0.8 and 5.46% for the same parameters respectively in WS2. The stream frequency was 1.09 (No of streams per km<sup>2</sup>), Drainage density 1.41 (km per km<sup>2</sup>), Stream texture 1.53 km and Overland flow 0.35 km of WS1 whereas they were 1.25 (No of streams per km<sup>2</sup>), 2.08 (km per km<sup>2</sup>), 2.60 km and 0.20 km of the WS2. In conclusion, delineation of paired watershed and estimation of its morphological analysis in YFR provides a prerequisite for advanced forest hydrological studies in tropical lowland rain forest.

**Keywords:** Paired watersheds, Watershed morphology, Watershed delineation, Yagirala Forest Reserve, GIS, DEM