Large-scale Monitoring of Gully Erosion in Semi-Arid Landscapes (Morocco)

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Gullies are typical erosion forms in semi-arid and arid landscapes all over the world where high morphological activity and dynamics can be observed. Semi-arid climate conditions and precipitation regimes combined with widespread land use changes of traditional agriculture towards more extensive use – often as sheep pasture – induce reduced soil infiltration capacity of the ground and increased runoff, aggravating the risk of linear erosion downslope. The contribution of gullies to total soil loss by erosion is, however, much debated by erosion researchers: While some speak of spectacular but overestimated erosion forms, others describe gullies as the most important sediments sources in drylands and emphasize the massive offsite impairment (e.g. reservoir siltation) caused by gullying.

One study areas is situated in an arid region in South-Morocco near Foum el Hassane. Research methods to investigate gully erosion in this area include large-scale aerial photographic surveys, pedological and geomorphological surveys of the regional surroundings and experimental measurements of surface runoff and infiltration capacity. A core method is the large-scale aerial photographic monitoring with hot-air blimps and kites for detailed documentation of the gully systems with very high spatial and temporal resolution. Gully growth and loss of soil material are precisely measured with geographic information systems and digital photogrammetric analysis, thus allowing the quantification of gully development in different climatic zones under various conditions of relief, runoff, substrate and land use.

Key words: Gully erosion, pedological and geomorphological surveys, land use