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Assessing the Effectiveness of SLM Measures in Restoring Forest Ecosystem Services Disturbed by Forest Fires

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Forest fires strongly disturb important hydrological ecosystem services, such as the provision of clean water, the regulation of water flows, erosion prevention and soil conservation, which can ultimately lead to public health problems for communities. Post-fire management measures can be very expensive and their effectiveness depends on many factors, i.e., the measures themselves, the selection of the target areas and extent of their application.

This study aimed at assessing which combination(s) of soil and water conservation (SWC) measures are the most effective in restoring forest ecosystem services, by preventing soil erosion and stream water contamination.

The OpenLISEM v5.97 model was applied, calibrated, and validated for the Odiáxere catchment in southern Portugal, using pre-fire and post-fire data gathered for a wildfire in 2003. The model is able to simulate runoff, sediment yield and total erosion for conditions before and after the fire. SWC measures were parameterized and tested in the model; these include mulching, riparian buffers, fuel breaks, prescribed fires, and erosion barriers, such as geotubes, contour-felled logs and contour bunds. Multiple application strategies for these measures are also being designed.

The results obtained from the model are being further assessed using a multiple criteria analysis (MCA), including criteria such as measure effectiveness (in decreasing erosion and sediment yield), application costs, benefits besides soil and water conservation, and other relevant factors.

Finally, the results will be translated to more practical findings, that facilitate the implementation of the selected measures. Preliminary results showed that only some SWC measures should be implemented carefully in target spots to achieve the more effective solutions, useful information for forest managers and local administrators.

Keywords: forest fires, soil erosion, SWC measures, OpenLISEM.

