



Modeling shallow landslides susceptibility based on statistical analysis

Helen Cristina Dias (1), Carlos Bateira (2), Marcelo Fisher Gramani (3), Rebeca Durço Coelho (4), Vivian Cristina Dias (5), Tiago Damas Martins (6), and Bianca Carvalho Vieira (7)

(1) Department of Geography, USP - University of São Paulo, São Paulo, Brazil (helen.dias@usp.br), (2) Riskam/CEG,UL/FLUP, University of Porto, Porto, Portugal (carlosbateira@gmail.com), (3) IPT - Institute of Technological Research of the state of São Paulo, São Paulo, Brazil (marcelo.gramani@gmail.com), (4) Department of Geography, USP - University of São Paulo, São Paulo, Brazil (rebeca.coelho@usp.br), (5) Department of Geography, USP - University of São Paulo, São Paulo, Brazil (vivian.cristina.dias@usp.br), (6) Intitute of Cities, UNIFESP - Federal University of São Paulo, São Paulo, Brazil (martins.td@gmail.com), (7) Department of Geography, USP - University of São Paulo, São Paulo, Brazil (biancav@usp.br)

The susceptibility shallow landslides are related to lithological, structural, morphological and climatic condition-sand can be defined in different ways, such as statistical analysis, that compares the spatial distribution of the process, combined with conditional factors. It enables the relation of different factors (morphological, geological, etc.) with the unstable areas registered on inventory, based on the assumption that conditions that have generated events in the past, will be the same as in the future.

Thus, the aim of this research was to identify prone areas to shallow landslides occurrences based on bivariate statistical analysis of the morphological factors to Caraguatatuba county, in the Serra do Mar. Serra do Mar is a mountain range that extends for 1,500 km along the South and Southeast regions of Brazil. It is characterized by frequent disastrous events of mass movement associated with the rainy season between December and March, with 60% of the annual mean precipitation, of approximately a total of 3,300 mm.

To evaluate the susceptibility potential were adopted: a 30 m resolution Digital Terrain Model (DTM) based on Shuttle Radar Topography Mission (SRTM) and the application of bivariate statistics by the Informative Value using slope angles, elevation, curvature and aspect.

The results shows that some morphological characteristics, such as slope angles between 30° and 40° and elevation between 200 m and 400 m, are significantly associated to shallow landslide occurrences. It was possible to define susceptible areas and a success index by Area Under the Cover (AUC), classifying 78% of the pixels correctly. Based on these results, the use of this Informative Value is considered important tool in the prediction of the shallow landslides, mainly, in areas where the mechanical and hydrological data are scarce, as in many areas of Serra do Mar.