



## **The success of recent land management efforts to tackle gully erosion in Northern France**

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In the open-field agricultural landscapes of Europe, especially in the topographic-rolling loess-covered regions, soil erosion is an important problem. Here, small headwater catchments hold almost no permanent vegetation, and with few physical obstacles to reduce runoff velocities, runoff concentration along linear landscape elements (plot boundaries) or thalwegs frequently causes ephemeral gullies to occur – the latter reflecting the poor hydrogeomorphic condition of the land- and soilscape. To tackle this, and to remediate negative on- and off-site effects, land management efforts have multiplied over the past decades in many regions. This includes, amongst others measures, the implementation of vegetation barriers (French fascines, Dutch wilgenteendam). In the loess-dominated Aa river basin (640 km<sup>2</sup>) of northern France, where cropland accounts for 67% of the cover, mainly managed in open-field agro-industrial farming schemes, we investigated the effect of the implementation of vegetation barriers on ephemeral gully erosion dynamics, together with rainfall characteristics and cropland management. This was done from a spatially explicit study at the scale of 500 x 500 m grid cells using a diachronic analysis of historical aerial photographs (period 1947-2012). Fascines, introduced since 2001, were present in ca. 25% of the gully erosion sites. Spatio-temporal gully length variability was mainly driven by cumulative precipitation, and the presence of fascines could not significantly explain trends in decreasing gully lengths. In addition, the impact of fascines on mudflow hazards and on local sediment storage was also analysed. In sum, fascines clearly showed to have a local effect on the storage of sediment, but due to their limited implementation and poor maintenance, they did not decrease the landscape's vulnerability to gully erosion or mudflow hazards. Being increasingly implemented for erosion control in western Europe, this study points at the challenges encountered when managing vast open-field landscapes with vegetation barriers.