



Long-term effects of fire on soil loss under simulated rainfall

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Wildfires affect soil properties as they burn vegetation and disturb the soil. These changes result in a sharp reduction of the soil infiltration capacity and an increase in runoff which encourages high soil losses, as soil erodibility is increased by vegetation removal. This conclusion has been established in the scientific literature by authors on research sites under different environmental conditions. But it is usually based on short-term measurements with durations of months only, or at the most 2-3 years. However after fire, in due course the recovery of vegetation and the development of litter layers can contribute to soil protection and the reduction of erosion rates. Furthermore, after their initially high values erosion rates may reduce as the material available to be eroded is sometimes exhausted and vegetation cover is re-established. These issues are the background to experiments that have been carried out since 1990 on a typical Mediterranean scrubland where forest fires are recurrent. Experiments by means of simulated rainfall on small plots (0.25 m^2) under winter wet and summer dry conditions were carried out until 2005 in the town of El Genovés in eastern Spain (Valencia province) which suffered a fire in 1981. The scrubland vegetation had already recovered by 1990 when the first experiment took place and the experiments carried out until 1992 showed a patchy distribution of the sediment release. The erosion rates were very low, even negligible in 60 % of the plots. Runoff was greater during the wet season and almost no runoff occurred in summer. However, runoff sediment concentration was always greater during the summer season as more material was available. In August 1995 the study area suffered a fire and the soil loss increased, although the experiments carried out after the fire demonstrated that runoff was very low due to the high infiltration rates of the ash covering the soil. After the recovery of the previous conditions a third fire took place during summer 2002. The yearly measurements show the high correlation of soil losses with fire, since more than 90 % of the

decade's soil loss took place during the post-fire rainy season. Soil erosion rates under Mediterranean typical scrubland (Maquia or Matorral) are very low, except during the post-fire wet seasons. A key topic for future and further research is how recurrent fires can induce land degradation.

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