



Suspended sediment transport in two mediterranean impounded rivers

Gemma Lobera (1), Ramon J. Batalla (1,2,3), Damià Vericat (1,3), Jose A. López (1,4,5), Alvaro Tena (1,6)

(1) Fluvial Dynamics Research Group, University of Lleida, Lleida, Catalonia, Spain, (2) Catalan Institute for Water Research, Girona, Catalonia, Spain, (3) Forest Sciences Centre of Catalonia, Solsona, Catalonia, Spain, (4) Institute of Earth and Environmental Science, University of Potsdam, Germany, (5) School of Natural Sciences and Psychology, Liverpool John Moores University, Liverpool, UK, (6) University of Lyon, CNRS-UMR 5600, site ENS, Lyon, France

Mediterranean basins are characterized by marked hydroclimatic fluctuations, from low discharges during long dry seasons to flashy events during wetter periods. Moreover, Mediterranean regions are often rugged, marked by a notable altitudinal gradient between the headwaters and the outlet; hence large climatic heterogeneity can be found along relatively short horizontal distances, with mean annual precipitation usually ranging from 275 to >900 mm. As a result, and in order to ensure water availability and reduce its spatial and temporal variability, a high number of large dams were built during the 20th century, with more than 3500 located in Mediterranean rivers. Dams alter the river's flow regime and interrupt the continuity of sediment transfer along the river network, thereby changing its functioning as an ecosystem. Within this context, this paper assesses the suspended sediment loads and dynamics of two climatically contrasting Mediterranean regulated rivers (i.e. the Ésera and Siurana) during a 2-yr period. Key findings indicate that floods were responsible for 92% of the total suspended sediment load in the River Siurana, while this percentage falls to 70% for the Ésera, indicating the importance of baseflows on sediment transport in the Ésera. This fact is related to the high sediment availability, with the Ésera acting as a non-supply-limited catchment due to the high productivity of the sources (i.e. badlands). In contrast, the Siurana can be considered a supply-limited system due to its low geomorphic activity and reduced sediment availability, with suspended sediment concentration remaining low even for high magnitude flood events. Reservoirs in both rivers reduce sediment load up to 90%, although total runoff is only reduced in the case of the River Ésera. A remarkable fact is the change of the hydrological character of both rivers downstream for the dams; the Ésera shifts from a humid mountainous river regime to a quasi-invariable pattern, whereas the Siurana experiences the opposite effect, changing from a flashy Mediterranean river to a more constant flow regime below the dam.