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## Effects of vegetation as an ecosystem service on the changes in runoff and sediment yield in a Mediterranean semi-arid basin

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Semi-arid basins contribute significantly to sediment loads, as they are often characterized by torrential flows, source areas with high sediment-producing rates, great availability of erodible material subjected to intense weathering processes, and poor vegetation cover. Vegetation, despite its scarce presence, is a dynamic component of this environment, which provides a range of important ecosystem services such as biodiversity, flood retention, nutrient sink, erosion control and groundwater recharge. This study examines the vegetation responses to the magnitude of peak flows and its contribution to the changes in runoff and sediment yield during the period 1997-2020 in a catchment Mediterranean semi-arid basin: The Rambla de la Azohía (southeastern Spain). Vegetation type, density, preferred location and degree of permanence in each sub-basin were analyzed in order to determine their degree of influence on surface runoff and erosion control. Changes in riparian vegetation cover was quantified at large scale for the analysis period (1997-2020), using remotely sensed spatial information, such as satellite images and aerial photographs separated by two years on average (at scales from 1:15000 to 1:30000, and resolution between 0.22 and 0.50 m/pixel). A geo-spatial erosion prediction model was applied to estimate the runoff and sediment load generated at the event scale, taking into account the variability of the vegetation cover in each sub-basin. The simulated outputs of this model were previously calibrated with water levels measured by pressure sensors and suspended sediment records. The results showed both a poor response of vegetation (low incidence in the runoff coefficient) in steep metamorphic watersheds, capable of supplying large sediment loads, and functioned as an efficient ecosystem service (stabilization of slopes and decrease in peak flow) in less steep sub-basins with slopes in the shadow, composed of limestone formations and alluvial fans. This suggests important spatial differences in the vegetation impact, according to other environmental conditions intrinsic to each sub-basin, but also a low overall influence on the temporal variability of sediment fluxes at the event scale. This research was funded by FEDER/Spanish Ministry of Science, Innovation and Universities—State Research Agency (AEI)/Projects CGL2017-84625-C2-1-R and CGL2017-84625-C2-2-R; State Program for Research, Development and Innovation Focused on the Challenges of Society.