



## **Multicriteria GIS Modelling of Terrain Susceptibility to Gully Erosion, using the Example of the Island of Pag**

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### **Abstract**

Gully erosion causes gradual soil degradation and disappearance. Predicting areas that are potentially susceptible to the formation of new gullies is essential to determine the most vulnerable and plan measures promptly to reduce the negative effects of gully erosion. There are many varied predisposing factors that affect the occurrence and intensity of gully erosion, so identifying zones susceptible to gully erosion is a very difficult process. Gully erosion susceptibility depends on the complex interaction of various factors, such as lithology, land cover, vegetation cover, terrain and climate characteristics, as well as anthropogenic influences.

The model of gully erosion susceptibility presented in this paper was made using multicriteria GIS data analysis (GIS-MCDA), based on 11 chosen criteria. With the help of the analytical hierarchy process (AHP), specific weight coefficients were assigned to each criterion in terms of its importance in terms of the occurrence of gully erosion. The Island of Pag was classified through the generated gully erosion susceptibility model as having areas of very low susceptibility, low susceptibility, medium susceptibility, high susceptibility and very high susceptibility. A validation of GIS-MCDA quality was made with the help of ROC curves made based on two referent gully datasets. The validation confirmed the consistency of the created models and proved that existing gullies fall within zones of high gully erosion susceptibility. High and very high gully erosion susceptibility zones cover around 30% of total area of the Island of Pag. Through an analysis of the spatial distribution of these zones within 500 m of 25 urban areas, it was determined that most vulnerable settlement was the town of Pag.

**Keywords:** GIS-MCDA, gully erosion susceptibility, Pag, AHP, modelling, ROC curve