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Assessment of over-grazing effects on water and soil resources in Souther Spain)

Juan Francisco Martínez-Murillo, José Damián Ruiz-Sinoga, and Miguel Ángel Gabarrón-Galeote
Department of Geography, University of Málaga, Málaga, Spain (jfmmurillo@uma.es)

Water and soil resources can be seen negatively affected due to over-grazing activities, especially in threatened environmental areas like the Mediterranean region. Runoff generation and soil losses can be higher than expected in humid environments when some controlling factors: e.g., the decrease in the vegetation cover due to over-grazing can lead to similar order of magnitudes in runoff volume and soil losses than those observed in semiarid lands.
This aim of this study is to investigate the effects of over-grazing on water and soil resources by means of the analysis of runoff generation and soil losses processes in an over-grazed land. The research focuses on the influence of exposure, soil surface condition and vegetation cover in relation to the management of water and soil resources.
The study is carried out in an experimental area from South of Spain (Serranía de Ronda, Gaucín). The experimental area is characterized by a humid Mediterranean climate (Annual precipitation = 1,010 mm; Annual temperature = 14,0ºC), steep hillslopes (slope gradient > 25%) and metamorphic rocks (phyllites). The land use is natural forest and matorral but over-grazed implying a vegetation cover lesser than expected for the climatic conditions.
The experimental area include two sets of small plots located every of them in opposite exposures (North and Southfacing, respectively). The small plots are closed, with 1.30 m2, and are connected to one 25-litres tank for collecting runoff and sediment. Every set of plots are composed by four plots: two of them include a vegetation patch at their upper part and other two at the lower part. Likewise, a bare soil area is included within the plots which is characterised by crusts and some embedded rock fragments in the Southfacing plots and by lichens and moss in the Northfacing ones. Also, a meteorological station was installed to measure precipitations. Two years of measurements were carried out from Feb-2008 to Jan-2010.
A total depth of 1,219.6 mm of rainfalls was registered during the study period. Three events were higher than 75 mm day-1. The maximum rainfall intensity was equal to 76.2 mm h-1 for 10 minutes (I10), surpassing 25 mm h-1 in 9 rainfall events from a total of 34 registered at the meteorological station. Results indicate the soil surface condition controlled by the exposure and soil moisture influenced runoff generation and soil losses, though the differences between hillslopes were less significant than it was expected. The reduction in vegetation cover due to the over-grazing was thought to be the main factor for controlling runoff and soil losses. Nevertheless, runoff and soil losses from Southfacing plots were one order of magnitude higher than from the Northfacing ones.
More studies are needed to assess correctly the incidence of over-grazing in Mediterranean rangeland under humid climatic conditions, an environment with no expectation of being severely affected by water erosion and soil losses. The effects of over-grazing seem to aggravate the deterioration of water and soil resources for vegetation growth more than expected. This can enhance a positive feedback process which finally affects to the maintenance of the vegetation cover, precisely, the main source of sustenance for the cattle.