Geophysical Research Abstracts
Vol. 16, EGU2014-9897, 2014
EGU General Assembly 2014

Ephemeral gully: soil control factors

Paul Ollobarren, Rafael Giménez, Miguel Ángel Campo, and Javier Casalí
Public University of Navarre, Department of Projects and Rural Engineering, Pamplona, Spain

Soil erosion on hillslopes has been divided traditionally into sheet, rill, and (ephemeral) gully erosion. In sheet erosion, a relatively shallow overland flow acts on a hillslope and removes sediment particles uniformly from the land surface. Usually, rill erosion occur in uncertain points within sloping surfaces, whereas gullies occur in more specific places in the landscapes, i.e. within topographic swales or hollows.
So that, current models for prediction of (ephemeral) gully initiation and development rely mainly on topographic factors while soil conditions are almost neglected. However, the assessment of the erodibility of soil materials is essential for analyzing and properly modeling gully erosion. But, despite the wealth of studies to characterize soil vulnerability to (gully) erosion, a universal approach is still lacking. This is due to the complexity of soil conditions and erosion phenomenon and their interactions.
A useful and feasible soil characterization for gully erosion prediction at large scale should be based on simple, quick, repeatable and relatively inexpensive tests to perform. This work proposes a methodology for conducting simple tests in the field and laboratory to detect soil conditions prone to gully initiation. This approach for assessing soil erodibility includes the use of vane shear apparatus, penetrometers and a mini-rain simulator as well as some current (modified) laboratory tests for assessing soil crustability and erodibility.
A pool of simple soil variables to assess soils prone to gully development is proposed. Among the main variables we have the granulometric composition of the top soil (textural fractions and gravel), organic matter content, soil cohesiveness and relative sensitivity of topsoils for crusting.
Our finding may be particularly useful for erosion modelling when gully initiation and development do not largely rely on topographic features but in soil conditions.