



Sediment Budget of the Lowermost Ebro River Basin (Catalonia, Spain)

albert Rovira and Carles Ibáñez

IRTA-Aquatic Ecosystems, Carreter del Poble Nou, Km. 5.5, 43540-Sant Carles de la Ràpita (Tarragona, Spain),
(albert.rovira@irta.cat) (Fax: 34 977 74 41 38)

Past and present management of the Ebro catchment have altered water and sediment fluxes of the lower Ebro River and its delta. The construction of dams disrupted the sediment transport continuity. Consequently, the lower Ebro River and its delta are facing a dramatic reduction in sediment delivery. As part of the design of a sediment management plan, we constructed the sediment budget of the lowermost Ebro (85.530 km²) to evaluate the sediment deficit and the required restoration needs from the reservoirs. The sediment budget is based on field measurements collected during the period 2007/2010. Bed-load samples were obtained at two different verticals; covering up to 50% of the total channel width; while suspended load samples were obtained at four different sampling points covering the total channel width. Thus, special attention has been paid on the importance of the sampling point, and its implications on the sediment budget. Preliminary results indicate that around 100.000 t of sediment passed at the outlet basin in 2008; which represents a reduction in sediment delivery up to 99% of its original yield (about 2 x 10⁷ t/yr). Sediment was transported in a proportion of 93% as suspended and 7% as bed load. Altogether, the total suspended yield is slightly lower than the average annual estimations obtained by Guillen and Palanques (1992) and Négrel et al. (2007). These authors give a value of 0.12x10⁶ t/y (for the period 1986-1987), and 0.1x10⁶ t/y for the long period 1981-2004, respectively. Tena et al. (2011), obtain a mean suspended sediment value of 0.092x10⁶ t/y in a section located 40 km upstream of the study section. Results suggest the total transference of the suspended load through the lower Ebro basin. An inter-annual variability in the sediment transport is observed, mainly related to the magnitude of the floods recorded yearly. In addition, results show that when using bed-load data from two different verticals, the estimate of the total sediment transported is one order of magnitude different (8.000 t versus 17.000 t) during high to moderate floods (i.e. 5 years return period). In contrast, for frequent floods (i.e. 1.5 to 2 years return period), differences between sampling points are not significant. Furthermore, during high to moderate events bed material passing through the first vertical is composed by sand (48%) and gravels (52%), while bed load at the second vertical is almost composed by gravels (>95%). Conversely, during low flood events, bed-load in both verticals is mostly composed by gravels (>90%). Both factors have severe implications on the assessment of the sediment budget; especially when results are to be used for river management and sediment yield assessment.