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Mass movements and infiltration on abandoned terraces in the Iberian Range, Northern Spain

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Terraced slopes were one of the most common agricultural landscapes in mountain areas of the Mediterranean region. Built to ensure agricultural production, terraces have acted as an effective soil conservation system at both slope and catchment scale. Demographic and socioeconomic changes in the last 60 years in the Mediterranean mountains have led to the abandonment of terraces. The consequent lack of maintenance of such agricultural structures has triggered diverse erosion processes. At the beginning of the 20th century, the upper valleys of the Leza, Jubera and Cidacos rivers, in the Iberian range (northern Spain), held more than 10,000 inhabitants and a cultivated area of 21,021 ha, of which 13,274 ha were farming terraces (63% of the agricultural space). At present, these terraces are abandoned. The most common erosion processes on the walls of abandoned terraces are stone collapses, which leave the riser completely unprotected, and small mass movements. A total amount of 240 terrace failures with mass movement were identified in the 53 studied plots, which means an average number of 4.5 per plot and 10.6 per 100 m of wall. At plot scale, the average volume of debris was 15.1 m3 (33.1 m3 for every 100 m of wall).
Soil infiltration capacity and the way the water flows downslope may be the main triggers for mass movements. Rainfall simulations carried out in the study area showed an average infiltration coefficient above 75%. Infiltration coefficients were higher on concave hillslopes (above 85%), probably because the plots in these sectors were intensively tilled in the past, with plowed and permeable anthropogenic soils. The infiltrated water becomes a destabilizing factor for the terrace wall. The lack of deep percolation due to a more impermeable substrate (e.g., the original soil of the slope) favours the accumulation of water within the artificial soil, behind the stone wall. The increasing weight of the material can cause the activation of mass movements.
The information obtained can be useful to identify the sectors prone to soil erosion due to terrace failure, and thus help to preserve terraces more efficiently.

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