



Mapping of geomorphic processes on abandoned fields and cultivated land in small catchments in semi-arid Spain

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In semi-arid landscapes vegetation succession on abandoned agricultural land is a long lasting process due to the water deficit for the best time of the year. During this phase of succession, geomorphic processes like the formation and development of rills, gullies and other geomorphic processes lead to a more or less constant deterioration of the abandoned land. But also on currently cultivated land and under quasi-natural vegetation the processes of soil degradation by flowing water take place. Regarding small catchments like gully catchments, the topography and the land cover (abandoned land, cultivated land, quasi-natural vegetation) are highly important factors in gully formation and soil degradation. Another important point is the distribution of different land cover units and therefore the connectivity of the catchment as described by Bracken & Croke (2007).

In this study, 11 catchments of single gullies have been mapped geomorphologically and compared to the rate of gully development derived from small-format aerial photography. It could be shown that there is a high variability of processes due to differences in topography and the way the land is or has been cultivated. On abandoned land, geomorphic processes are highly active and enhance or even predestinate the direction of headcut movement.

Another result is that geomorphological mapping of these gully catchments revealed interactions and dependencies of linear erosion features like the connection to the main drainage line, e.g. the gully. In the larger of the observed catchments (>5 ha) it became clear that some catchments have morphological features that tend to enhance connectivity (long rills, shallow drainage lines) and some catchments have features which tend to restrict connectivity (terraces, dense vegetation). In “more connected” catchments the retreat rate of the headcut is generally higher. By the method of geomorphological mapping, valuable information about the soil degrading processes taking place in gully catchments and especially on abandoned lands could be derived.

References:

Bracken, L. J. & J. Croke (2007): The concept of hydrological connectivity and its contribution to understanding runoff-dominated geomorphic systems. *Hydrological Processes* 21: 1749-1763.