



Analysis of the suspended sediment measurements on the Austrian Danube during the flood event of August 2002 and its implication for long term monitoring

W. Kerschbaumsteiner, H. Habersack

Department of Water, Atmosphere and Environment, University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria

(willibald.kerschbaumsteiner@boku.ac.at / Fax: +43-1-36006-5549 / Phone: +43-1-36006-5525)

The flood event of August 2002 in the Danube has reached a recurrence interval of 100 years, especially in the part of lower Austria and Vienna. Prior studies showed that the suspended sediment yield of an average year can be transported during one big flood event. This fact stresses the importance of suspended sediment sampling during flood seasons for the purpose of sediment budgeting on an annual basis.

Systematic suspended sediment sampling has been carried out for certain stations since 1928. The number of sampling sites has been increased up to ten together with the installation of hydro power plants. The monitoring program is based on 1l bottle sampling at stream banks and bridges as well as on pump sampling at selected weirs (hydro power plants). The sampling frequency for each spot is controlled by the local discharge and varies between three samples per week in low flow seasons and increases to four (six) samples per day during floods. The reservoirs serve as sinks for suspended material during low flow periods, while high flow triggers a remobilisation of fines and adds them to the “natural” suspended sediment transport.

Suspended sediment budgeting can be based either on stream surveying, measurements of the tributaries' sediment yields, ratings on the deposition of sediments in inundated flood plains or correct measurements at certain cross sections. Stream bed surveying is carried out at varying intervals. A substantial time lag between measurements and the flood peak can cause significant uncertainties. Lacking data of suspended sediment yields for important tributaries and missing deposition surveys add

to the inaccuracy of such an approach. Therefore, the necessity of accurately measured sediment concentrations at defined cross sections for the purpose of suspended sediment budgeting has to be stressed at this point.

The Austrian Hydro Power AG, the operating company of the dams, has integrated an optical measuring device in the pipe of a pump-sampler in order to record the turbidity of the river water with high temporal resolution. This surrogate measuring tool generates a “turbidity – hydrograph”, which can be converted into suspended sediment concentrations by correlating turbidity measurements with sediment mass concentrations, which were taken by the pump sampler.

It is proposed that the turbidity measurements could also be utilized for governing and optimizing the automated pump sampling in order to concentrate the sampling within time periods with high flow and intensive suspended sediment transport, while in periods, which do not contribute much to the annual sediment yield, the frequency of the sampling can be substantially reduced.

Turbidity measurements in combination with suspended sediment sampling are a promising tool for long term sediment budgeting. Other corresponding measurements like surveying of the stream channel and observing sediment depositions on flood-plains are of assistance in river management, but can also be used for verifying the concentration measurements at the specified cross sections.