



## **Risk analysis of a shallow land sliding controlled by vegetation**

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The positive effect of vegetation on slope stability is well-known but not very studied.

The present work carried out information related to risk analysis evaluation in territorial accident field with particular reference to the control by vegetation.

A potential risk situation (shallow land sliding) with a natural control system represented by the vegetation will be studied.

The study was divided in four principal stages:

- 1- definition of analyzing system.
- 2- Existing hazards and potential damage situation.
- 3- Selection of initiating events
- 4- Incidental sequences.

Concerning the first stage a studied system structure, function, behaviors and use description was done. The studied system is an instable part of mountainous territory in which the vegetation was used in order to control small landslides. The vegetation hydrological, biological and mechanical role was considered.

Concerning the second stage, in order to evaluate the existing hazards and the potential damage situation, different methods were available; we chose FMECA (Failure Modes Effects and Criticality Analysis) because in a shallow land sliding (territorial accident) with an existing protection system (vegetation) it resulted from previous evaluation the more suitable method. This method is based on a structured approach, the first step was to split the complex system in components; 3 components were in-

dividuate: soil, vegetation and the water-bearing. Then all the failure modes of components and possible effects were individuated; damage degree and frequencies were defined in order to assess the risk associated with failure modes. At the end of this stage the available protection, survey modality and recommended actions was defined.

During the third and fourth stage, in order to assess the incidental sequences, the initiating events were defined and then the sequences itself were developed.

In order to support the analysis with experimental data, during the research some scenarios failure mode and effects of failure were reproduced: in particular share tests were done on different samples (saturated and not soil, vegetated and not soil, different compactness degree. . .).

The application of risk analysis in territorial accident is innovative for that reason still not exist complete data base as happen for other system in witch this technique is traditionally applied.

For that reason in the study there is an important experimental research for the acquisition of data both in situ and in laboratory in order to implement the existing data base.

The first results show that the risk analysis application on shallow land sliding could be a valid instrument to identify and counter weak points in the early conception phase of an intervention because this technique allow to assess the risk associated with different failure modes. The results of the analysis can give suggestions concerning the best solution in an area subject to landslides.