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In-situ soil loss monitoring in a small Mediterranean catchment to assess the siltation risk of a limno-reservoir

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The existence of large reservoirs under Mediterranean climate causes some negative impacts. The construction of small dams in the riverine zone of these reservoirs is an innovative idea designed to counteract some of those impacts, generating a body of water with a constant level which we have termed "limno-reservoirs". Pareja Limno-reservoir, located in the influence area of the Entrepeñas Reservoir (Guadalajara) is among the first limno-reservoirs built in Spain, and the first having a double function: environmental and recreational. The limno-reservoir basin (85.5 Km^2) enjoys a Mediterranean climate, however, cold temperatures prevail in winter and maximum annual variation may be around 50 ºC. Average annual precipitation is 600 mm, with high variability too. Most of the basin is dominated by a high limestone plateau, while a more erodible lithology surfaces in the hillsides of the Ompólveda River and its tributaries. These characteristics make the basin representative of central Spain.

Despite the unquestionable interest of the initiative, it construction has raised some issues about its environmental viability. One of them is related to its siltation risk, as the area shows signs of high erosion rates that have been contrasted in previous empirical studies. An in-situ soil loss monitoring network has been installed in order to determine the soil loss and deposition rates in the limno-reservoir basin (85.5 km^2). It includes 15 sampling plots for inter-rill erosion and 8 for sedimentation, each one containing 16 erosion sticks. Rill erosion was studied monitoring 8 rills with a needle micro-profiler, quantifying the sediment deposition in their terminal zone with sticks. These control points have been located in places where the soil type, land use and slope present are representative of the basin, in order to extrapolate the results to similar areas.

In-situ monitoring has been performed for three years, starting in 2009 and carrying out sampling every 3 months. Soil samples have been taken in the different areas monitored in order to obtain bulk density values. First results suggest that average soil loss rates have ranged from 3 to 75 T ha^{-1} $year^{-1}$, while average deposition rates have been between 0 and 220 T ha^{-1} $year^{-1}$. Maximum soil loss rates has been seen in hillsades of clayey lithology and low vegetation coverage, representing a serious erosion risk. These results, extrapolated to different areas of the basin, have allowed estimating yield rates in the limno-reservoir. To check the degree of fit of these predictions, we proceeded to measure the thickness of sediments deposited in the limno-reservoir by taking of witnesses.