



Assessing landslide susceptibility by statistical data analysis and GIS: the case of Daunia (Apulian Apennines, Italy)

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This study aims at the landslide susceptibility mapping within an area of the Daunia (Apulian Apennines, Italy) by a multivariate statistical method and data manipulation in a Geographical Information System (GIS) environment. Among the variety of existing statistical data analysis techniques, the logistic regression was chosen to produce a susceptibility map all over an area where small settlements are historically threatened by landslide phenomena. By logistic regression a best fitting between the presence or absence of landslide (dependent variable) and the set of independent variables is performed on the basis of a maximum likelihood criterion, bringing to the estimation of regression coefficients. The reliability of such analysis is therefore due to the ability to quantify the proneness to landslide occurrences by the probability level produced by the analysis. The inventory of dependent and independent variables were managed in a GIS, where geometric properties and attributes have been translated into raster cells in order to proceed with the logistic regression by means of SPSS (Statistical Package for the Social Sciences) package. A landslide inventory was used to produce the bivariate dependent variable whereas the independent set of variable concerned with slope, aspect, elevation, curvature, drained area, lithology and land use after their reductions to dummy variables. The effect of independent parameters on landslide occurrence was assessed by the corresponding coefficient in the logistic regression function, highlighting a major role played by the land use variable in determining occurrence and distribution of phenomena. Once the outcomes of the logistic regression are determined, data are re-introduced in the GIS to produce a map reporting the proneness to landslide as predicted level of probability. As validation of results and regression model a cell-by-cell comparison between the susceptibility map and the initial inventory of landslide events was performed and an agreement at 75% level achieved.