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Effect of the vegetation cover on the ^{137}Cs soil redistribution rates in Mediterranean slope transects

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Soil degradation due to water erosion is considered as one of the major environmental problems for the preservation of soil which is required to support biodiversity. Vegetation cover is widely recognized as one of the main factors controlling soil erosion and its maintenance is vital for the sustainability of fragile ecosystems. In the study reported in this contribution, soil redistribution was estimated along slope transects of a subhumid Pre-Pyrenean catchment. The artificial radionuclide ^{137}Cs coming from nuclear tests was applied to assess soil erosion and deposition along two transects with contrasting land use and vegetation cover. A total of 19 soil sectioned cores were collected along two slope transects. The northern transect consists of 7 cores along 300 m length and the western transect provided 12 cores along 600 m length. Models reported by Soto and Navas (2004, 2008) were used to estimate soil redistribution rates (t ha^{-1} y^{-1}) based on ^{137}Cs for individual sampling points. Assuming that each transect represents a 1 m wide strip, the rate values for each sampling point were used to calculate equivalent values of soil loss or deposition (kg y^{-1}) for individual slope segments with similar vegetation cover. The resulting values for each segment were summed to provide a sediment budget for the overall transect, comprising information on the total erosion, total deposition, net soil loss, sediment delivery ratio and net rates of soil loss for each of transect. The northern transect (11% slope) has a relict of forest of Quercus coccifera in the upper and middle part of the transect and 43% of its surface was originally cultivated, but was then abandoned and at present supports a natural sparse shrubland vegetation. The total erosion estimated for this transect was 75 kg y^{-1} and total deposition was 28 kg y^{-1}, representing a sediment delivery ratio (SDR) of 63%. The western transect T4 (17% slope), with 15% of abandoned terraced fields but predominance of cultivated land (58%) had a total erosion estimated at 1008 kg y^{-1}, and total deposition at 193 kg y^{-1}, representing a SDR of 81%. The northern transect, where the surface of abandoned land has naturally recovered, showed much lower values of net soil loss in comparison with the western transect, where predominance of cultivated land largely increased soil erosion resulting in higher SDR. The results suggest that vegetation cover together with tillage are key factors affecting the pattern of soil redistribution in the transects. Cultivation increases soil losses because in the study area in addition of tillage erosion there is documented coincidence of intense rain events when soils are bare after harvest and during sowing periods. In the transects, the vegetation cover not only prevents soil erosion but affects sedimentation patterns as vegetation strips contributed to trap sediments. The assessment of soil redistribution rates under different land uses and vegetation cover is of importance for a better understanding of the factors involved in the functioning of Mediterranean agroecosystems.