**Deutscher Tropentag, October 8-10, 2003, Göttingen**

"Technological and Institutional Innovations
for Sustainable Rural Development"

# Evaluation of Two GIS-Based Models for Landslide Prediction

Steffen Walther[1], Thomas Oberthur[2], Jorge Rubiano[2], Rainer Schultze-Kraft[1]

[1] *University of Hohenheim, Institute for Plant Production and Agroecology in the Tropics and Subtropics, Germany*

[2] *Centro Internacional de Agricultura Tropical (CIAT), Land Use Project, Colombia*

**Abstract**

Agriculture sustainability studies, commonly undertaken on farms in areas selected as representative, pinpoint the importance of hillside management and protection. However, a vulnerability analysis with regard to landslide risk is commonly nonexistent. An alternative to costly long-term geotechnical studies may lie in simple and fast tools (models) for a contemporary analysis of regions of interest. However, models are generally built upon average or common climatic conditions and do not account for rare and unpredictable variations, such as "Hurricane Mitch" 1998 in Central-America. The objective of this study was to assess the success of landslide prediction based on combination of readily available spatial data and two commonly available GIS-based models, under the conditions of this extreme meteorological event.

The chosen models represent the outer edges of methods used in (landslide) modelling: Deterministic or process-driven (SINMAP) and probabilistic (ArcWofE). The quality of the modelling results was assessed by comparing known areas of risk (all known landslides in the study region mapped by GPS) with predicted areas of risk. An additional criterion was the utility value of the results. SINMAP can differentiate between areas with lower and higher risks, but only with insufficient accuracy. This allows the conclusion that either important landslide driving processes are neglected, or the underlying assumptions of process behavior are too general. SINMAP must be considered an insufficient tool for landslide prediction under severe meteorological events.

ArcWofE accurately distinguished areas with high landslide densities, however it could not account for the vast majority of landslides. Besides limiting the applicability, this opens the further question whether what is currently known about landslides is sufficient enough to explain landslides occurring under severe meteorological events. A perspective for the future are models combining the two methods. These are currently being developed and can be expected commonly available in future.

**Keywords:** GIS, landslides, modelling

**Contact Address:** Steffen Walther, University of Hohenheim, Institute for Plant Production and Agroecology in the Tropics and Subtropics, Garbenstr. 13, 70599 Stuttgart-Hohenheim, Germany, e-mail: walther@uni-hohenheim.de