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FATE: Framework for modelling diffuse nutrient losses at EU continental scale

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Human activity has altered the global cycle of nitrogen, doubling the rate of nitrogen input into the terrestrial nitrogen cycle and increasing the transfer of N through rivers to estuaries and coastal oceans. Agriculture has large environmental consequences including degradation by conversion of land use, increased erosion and soil loss, pollution by agro-chemicals, and pollution from animal operations. Agriculture is the main source of nitrogen loading to water bodies in Western Europe while agriculture and households contribute the most to phosphorus loading. During the last ten years new agricultural policies and environmental regulations have been developed in several European countries in order to reduce agricultural non-point source pollution, improve water quality and protect the stream habitat from eutrophication. In this context, the Soil and Waste Unit of the European Commission's Joint Research Centre (JRC) is developing an integrated approach to modelling nutrient fluxes: FATE (Fate of Agrochemicals in Terrestrial Ecosystems in Europe). The FATE project has three major objectives: 1) develop an EU wide database containing consistent GIS coverages; 2) develop a relational database to manage the non-spatial data; 3) setup and link various models to the data and information collected in the first two parts of the project.

The present study presents the FATE project and in particular will introduce all European datasets available to simulate the fate of nutrient in terrestrial ecosystems. This database was linked to a statistical methodology to perform source apportionment, to a one-dimensional nitrogen model and to the watershed scale SWAT model. An application of the three methodologies using the European datasets is illustrated for one catchment in northern France.