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The EcoSlopes DSS: a knowledge-based decision support system for slope stability assessment and the selection of eco-engineering mitigation strategies

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Within the multidisciplinary project EcoSlopes on the influence of vegetation and land use on slope stability, a decision support system (DSS) has been developed to assist expert and non-expert users alike in the evaluation and selection of eco-engineering strategies for slope protection. This DSS combines a qualitative hazard assessment of the interrelated threats of erosion and mass movements with a detailed catalogue of eco-engineering strategies for slope protection. The DSS is a knowledge-based system that evaluates the available information through an extensive set of rules. The rules are established on generally accepted and traceable knowledge from eco-engineering and the related disciplines of forestry, soil mechanics, hydrology, ecology etc. The use of a knowledge-based system offers a means to integrate knowledge from these different disciplines. The rules evaluate case-specific information that can be entered, changed and refined progressively yet the qualitative nature of the information does not instil the user with a sense of unjustified exactitude. Rather, each rule returns a comment pertinent to the evaluated case that is characterised by a confidence level and its suitability. From there, the user can access additional information via the associated help file and documentation. The returned comments and ancillary information guide the user to an appraisal of the likely hazard and to a range of possible suitable solutions. The accent of the output of the DSS is on the application of eco-engineering strategies for slope protection as an environmentally-friendly solution aiding sustainable development. By its multidisciplinary and progressive nature, the DSS be of immense value during the initial stages of an eco-engineering project when data collection and the potential of different eco-engineering strategies are considered. In this paper, the

concepts and the practical application of the DSS at different scales are illustrated. The interrelated hazards of mass movements and erosion have been assessed and compared to their actual occurrence in relation to land use and eco-engineering practices as well as alternative scenarios that could have been adopted to obtain higher safety levels.