LANDSLIDE HAZARD MAP OF THE UPPER TIBER RIVER BASIN, CENTRAL ITALY

M. Cardinali (1), A. Carrara (2), F. Guzzetti (1), P. Reichenbach (1),

(1) CNR-IRPI Perugia, via della Madonna Alta 126, 06128 Perugia, Italy (2) CNR-CSITE, Viale Risorgimento 2, Bologna, Italy

For the Upper Tiber River basin, which extends over 4000 km2 in Central Italy, a landslide hazard map was derived from a statistical model based on a mix of morphological, lithological, structural and land use data. All these data were obtained from the analysis of different sets of aerial photographs, ranging in scale from 1:33,000 to 1:13,000, systematic field surveys and bibliographical information. Rock types were grouped in 37 units on the basis of the hard vs. soft rock percentage, as ascertained from photo-geological interpretation and field surveys. During the photo-interpretation, the spatial relations between bedding plane attitude and slope aspect were also systematically determined. The landslide inventory map recognised 17,600 slope-failures that cover nearly 12.5% of the basin area. Landslides, which are mainly slide flow slide earth-flow and compound or complex movements, were classified and mapped as shallow or deep seated. A DTM, with a grid resolution of 25x25 m, was derived from digitised contour lines of base topographic maps, 1:25,000.in scale. The basin was then automatically partitioned into nearly 16,000 main slope-units through a specifically-designed software module that, starting from a high quality DTM generates fully connected and complementary drainage and divide networks and a wide spectrum of morphometric parameters. Main slope-units were then subdivided according to the major rock types cropping out in the basin generating over 28,700 hydro-morphological-lithological terrain-units. Using the presence/absence of landslide in each terrain unit, as the grouping variable, a stepwise discriminant function was applied to the terrain units. Of the 50 variables entered into the discriminant function, 15 are lithological, 15 morphological, 11 express the structural setting or bedding plane attitude, 7 refer to land use and the last 2 reflect local climatic conditions. The model proved to be capable of correctly classifying as stable or unstable over 75% of the terrain units.