MONITORING OF SEDIMENT TRANSPORT DURING A FLUSHING EVENT

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At the Bodendorf run-off-river hydro power plant great efforts have been taken to perform regular reservoir flushes. As part of the EU Interreg IIIB Project ALPRESERV "Sustainable Sediment Management in Alpine Reservoirs" (www.alpreserv.org), several groins have been installed at the beginning of the reservoir (as described in Batuca and Jordaan, 2000 and Morris and Fan, 1998). Furthermore, a flushing channel has been excavated in order to improve erosive processes. Extensive monitoring during the flushing event in 2004 has accounted for both erosion and its impact on sediment transport.

By means of reservoir measurements and the design of digital terrain models before and after the flushing, a mass budget concerning erosion and sediment deposition has been implemented. From sediment measurements and calculations, conclusions have been drawn regarding the natural sediment transport upstream. By gauging the suspended sediment load at three different locations, the rate of suspended sediments in the entire transport system could be specified. Grain size analyses in the reservoir have conveyed the grain distribution after the flushing.

All in all, the 2004 flushing event took 31.5 hours with the free flow being achieved only during 17 hours. Due to substantial suspended sediment concentrations and with special regard to the river fauna downstream, the increase of the discharge was interrupted and the drawdown at the weir was reduced. In Figure the outflow course have been illustrated with vertical lines marking the drawdown of the flushing, and the suspended sediment concentration measured upstream and downstream of the reservoir.

Both the mass budget and the evaluation of the applied measures have been based on digital terrain models designed before as well as after the flushing. For a survey of the bed elevations, a GPS-echo sounding system has been employed.

Owing to the results, a mass budget for the flushing could be defined. In general, the difference in the volume of the transferred sediments was estimated to be 47,000 m^3. This number included 11,000m^3 of suspended sediments as well as 2,200 m^3 of transferred bed load having been deposited at the beginning of the reservoir.

This monitoring project aims at recording the exact sequence of events during the flushing. The installation of groins fulfils the task of increasing the shear stress at the beginning of the reservoir, partly. However, some of them failed to show any positive effect on the increasing the sediment transport during the flushing 2004.

Looking ahead to the future, it may form the basis for improvements in the flushing procedure, particularly concerning discharge times and minimal water supply. Finally, it has become the basis for optimizing flushing intervals with regard to their economical and ecological compatibility downstream.

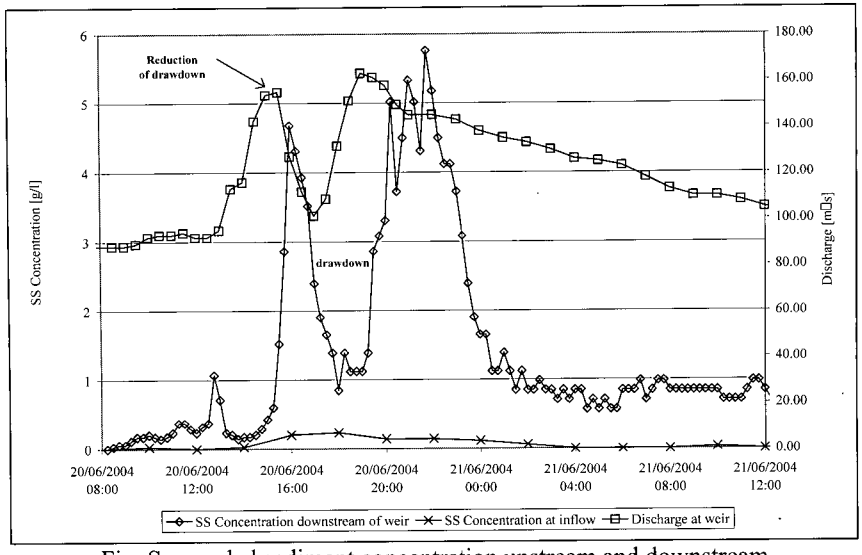

Fig. Suspended sediment concentration upstream and downstream

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