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Modelling spatial distribution of nutrients (N and P) according to landuse and point sources (Loire river basin, France)

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Water Agencies have to reach new objectives in terms of management and quality in 2015 according to the European Framework Directive. Our study, undertaken in association with the Loire-Bretagne Water Agency (France), aims at characterising nutrient transfer (e.g. nitrogen and phosphorus) in the Loire river watershed (117000 km^2) using available databases.

80 subwatersheds have been divided into two size groups: 0-100 km^2 and 500-1000 km^2). Two aspects of this problem of anthropic pollution are investigated: (i) typology of watersheds and (ii) empirical modelling of nutrient transfers.

The first approach uses a multi-factorial method (PCA) to identify the most significant variables contributing to the spatial distribution of nutrient concentration in surface waters. This typology led to the identification of four areas in the Loire river watershed: anthropic (urban and industrial rejects) and agricultural (landuse, fertilizers and manure) variables are representative of significantly different behaviours of nutrient. In a second approach, empirical modelling has been used to quantify the influence of diffuse and point source using the predefined typology. Various soil export coefficients for nitrogen transfer have been computed whereas phosphorus is better modelled using point source and suspended matter.