



## **Impact of flush pulses in semi-arid temporary rivers - experiences of modelling particulate organic matter**

**M. Obermann** (1), J.L. Perrin (2), M.G. Tournoud (2), J. Froebrich (1)

(1) Water Resources Management, Institute for Water Quality and Waste Management (ISAH), Leibniz Universität Hannover, Am kleinen Felde 30, 30617 Hannover, Germany, (mo@fggm.uni-hannover.de), (2) Hydrosociences Montpellier, JRU CNRS - IRD - Université Montpellier 1 - Université Montpellier 2, Maison des Sciences de l'Eau, Université Montpellier 2, 34095 Montpellier cedex 5, France

Temporary streams in semi-arid regions are often affected by high anthropogenic pressures through intensive agriculture, industry and sewage water inflows. There is a need for measures to analyse and mitigate negative impacts on these sensitive ecosystems, especially in the transition period just before or during the early rainy season. Fluctuation in flow intensities lead to an extended accumulation potential of various nutrients and pollutants in the catchment and especially in the river bed. A great quantity of these accumulated materials will be removed by the first significant flood events. This means that the occurrence of first flush phenomena has a number of important impacts on water management. The modelling of temporary rivers is a complex multi-dimensional task. Spatial issues play a major role especially in fluxes for particulates: hot spots of concentrated matter, built up during the dry period, can be successively transported downstream. Instream concentration of pollutants depends on the complex interaction of dissolved and particulate nutrients and their consumers. During the dry period, turnover rates, mostly directly bound to concentration values, are very sensitive to even minor inflows which disturb the settled, equilibrium system. An application of the newly developed tempQsim - STREAM model showed, that the system reaction is very vulnerable during the drier phase to even small events. If there is no relevant water flow in the river, and the existing pools are only maintained by point source inflows, the concentration of nutrients is usually high. If small waves of relatively uncontaminated rainwater frequently enter the system, this leads to many small disturbances, letting the concentration constantly fluctuate between the one of the rainwater and the one provided by the point sources. This means, that during the

calibration and validation of a model in temporary rivers, not only the uncertainty noise, which is always present in measured data must be considered, but also the natural temporary river noise, caused by the fast and irregular fluctuation in concentration during short termed dry period storms. Hence, timeseries of measurements often do not possess the same properties as timeseries of continuous simulations. Some features, which can be modelled, are normally not measured in campaigns done in temporary rivers. Further, it was found in a modelling of the Vène catchment (France), that the resuspension capacity of events during the dry period can be very important for the annual VSS balance. Even though comparable small, an event during August 2003 was capable to release over 95% of the stored bottom VSS and transported nearly 10% of the total annual load. The simulation showed, that these events can have a severe impact on the downstream lagoon. Hence, great care should be taken in order to include these short-lived events during the summer in measurement programmes for temporary rivers.