

## Reliability of watershed area estimation using Digital Elevation Models

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**Abstract:** Digital elevation models (DEM) have become very useful for delineating catchment basins to obtain more accurate area estimations in the last decades. As a discretization of a continuous surface, DEM's ground sample data (GSD) delimit the elementary watershed boundary segments. The finer the GSD resolution, the closer tends to be the true drainage basin edge and its area to those estimated by DEM processing. Our goal is to establish the minimum area estimation that fits a desired degree of reliability for any catchment shape, considering the GSD of the DEM, the admitted tolerance and the shape of the basin. This approach starts with the area assessment of perfect circles which are then converted to raster format using a regular matrix of pixels. The squared Gravelius Index of a watershed is taken as a multiplicative factor that will allow the comparison between different shapes of basins, aiming to establish the minimum circular area compliant with the desired tolerance, in this case acknowledged as 0.5 percent and an equivalent GSD of 3-second-arc (90m) from SRTM. The estimation of mean response for the minimum area according to a least squares regression model is 0.641 Km<sup>2</sup>.

**Keywords:** Watershed area, Gravelius Index, digital elevation models, SRTM.