

Bank erosion as a phosphorus source in a Danish river basin

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Bank erosion was studied in the River Odense, Denmark during a three years period (2006/2007, 2007/2008 and 2008/2009). A total of 36 different stream reaches each being 100 m long and representing different stream types and bufferzone types were deployed with a total of 3000 sixty cm long steel erosion pins. Each 100 m reach consisted of five plots each having three columns of erosion pins sitting from stream bed to bank top. The total phosphorus (P) content of the studied banks were analysed from soil samples taken 20 cm and 60 cm above stream bed and in the first meter of the buffer strip. Turbidity was measured at a downstream station in the 475 km² catchment and grab samples were taken for analysis of suspended sediment concentration, total phosphorus and particulate phosphorus. Moreover, an in situ sampler for suspended sediment (SubMarie) was deployed at the monitoring station to extract suspended sediment for characterization of the different sediment phosphorus forms being exported from the catchment. Information on the discharge from different point sources of P in the catchment was obtained and the background P loading was calculated in order to establish the amount of P derived from agricultural areas. Bank erosion amounted to an annual gross input of particulate P to surface water between 13.8 and 16.5 tonnes P. The net input of particulate P from bank erosion was calculated as the difference between gross erosion input from plots and the measured deposition within the plots. The net input amounted to 2.9-6.0 tonnes P per year. A relationship was established between gross input of P and net input of P against annual runoff during the three study years the latter relationship showing the best relationship. The net contribution of particulate P from bank erosion amounted to 18-21% of the total P transport at the monitoring station at the outlet of the catchment, and 24-62% of the calculated loss of total P from agricultural land during the three study years.