

## **MODELING OF LONG-TERMED NUTRIENT RETENTION IN SURFACE WATERS IN SAXONY**

*Stefan Halbfaß, Micha Gebel, Stephan Bürger, GALF bR, Dresden*

Transfer of nutrients (P, N) in catchment areas is determined by different interdependent processes. Nutrient sources, pathways and sinks are controlled by catchment character, hydrology and anthropogenic input. Processes of transfer are in general mobilisation and dislocation caused by heavy rainfalls via surface runoff and soil erosion (Sharpley et al. 1999), infiltration via macropores (Bundt 2000, Heathwaite a. Dils 2000), drainage, interflow and groundwater (Kronvang et al. 1997, Pudenz 1998, Chapman 2001, Jonge et al. 2004), bank erosion (Sekely et al. 2002, Zaimes et al. 2005, Koch 2007), resuspension of and desorption from bottom sediments (Bowes et al. 2003, Mulholland 1992, Schulz et al. 2008), processes of biological turnover in waters (Boulton et al. 1998, Jin et al. 2007) and nutrient inputs from point sources.

P- and N-fluxes in waters are determined by spatial and temporal dynamic (nutrient spiraling). A lot of physical and biogeochemical factors are influencing processes, nutrient concentrations and loadings (e.g. Withers a. Jarvie 2008). Important time and space differentiated parameters are conditions of morphology, hydrology and meteorology, bioactivity, processes in riparian zone, river bed and inundation zone and water management practice (u.a. Svendsen et al. 1998, Zessner et al. 2004).

Dealing with the nutrient retention phenomenon we should attend, that many effects are short time related, especially controlled by hydrological variability (flood, low water). A long time related retention for P especially exists in flooding areas and reservoirs (Walling a. He 1994, Guhr a. Meissner 2000, Venterink et al. 2003, Withers u. Jarvie 2008). The most important N-removal is caused by denitrification in river bed (e.g. Donner et al. 2004). At the moment there is still a lack of plausible methods to derive process-orientated retention rates in the meso- or macroscale catchment modeling.

In order to derive measurements to reduce nutrient loadings in waters in Saxony for a longer time period (i.e. according to WFD), we are calculating diffuse and point related N- and P-inputs with the model STOFFBILANZ (Halbfaß et al. 2009). An estimation of the long-termed capacity of retention for nitrogen will be done on the basis of the nutrient spiraling concept, using water residence time and time-specific N-uptake. Long-termed P-retention will be estimated as a function of average rates of sedimentation for flooding areas and reservoirs. Short time related processes of mobilisation and immobilisation are being neglected, because they are of minor importance for the derivation of measurements in the present scale of investigation.