



Geo-referenced exposure assessment of metals in surface water by model simulations

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Metals such as copper or zinc are commonly detected in surface waters in concentrations that may exert adverse ecotoxicological effects. For the development of promising reduction strategies a detailed exposure assessment for the compounds is necessary. This includes the identification of emission sources and pathways as well as the evaluation of the impact on local and regional surface water concentrations. Metal emissions into surface water may occur from household wastewater (cosmetics, food, piping systems), industrial wastewater, runoff from sealed surfaces (tire and brake pad abrasion, roof wash-off, metal-plated gutters) or from agriculturally used areas (fertilizer), atmospheric deposition, mining activities and natural background from soil washout.

The geo-referenced simulation tool GREAT-ER (Geo-referenced Regional Exposure Assessment tool for European Rivers) couples a geographic information system with chemical exposure models including emission, transport, degradation and output processes to predict steady state concentrations of chemicals in all reaches of a whole river basin. The spatial variability of the river network (discharge, flow velocity, river depth) is incorporated in the geographic data. This geo-referenced approach enables to consider each source and its emission explicitly. As simulation results consist of spatially resolved concentrations in the river network it is possible to link specific immission concentrations to emission sources and to evaluate the relative importance of emission pathways. The simulations allow for identifying the influence of each emission source and pathway on local and regional concentrations individually. Scenario analyses can predict the effect of reduction measures (e. g. reduced consumption or

better sewage treatment) to support the choice of effective reduction strategies.