

## **Application of morphometric ranking approach using geospatial techniques for flash flood susceptibility modelling in district Shangla, North Pakistan**

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Every year, disaster strikes, and led to thousands of casualties and deaths around the world. A meteorological disaster such as flash floods is a multifaceted hydro-meteorological phenomenon that can cause a huge loss to human life and can create severe economic problems. In this study, techniques based on Geographic information system and Remote sensing were used to get the flood susceptibility map for District Shangla in the North Pakistan. For the susceptibility of flash floods, geo-morphometric ranking model was used. Various causative factors were considered including; topography, river pattern and flow accumulation. ALOS PALSAR digital elevation model was used for calculating the required causative factors. Eleven different sub-basins were delineated in the shangla basin. A total of eighteen morphometric parameters were studied, these parameters included; area, stream order, stream frequency, stream number, stream length, drainage density, relief, relief ratio, circulatory ratio, gradient, elongation ratio, shape factor, compactness coefficient, ruggedness number, geometry number and length of overland flow factors. The morphometric ranking approach (MRA) score was determined with a range of 1 to 5. Rank 5 represents high risk while rank 1 exhibits low risk. The results of the model were categorized into five flood vulnerability classes; very low, low, moderate, high and very high. The study finds that the geomorphometric ranking model is the most applicable model in the study region. The total population of shangla district is 757,810 with a population density of 480 person per sq km<sup>2</sup> and 23% of the total geographic area (364.11km<sup>2</sup>) is more vulnerable to high flash flood.

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