Soil erosion on abandoned land in Andalusia – a comparison of sheet- and rill erosion rates

S. Wirtz (1), T. Iserloh (1), G. Rock (2), V. Butzen (1), M. Seeger (1), S. Betz (1), and J.B. Ries (1)

(1) Trier University, FB VI Geography/Geosciences, Department of Physical Geography, Trier, Germany (wirtz@uni-trier.de), (2) Trier University, FB VI Geography/Geosciences, Remote Sensing Department, Trier, Germany

It is still part of the scientific debate, whether rill or inter-rill processes contribute more to soil erosion. Aim of this study was to compare the effectiveness of rill and interrill areas concerning soil erosion on an abandoned land in Andalusia. We combined the results of rill experiments, rainfall simulations, field mapping and small scale aerial photographies (SFAP) to get an idea about the dimension of the soil loss caused by rill- and sheet flow. The test site (gully catchment) has an area of 11.28 ha with a rill density of 150 m ha-1, that means a total rill length of 1694 m. Assuming an average rill width (based on field mapping and SFAP) of 0.15 m, the total rill area is about 250 m^2 (0.025 ha), this are only 0.22 % of the test site. The rill network drains 19800 m^2 of the 112800 m^2, that means 0.22 % of the study area is collects the runoff from 17.5 % of the catchments surface. The rills deliver a soil detachment rate between 1773 and 3123 g m-2, the interrill areas (99.78 % of the test site) 29-143 g m-2.

The rills' erosion rates are 20-60 times higher than for sheet erosion. Due to the larger interrill area the total sediment delivery of the interrill areas is 5-15 times higher than that of the rills. The results show clearly the effectiveness of the rills as sediment provider as well as runoff accumulator. The results are only valid for the tested area, they can not easily be adopted to other areas or even used as general statement about the relation between rill and sheet erosion. We know about the problems and risks which can occur but as we only present ranges or class limits we assume that the results range in realistic dimensions.