

Nature-based Solutions to address water threats in the mediterranean region. A characterisation of the GIAHS area of Axarquia (Málaga, Spain)

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In Mediterranean areas, rainfall is one of the main variables affecting the control of eco-geomorphological processes. Water erosion processes, sealing and degradation of soils, reduction of the amount of water available for vegetation, modification of hydrological regimes can be cited among the most remarkable. Thus, the modifications in climatic variables resulting from Global Change are having an impact on the Mediterranean eco-geomorphological system, especially issues associated with water risks. Specifically, a dual pattern can be observed: on the one hand, a notable increase in the recurrence of the number of torrential events and an increase in the risk of water erosion, and on the other hand, an increase in the intensity or frequency of droughts, determining productivity and ecological and economic values due to the reduction in the availability of water in the soil. In this context, the research has focused on a traditionally agricultural territory that is highly fragile to these processes, namely GIAHS (Globally Important Agricultural Heritage Systems) dedicated to the raisin production in the Axarquia (Malaga, Spain). The main objective has been to (i) assess the impact of the most important water risks and (ii) identify the main Nature-based Solutions (NbS) implemented as adaptive mechanisms that have been implemented to ensure food security and the sustainability of these areas. To achieve these objectives, the rainfall dynamics have been statistically analysed with the data downloaded from nine meteorological stations of the SAIH Hidrosur Network located in the region (1997-2021). In addition, a total of 60 soil samples have been collected and analysed for the estimation of soil water erosion rates, based on the RUSLE model, and for the evaluation of its hydrological dynamics in recent decades. Finally, the NbS identified in the study area have been qualitatively assessed and analysed from an ecosystemic and agricultural approach. The results show an increased water stress in this GIAHS area according to the projections published by the latest IPCC report for the Mediterranean region. A slight tendency to concentration and increased rainfall erosivity is detected, as well as a lower water availability in soil for crop phenology. Similarly, soil erosion rates show very high values,

with slopes exceeding $250 \text{ t ha}^{-1} \text{ year}^{-1}$) However, agricultural practices and the different structures identified have been determinant in the control of these natural risks, being considered as sustainable adaptation strategies and conforming as NbS.