



Hazard Evaluation of Landslides Triggered by a Rainfall Storm, a Case Study of Valladolid River Basin in Ecuador

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Present paper describes a meteorological event occurred on May 24th, 2007, that triggered an important debris flow in the upper Valladolid river basin, in Ecuador.

The generated debris flood affected several kilometers producing erosion, sedimentation downstream and causing damage in a number of works located near the river channel; predicted 250-year hydrological flood peak discharges for the river basin were about $80 \text{ m}^3\text{s}^{-1}$, while estimated actual debris flood discharge during the event reached 200 to $300 \text{ m}^3\text{s}^{-1}$. Moreover, field observations showed that instability processes occurred in a well conserved basin that did not showed evidences of incidence of such phenomena in the recent past.

The study was carried out by CAMINOSCA in the framework of a consultancy study, developed to design the Valladolid Hydroelectric project. Main triggering factors such as the rainfall and soil moisture were considered for event analysis. To do so, the storm intensity for durations less than 12 hours and antecedent precipitation AP for the cumulative rainfall in 30, 60, 90, 120, 150, 160 and 180 days prior the event, were studied through frequency analysis. The return period of the concurrence of the two factors was defined, as well as the risk. Results showed that the cause of the land slide were the combination of more than 1 900 mm of cumulated antecedent precipitation on 160 days prior the event, the continuous occurrence of the rainfall, with only 12 days without rain in 160 days, and a triggering short duration 15-years return period storm occurred the day of the landslide.

Finally, the magnitude of triggering factors is compared with landslide precipitation thresholds based on data from several places around the world, as proposed by different authors.

Key Words: Hazard, Debris Flow, Meteorological Characterization, Landslide Thresholds.