



Impacts of the post-fire erosion processes compared with the agricultural erosion rates for a mountain catchment in NW Iberia

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Mediterranean ecosystems are very vulnerable to soil erosion by water due to particular characteristics of climate, lithology and land use history. Moreover, the foreseen climate changes might worsen land degradation and desertification, in which soil erosion has been classified as one of the most important driving forces. In this context, the frequent forest fires seen in some Mediterranean regions can cause disturbances to vegetation cover and enhance soil erosion processes.

This work addresses this issue for the Caramulo mountain range, NW Iberia. In the past century, large land use changes occurred due to massive afforestation. Changes from mixed natural forest cover and shrublands to Pine, the introduction of Eucalyptus plantations and, more recently, a trend for the substitution of pines by eucalypts, are the evidence of a large and rapid land use change in the last decades. Forest fires started to occur as afforestation proceeded, as a consequence of the disappearance of pasturage and accumulation of highly inflammable material; they became more frequent after the 1960's and became a determinant factor for land use changes in this region.

Data collection focused on the Macieira de Alcoba catchment, a headwater agro-forested catchment (94 ha) located in this region. It has a wet Mediterranean climate, with an average annual rainfall of about 1300 mm (2002-2012), concentrated in autumn and winter, while spring and summer are dryer seasons. The mean annual temperature is 14°C and in summer it can reach 35°C. The land use is mixed, with forest and agriculture lands covering respectively 60 and 35% of the catchment area, 5% being built-up areas in the village of Macieira de Alcoba. In the last decades, this catchment suffered several forest fires (in 1969, 1986, 1991, and 2011). Erosion processes are related with periods of low vegetation cover in autumn in fields with a pasture-corn rotation, but also with forest plantations after clear-cutting and especially after forest fires.

The last forest fire in August 2011 burned 10% of the total area in the north-west part of the catchment. Post-fire management operations 9 months after the fire (clear-cutting and deep plowing operations) and after plantation of "Quercus robur" left the soil exposed, and relatively mild rainstorms led to large amounts of soil loss, including a large amount of rills and other erosion features. This constituted an opportunity to compare these erosion rates with the ones observed in agricultural fields for similar edapho-climatic conditions, and also observe distinct timing of erosion occurrence which was linked with different periods when soils are exposed.

This communication presents the assessment of the impact of this fire on soil erosion rates, where results indicate that soil losses after soil preparation for forest replanting might be equivalent, in long-term, to soil losses in agricultural fields.