Morphometric analysis of landslide in the Mountain Region of the State of Rio de Janeiro in Brazi: the case study of D'anta′s watershed

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Mass movements are recurrent phenomena in the whole Mountain Region of the State of Rio de Janeiro in Brazil. These events actively participate in the relief evolution and are also responsible for many damages and loss of human lives. The triggering of these events depends on the natural environment and the preparatory and immediate action of the physical, biotic and human agents responsible for these processes. This work is based on the hypothesis in which the topographical conditions have a major effect on the spatial distribution of translational landslides caused by decreased of the internal resistance of the material mobilized. Therefore, the purpose of this study is to identify the topographical conditions favorable to landslide triggering based on morphometric analysis in a pilot watershed - D'anta′s watershed - located in the mountainous region of the State of Rio de Janeiro. The indices include the topographic wetness index (TWI), contributing area, slope angle and elevation and were derived from 5-m grid digital terrain model, computed on a Geographic Information System (GIS). The maps produced allowed the analysis of topographic influence on the landslides distribution from the indices of frequency classes (F), concentration of scars (CC) and potential of landslide (PL). The landscape sectors that are more likely to be affected by landslides were the ones where the elevation ranges from 1070m - 1187m, slope angle between 40.95° and 47.77°, contributing area between (log10) 1.32 m^2 - 1.95 m^2 and topographic wetness index between 7.11 to 9.59. This work provides important information which may help in the decision-making process, using fewer data and indices of easy application. Finally, the results obtained will subsidize of a landslide susceptibility map through the implementation of the conditional probability method aimed at predicting and mitigating of the damage caused by landslides.