

SUSPENDED LOAD MEASUREMENTS IN THE SAVA RIVER (CROATIA) – TRADITION AND DEVELOPMENT BY USING ADCP TECHNOLOGY

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Introduction: Good sediment monitoring network in the river basin is the essential part of innovative sediment management. This case study of the middle part of the Sava River in Croatia is a contribution of looking for new, more efficient and less costly methods for suspended soil measurements, which should be a ground for better understanding of morphological processes in some vulnerable river sections.

Methods: Daily measurements of Sava River suspended sediment in Croatia has been taken at five location for more than 30 years, following standard filtration procedure (ISO 4365:2005). Results of daily concentration rates, daily, monthly and total amount of load transport rates are published in Hydrological yearbooks. Periodically, cross-sectional mean suspended sediment mass measurements, and mean particle size distribution (ISO 4363:2002) are conducted at three locations at urban part of Sava riverbed. Those data series represents the base for the empirical relations defined between different hydrological parameters. Nowadays, there is an intention of the Meteorological and Hydrological Service of Croatia to replace this traditional methodology with more efficient and less costly methodology. The new methodology of suspended load measurements is by using Acoustic Doppler Current Profiler (*ADCP*) measurements and special software for converting echo backscatter intensity to the concentration of suspended solid in water.



Fig. 1: Sava riverbed upstream of Zagreb during low water season in 2011.

Results: First results of new methodology encourage the use of acoustical profiling for monitoring fine suspended sediment transport. The method improves temporal and spatial distribution of load transport processes in cross section which can be useful especially at some vulnerable locations.

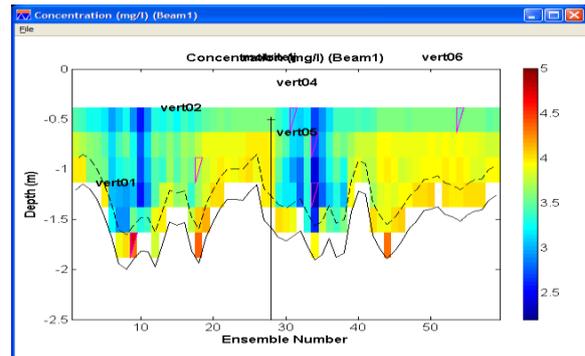


Fig. 2: Spatial distribution of concentration of suspended load on Sava – Podsused cross section.

On the figure 2 is given result of conversion the acoustic echo intensity from acoustical profiler into suspended sediment concentration carried on 26/10/2011 in comparison with results of water samples taking manually at the same time during the *ADCP* measurement.

Discussion: The regression curves defined on traditional measurements, carried at urban reach of Sava canal between hydrological station Podsused and Rugvica, have been showed decreasing tendency of monthly and annually suspended load transport. Since 1990s on hydrological station Podsused, there is ten times less of total amount of load transport in comparison with period 1980-1990. There are at least two reasons for this change: 1st - HEPP reservoirs building in the upper stream, 2st - river restoration and flood management schemes. In this case study are taken in account all *ADCP* measurements from 2005 at tree location: Podsused, Rugvica and Jasenovac, and post processed by *ViSea4* software from AquaVision-Hydro & Oceanografic Consultancy. Water samples from that period, are also taken in the account for each measurement and used for backscatter calibration. The results of this methodology are compared with results of analytic method have been used before.

References: [1] Rotaru E. at all (2005): *ADCP Measurements of Suspended Sediment Fluxes in Banat Rivers, Romania*

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