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Controlling factors of gully erosion in the upper part of the Isser River watershed (Algiers, N Algeria)

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North Algeria is strongly affected by gully erosion. To better understand this phenomenon, we focussed on three subbasins of the Isser River watershed, close to the town of Algiers, which extend respectively from north to south: Elhad (Tablat), Alayem (Beni Slimane), and Si Mohamed Ben Saad (Souagui). These three watersheds, covering 62 km^2, 118 km^2, and 51 km^2, are developed in loose lithologies (marls). The climate differs from subhumid conditions to the north to semi-arid conditions to the south; both being associated with irregular but frequently intense rainy events. The gullies can extend up to several kilometres in length and up to 10 meters in depth. The aim of this research is to detect which controlling parameters affect gully erosion according to the subbasin characteristics. Two statistical tests, i.e. Kolmogorov-Smirnov test and Student's t-test, were applied on several factors such as: slope angle, slope aspect, elevation, profile curvature, plan curvature, rain erosivity factor (R Factor), flow accumulation and flow length. Chi-square test was used with lithology, land use and a parameter which represents the north-south distribution of the watersheds. These tests revealed that gully erosion is controlled by the same six factors within the three watersheds: slope, lithology, slope aspect, elevation, runoff erosivity and land use. The two variables flow accumulation and flow length act significantly only on two of the three watersheds.