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Bed disturbance patterns in two mediterranean impounded rivers

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Physical processes in rivers are the result of the interaction between flow regime and hydraulics, morphology, sedimentology and sediment transport. The frequency and magnitude of physical disturbance (i.e. bed stability) control habitat integrity and, consequently, ecological diversity of a particular fluvial system. Mediterranean basins are characterized by marked hydroclimatic fluctuations, from low discharges during long dry seasons to flashy events during wetter periods. Dams alter the river's flow regime (e.g. changes on annual runoff, seasonal patterns, flood magnitude and frequency) and the morphosedimentary dynamics in downstream reaches (e.g. channel incision, bed armouring, vegetation encroachment). Impacts caused by reservoirs in rivers of dryland regions (i.e. Mediterranean) are even more pronounced because their channel form and river ecology are adapted to such highly variable flow regimes. Within this context, this paper analyses intra and inter bed disturbance patterns in two Mediterranean impounded rivers with contrasted characteristics (i.e. high and low Mediterranean character). This research was developed in four river reaches, upstream and downstream of a dam in the Esera and Siurana rivers (Ebro catchment, NE Iberian Peninsula) during two hydrological years. The River Esera is considered a Mediterranean River with a continental character, while the River Siurana has a strong Mediterranean character. As bed disturbance can be assessed in different ways, we have designed a methodological approach that integrates four main components in order to examine the effects of regulation in bed disturbance at different spatial and temporal scales: 1) description of channel morphology (together with changes before and after floods) by means of detailed topographical data and close-range aerial photography; 2) flow discharge and hydraulics by determination of flow parameters from 2D hydraulic modelling that is based on detailed topographical data; 3) characterisation of grain size distribution by means of pebble counts and bulk samples; 4) bed mobility by tracers (i.e. painted bed areas and tagged particles using radiofrequency techniques).