



Estimation of landslides activities evolution due to land–use changes in a Pyrenean valley

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Global changes would have impacts worldwide, but their effects should be even more exacerbated in areas particularly vulnerable. Mountainous areas are among these vulnerable territories. Ecological systems are often at a fragile equilibrium, socio-economical activities are often climate-dependent and climate-driven natural hazards can be a major threat for human activities. In order to estimate the capacity of such mountainous valleys to face global changes (climate, but also climate- and human- induced land-use changes), it is necessary to be able to evaluate the evolution of the different threats. The present work presents a method to evaluate the influences of the evolution of both climate and vegetation cover on landslides activities over a whole valley, to propose adequate solutions for current and future forestry management. It is therefore necessary to properly estimate the vegetation influences on slope stabilities. In the present study, we develop a complementary module to our large-scale slope stability assessment tool to take into account the effects of vegetation on the mechanical soil properties (cohesion and over-load), but also on the slope hydrology (change in interceptions, run-off, and infiltration). Hence the proposed method combines a mechanical stability model (using finite slope analysis), a hydrological model, and a vegetation module which interfere with both aspects. All these elements are interfaced within a GIS-based solution. The whole chain is applied to a 100-km² Pyrenean Valley, for the ANR Project SAMCO (Society Adaptation for coping with Mountain risks in a global change COntext), as a first step in the chain for risk assessment for different climate and economical development scenarios, to evaluate the resilience of mountainous areas.