Geophysical Research Abstracts,
Vol. 11, EGU2009-8389, 2009
EGU General Assembly 2009

Mapping soil erosion hazard in a recently burnt forest area in north-central Portugal

D.C.S. Vieira, M.C. Malvar, J.P. Nunes, and J.J. Keizer
CESAM, University of Aveiro, Dept. Environment&Planning, Aveiro, Portugal (dianac.s.vieira@ua.pt)

The present work has as overall objective to evaluate the suitability of two easily-applied erosion models for slope-scale erosion risk mapping, using a Geographic Information System, following wildfire. It was carried out in the framework of the EROSFIRE project, which, in a nutshell, wants to assess the advantages and disadvantages of field rainfall simulation experiments for mapping erosion risk, in particular by providing the input data needed for model calibration.

The Universal Soil Loss Equation (USLE) and the Morgan-Morgan-Finney model (MMF) were selected in this study mainly for ease of application. In spite both models were specifically developed for agricultural fields, there exist off-the-shelf model parameter values that apparently or supposedly are suitable for recently burnt forest areas. Furthermore, USLE was applied by the Portuguese National Water Institute following the dramatic wildfire season of the summer of 2003 and, as such, was a lead motif behind the EROSFIRE project.

The two models were applied to a study area in north-central Portugal that burnt during the summer of 2005. The 270 hectares of burnt forest lands by and large consist of fast-growing eucalypt plantations but involve a notable variety of pre- as well as post-fire forestry management practices, the most conspicuous being the presence or construction of terraces. The model results were evaluated using three different sets of data: i) data from rainfall simulation experiments that were carried out at one or more occasions during the first year following the fire; ii) runoff and sediment loss data from unbounded slope-scale erosion plots at two sites, also during the first year following the fire; iii) data from a soil erosion features-survey carried out during 2008 at more than 20 slopes.

As expected, the performance of both models revealed marked weaknesses, especially in relation to the survey results. At least in part this can be attributed to the lack of off-the-shelf parameter values that allow distinguishing between the various types of land management practices. The MMF model provided estimates of the soil losses of the rainfall simulation experiments as well as the slope-scale plots that had the right order of magnitude, whereas USLE markedly overestimated the observed losses. In the present case, however, this appears to be a matter of a simple adjustment of USLE, since the USLE values were found to be strongly correlated with the MMF values.