Assessment of sediment yield and reservoir siltation using non-parametric regression and numerical modelling

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Siltation poses a severe threat to the operability and life time of reservoirs. While the consequences of reservoir siltation can be measured quite accurately by eg. bathymetry, continuous numerical modelling of the siltation process includes several challenges: The long-term input data, especially concerning sediment, is rarely available. The reservoir model itself needs to represent all relevant processes of water budget, sediment transport, deposition, re-mobilisation and the effects of management options in order to produce information on reservoir volume and bottom elevation changes.

This talk presents a study on the 92 hm^3-Barasona reservoir, located in the foothills of the Central Spanish Pyrenees, which is subject to heavy input of suspended sediments (concentrations up to 300 g/l) by its tributaries. The non-parametric regression method of Quantile Regression Forests enabled the reconstruction of suspended sediment data from ancillary predictors (e.g. discharge, falling/rising limb information, rainfall) for prolonged periods (1986-2006), which was impossible using traditional sediment rating curve techniques. Using the reconstructed sediment input information, the reservoir model performed favourably in reproducing sediment accumulation during unmanaged periods and flushing operation. Eventually, scenarios of different

reservoir management options allow the assessment of the efficiency of these measures.