

The role of land management practices in soil erosion hazard in eucalypt stands in north-central Portugal following forest wildfires

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Abstract: The EROSFIRE project (POCI/AGR/60354/2004), funded by Portugal's Foundation for Science and Technology (FCT), has as overall aim the development of a software tool that allows to assess and map, at the scale of individual hill slopes, soil erosion hazard in recently burned forest areas for different scenarios of post-fire land management. At the origin of the EROSFIRE project was the "Soil losses after the forest fires of the summer of 2003"-map elaborated by Portugal's Water Institute (INAG) using some modified version of the Universal Soil Loss Equation (USLE), and the idea to test the applicability of erosion models with a more up-to-date scientific basis than USLE.

The EROSFIRE project envisages intensive field campaigns of rainfall simulation experiments (RSE's) as a possible way-around the data constraints easily encountered in model parameterisation, calibration and assessment in environments that are highly variable through time and in space. In the aftermath of a wildfire, vegetation and soil conditions can be expected to change quite rapidly. Land management practices can add to the spatial variability in post-fire conditions as well, especially also when they are still in course. Notwithstanding the prevalent role of RSE's in the EROSFIRE project, runoff plots are employed as well. Small-scale plots having exactly the same dimension as the plots of the RSE's are used to address the representativeness of the RSE-data and, in particular, the corresponding modelling results for natural rainfall conditions. Slope-scale plots, in turn, are used to evaluate the upscaling of the modelling results at the RSE-plot scale. Thus, besides RSE's, soil erosion modelling is at the heart of the approach that the EROSFIRE project has set out to develop and test. Various existing erosion models, including the above-mentioned USLE version used by the INAG, are to be compared, and the best model - eventually adapted to the Portuguese situation - is to map qualitative or quantitative erosion hazard of recently burned forested slopes.

In the first project year, having as principal aim model parameterization and calibration, fieldwork is being carried out in an area in the Albergaria-a-Velha and Águeda municipalities that was affected by a wildfire during early July 2005. In this area, which is largely covered by commercial eucalypt plantations, four slope sections were selected in eucalypt stands for the installation of the runoff plots and for RSE's. The four slope sections were chosen for representing distinct land management practices.

Keywords: soil erosion, rainfall simulation, runoff plots, modelling