

# Morphometric Analysis of River Valleys Using GIS: A Case Study of River Ktsia-Khrami

*Giorgi Zedginidze*

E-mail: [giorgi.zedginidze276@ens.tsu.edu.ge](mailto:giorgi.zedginidze276@ens.tsu.edu.ge)

Department of Geography, Faculty of Exact and Natural Sciences  
Ivane Javakhishvili Tbilisi State University  
3, I. Chavchavadze Ave., Tbilisi, 0179, Georgia

The analysis of the river basin is important for any geomorphological and hydrological research, such as the assessment of the surface water runoff of the river basin, evaluation of groundwater potential, management of groundwater resources, and environmental impact analysis.

The purpose of this study was to assess the morphometry of the river Ktsia-Khrami river basin and its interaction with the hydrology of the Kvemo Kartli region. For the detailed assessment of the river basin's morphology NASA's Digital Elevation Model (DEM) was applied.

A Geographic Information System (GIS) was applied to create the maps for the exposition of the slopes (Aspect) and the inclination of the slopes (Slope).

We utilized a Geographic Information System (GIS) to determine basic morphometric parameters. These methods are relevant for the assessment of the surface water runoff of the river basin, prediction of erosion processes, assessment of reservoir sedimentation caused by surface water, and management of water resources in the watershed.

Hydrologists and Geomorphologists agreed that there is a connection between surface runoff and watershed systems in terms of geographic parameters and morphological characteristics. Various hydrological processes, such as the physical characteristics of river basin topography (size, shape, inclination of the slope, density, size and length of contributors, etc.), can be interconnected with morphological parameters.

Geology, relief, and climate have detrimental impacts on the ecosystems of rivers. Detailed morphometric analysis of the watershed is instrumental in understanding critical aspects, such as the delineation of the river network, assessment of river basin morphology, and the impact of relief forms on them.

The use of GIS technology is an accurate, fast, and efficient approach to morphometric analysis of river basins.