Geophysical Research Abstracts
Vol. 12, EGU2010-12457, 2010
EGU General Assembly 2010


# Monitoring Artificial Tracer Stones at the Danube East of Vienna

Marcel LIEDERMANN, Margit GERSTL, Michael TRITHART, and Helmut HABERSACK

Institute of Water Management, Hydrology and Hydraulic Engineering BOKU - University of Natural Resources and Applied Life Sciences, Vienna; Muthgasse 107, 1190 Vienna, Austria; e-mail: marcel.liedermann@boku.ac.at

The Integrated River Engineering Project on the Danube to the East of Vienna aims to implement innovative measures to stop riverbed incision on one of the last free flowing sections of the Austrian Danube River. In order to reduce erosion processes, it is planned to add larger gravel sizes within the natural grain size spectrum (granulometric bed improvement). It is planned to superimpose a layer of 25 cm thickness to reduce sediment discharge to a minimum of 10 to 15% of the current amount, but not to stop it entirely. Additionally seven huge sidearm systems will be reconnected, about 30% of the bank protection will be removed and low flow regulation structures will be improved in order to enhance the ecological situation.

Within the scope of this Project a comprehensive sediment monitoring program is implemented. Besides bedload transport measurements using a basket sampler and sediment transport modelling applying a newly designed numerical model, artificial stones were added and monitored in order to observe transport velocities and initiation of motion.

For the monitoring performed at the three kilometer long test reach near Hainburg, 40 artificial stones of three different sizes (intermediate b-axis: 23 mm, 40 mm, 70 mm) were produced and a coded radio acoustic transmitter was attached to each gravel. The stones were lowered to the river bed at six different locations at the beginning of the test reach, at a gravel bar and in a groyne field within the stretch. The positions of the stones have been observed about once a week, depending on hydrology, over a whole year including a HQ15 flood event. The positions of the stones have been determined by radio tracking from a boat. Hence transport paths and velocities as well as the initiation of bedload transport could be monitored.

The paper gives an overview on the methodology and presents results of the monitoring program. The observed stones showed a size selective behaviour in transport. At all discharges, small stones were transported more frequently, faster and further than medium and large stones. Independent of gravel size, the tracers generally covered short travel distances, long travel distances were observed less frequently. With increasing discharge, a higher quantity of stones was transported and travel distances increased. A relationship was found between river morphology and the positions of tracers where no transport occurred. Areas of no transport were more likely to have deeper water levels, less flow velocity and lower shear stress values than areas where tracerstones were moved. More than half of all stones passed the three kilometer long reach with a mean travel velocity of about 10 m per day and a mean transport length of about 200 m. The initiation of motion of the large gravel was detected at lower discharges than predicted by uniform bedload transport formulae.