



Assessing reservoir siltation by means of sediment budget techniques

J. A. López-Tarazon (1), T. Francke (2), and G. Mamede (3)

(1) University of Lleida, Department of Environment and Soil Sciences, Lleida, Spain (jlopez@macs.udl.cat, 34 973702613),

(2) Institute of Geoecology, University of Potsdam, Potsdam, Germany, (3) Department of Agricultural Engineering, Federal University of Ceará, Fortaleza, Brazil

Research on sediment transport is especially important in catchments draining highly erodible sediments that eventually cause the siltation of downstream reservoirs. Reservoir siltation leads to several problems such as reduction of storage capacity, obstruction of water intakes, and water quality problems, which may threaten domestic water supply and related economic activities (e.g. irrigation, hydropower production, nuclear power production). Siltation is a severe phenomenon in areas under variable climatic conditions, such as the Mediterranean mountains, with long dry periods and storms of high rainfall intensity, and where runoff occurs over highly erodible unconsolidated sediments on bare slopes (i.e. badlands on marls, mudstones or shales). Under such conditions, erosion rates are very high, creating high suspended sediment concentrations in the river network that reach the lowland areas and the reservoirs. This is the case of the River Isabena, a 445 km² drainage basin located in the Southern Central Pyrenees, whose suspended sediment yield has historically threaten the water storage capacity of the 92.2 hm³ Barasona Reservoir located at the catchment outlet. To assess the sediment contribution of the catchment to the reservoir an integrated sediment budget research has been carried out during the last 3 years considering three different scales: i) sediment yield from the badlands (main sediment source); ii) water and sediment transfer within the river system from the badlands to the reservoir; and iii) sediment dynamics and retention into the reservoir. Specific sediment yield of up to 6·10³ t km⁻² y⁻¹ were observed at the monitoring badland area, yielding an specific yield of 414 t km⁻² y⁻¹ at the catchment scale, a value that represents 550,000 t of exported sediments during the monitoring period. This value equals to 0.36 hm³, a value that represents more than the 0.4% of the original reservoir capacity, in accordance to the bathymetrical surveys carried out in the reservoir.