

SOME EXAMPLES OF EPHEMERAL GULLY EROSION IN AN ATLANTIC AREA OF NW SPAIN

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1. Introduction

This study aimed to describe types of ephemeral gullies and to determine their origin, evolution and importance as sediment sources in Galicia (Northwest Spain).

Concentrated erosion was surveyed on medium textured soils, developed over basic schist of the Ordenes Complex series (Corunna province, Spain) from 1997 to 2006.

The studied region has a humid Atlantic climate with a mean annual rainfall of about 1000-1500 mm. Precipitation distribution is uneven, with a maximum between October and March and a minimum in the summer. The geological materials of the study area consist of basic metamorphic rocks and granite.

Gullies formed within the field where runoff starts, gullies collecting the runoff from an upstream area and discontinuity gullies due to abrupt slope changes were identified (Valcárcel, M. et al., 2003).

Ephemeral gullies formed by incision along linear elements generally showed large sections in zones with high slope, so that a gradual decrease from the maximum cross-section, both toward the head and downstream, occurred. This variation from head-cut to outlet of the gully may be attributed to the small flow rates at the upstream and saturation of the transport capacity downslope, where sedimentation initiates (Casalí et al, 1999).

2. Material and methods

The study area was located in Northwest of Spain, near the Atlantic coast, 30 km around Corunna.



Fig. 1. Location of the study sites.

Concentrated erosion took place mainly on seed beds and recently tilled surfaces on late spring and by autumn or early winter (Valcárcel, 1999).

Main dominant cultivations in the study sites were maize and grassland, but some small fields were used for winter cereals, potatoes, orchards and rape; in addition some fields were left fallow during winter, after maize. In the Ordenes Basin area rotations during the study period were maize-fallow, grassland-maize, maize-winter cereals; in the granite area potatoes followed rape or winter cereals (Valcárcel, M. et al., 2003). Winter fallow was also observed, both in old landscapes and after land consolidation.

For appreciate the importance of the gully erosion, we are placing, topography and measuring the section and length for one of the erosion linear elements in the field. Then, we calculate the erode volumes (Poesen & Govers, 1990).

The losses by gulling was between 0,74 m³/ha and 26,14 m³/ha. Mean ephemeral gully cross-sections oscillated between 0,13 and 0,26 m². Average values of width-depth ratio were in the range between 1,63 and 11,97.

3. Conclusions

The main cause of gully formation is the lack of any proper waterway for conveying water excess.

In the medium textured soils of the Ordenes Basin, occurrence of concentrate flow erosion was related to development surface of surface crusting. Human impact is demonstrated through variations caused by crop rotation and tillage procedures.

Concentrated erosion may transport large amounts of sediment to streams, unless buffer zones between the eroded surface and the permanent water courses. Conventional tillage practices and seedbed preparation enhanced concentrated flow erosion and gully occurrence, whereas the maintenance of vegetation cover completely prevented soil surface incision and channel formation (Valcárcel, 1999). The study of the development of the gully system in time showed that main gullies tend to reappear at the same position.

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