

Morphometric Analysis and Prioritization of Sub Watersheds of Umar Nala Watershed, Madhya Pradesh Using Geospatial Technique

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Paper No. 39

Received: 14-04-2020

Revised: 17-07-2020

Accepted: 28-08-2020

ABSTRACT

Morphometric analysis and thereby prioritization of watersheds have gained significant importance in land and water resources management. In this study an attempt has been made to prioritize sub-watersheds based on morphometric analysis using geospatial techniques in Umar Nala watershed of Narsinghpur district, of Madhya Pradesh. Morphometric parameters considered for the present study are stream frequency (S_f), drainage density (D_d), texture ratio (T_r), elongation ratio (R_e), circulatory ratio (R_c), form factor (R_f), bifurcation ratio (R_b) and relief ratio (R_{rl}). These parameters were estimated for each sub-watershed then ranks were assigned for prioritization of sub-watersheds on the basis of value/ratio relationship to arrive at a computed value for final ranking of the sub-watersheds. On the basis of morphometric parameters determined in GIS environment and the applying standard formulae prioritization among seventeen sub watersheds of Umar Nala, sub watershed no 10 is on top priority among seventeen sub watersheds for further soil and water conservations measures to be taken in the watershed.

Highlights

- This study conducted in Umar Nala watershed of Narsinghpur, district of Madhya Pradesh, India to prioritize sub-watersheds based on morphometric analysis using geospatial techniques.
- In this study, we employed seventeen sub watersheds of Umar Nala, and found which watershed urgently requires soil and water conservation measures.

Keywords: GIS, Morphometric Analysis, Prioritization, Watershed.

Population of our country is increasing over the years as a result pressure on natural resources also increasing (Sharma *et al.* 2016). So, it necessitates management and development of land and water resources on watershed basis (Sharma *et al.* 2008; Sharma *et al.* 2010). Watershed is a hydrological unit from which precipitation water flows to a common outlet or single point into small and large streams, rivers or oceans (Sharma *et al.* 2011; Patil *et al.* 2016; Rao, 2019; Rao *et al.* 2019). Geospatial technique has emerged as powerful tool to manage watersheds (Sharma *et al.* 2013; Patle and Awasthi, 2019a; Patle and Awasthi 2019b).

Quantitative description of any watershed is

an aspect which is important to characterize any watershed, which can be made easily by morphometric analysis of the watershed (Strahler 1964). Linear, aerial and relief aspects of watershed require measurement of watershed area, its perimeter, stream number, stream length to make morphometric analysis (Sharma and Seth 2010). Strahler (1964), Miller (1958), Smith (1950), Horton (1932, 1945), and others carried out pioneering work on the drainage basin morphometry.

How to cite this article: Dubey, S., Rao, JH, and Patle, D. (2020). Morphometric Analysis and Prioritization of Sub Watersheds of Umar Nala Watershed, Madhya Pradesh Using Geospatial Technique. IJAE, 13(3): 269-274.

Source of Support: None. **Conflict of Interest:** None. 

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