

Impact of soil protection measures based on topographical variations through connectivity indices in two agricultural catchments in Spain

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Physiographic attributes of the catchments (spatial organization and internal connectivity) determine sediment production, transport and delivery to river channels downstream. Understanding the hydrological connectivity allows identifying runoff and sediment contribution from overland flow pathways, rills and gullies at the upper parts of the catchments to sink areas (Borselli et al., 2008). Currently, the design of orchards and row crops plantations is driven by traffic and machinery management criteria, meaning significant simplification of the landscape. Topographic alterations may reduce the connectivity and maximize the retention of water and sediments in catchments by increasing travel times and infiltration (Gay et al., 2016). There are connectivity indices based on topography and land use information (Borselli et al., 2008) and travel times (Chow et al., 1988) which may help to identify measures to reduce water and sediment transfer. In this work, connectivity indices derived from digital elevation models (DEM) of two small agricultural catchments where topographic measures to interrupt the connectivity had been implemented were analyzed. The topographical details of the tree row ridges in a young almond orchard catchment and half-moons (individual terraces) in an olive grove catchment were obtained using Unmanned Aerial Vehicles (UAVs) flights. The aim was to evaluate the benefits of ridges and half-moons by comparing spatial patterns of connectivity indices before and after the topographical modifications in the catchments. The catchments were flown in December 2016. The original DEMs were generated based on previous topographical information and a filter based on minimum heights. The statistics and the maps generated will be presented as results of our study and its interpretation will provide an analysis to preliminarily explore effective and economical measures for erosion control and improved water harvesting.

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