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Macrozonation Methodology for Landslide Hazard Determination

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ABSTRACT

This is a simple expert system designed to allow a fast, low cost "a priori" classification of landslide hazards in seismically active tropical areas. It has been created to guide decision making where further and more detailed geotechnical investigations should be performed.

The input consists of 5 factors. A combination of three of them (slope, lithology and soil humidity) define the "intrinsic landslide susceptibility indicator." Meanwhile, the "triggering indicator" results from a combination of rainfall and seismic intensity factors.

This system provides a data framework which can be adapted to local and regional trends. The zonation serves as a guide in determining the general trend and spatial distribution of potentially unstable slopes.

INTRODUCTION

Landslides are a common phenomenon in tropical areas. It is a highly significant process in the evolution of landscapes. At the same time, a rapid population growth, with its increasing socioeconomic problems, promotes a disordered settlement of hazard-prone areas. Slope instability and landslides have thus increased their impact in Central America and the Caribbean (DeGraff et al , 1989; Mora, 1989) The zonation of landslide hazards then becomes a very valuable tool for disaster mitigation and preparedness

A review of landslide hazard zonation was given by Varnes (1984). emphasizing the importance of local geologic, geomorphic, hydrologic and climatic conditions. Einstein (1988) developed a determination procedure consisting of five different levels: state-of-nature mapping, danger mapping, hazard mapping, risk assessment and landslide management. Hansen (1984) also proposed different mapping strategies.

At present, the existing geotechnical methodologies allow very detailed investigations on single local cases, upon which the processes are analyzed and quantified, resulting in physical models. However, these models are not useful when extrapolation and prediction in large areas are necessary. Models applicable to large areas are urgently needed for urban planning and hazard reduction (Mora 1991; Mora and Vahrson, 1992).