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Modelling fate and transport of glyphosate and AMPA in the Meuse catchment to assess the contribution of different pollution sources

Nele Desmet (1) and Piet Seuntjens (1,2,3)

(1) VITO, Environmental modelling / Land & water management, Mol, Belgium (nele.desmet@vito.be), (2) Ghent University, Department of soil management, Ghent, Belgium, (3) University of Antwerp, Department of bioscience engineering, Antwerp, Belgium

Large river basins have multiple sources of pesticides and usually the pollution sources are spread over the entire catchment. The cumulative effect of pesticides entering the river system in upstream areas and the formation of persistent degradation products can compromise downstream water use e.g. raw water quality for drinking water abstractions. For assessments at catchment scale pesticide fluxes coming from different sources and sub basins need to be taken into account. To improve management strategies, a sound understanding of the sources, emission routes, transport, environmental fate and conversion of pesticides is needed.

In the Netherlands, the Meuse river basin is an important source for drinking water production. The river suffers from elevated concentrations of glyphosate and aminomethylphosphonic acid (AMPA). For AMPA it is rather unclear to what extent the pollution is related to glyphosate degradation and what is the contribution of other sources, especial phosphonates in domestic and industrial waste water. Based on the available monitoring data only it is difficult to distinguish between AMPA sources in such a large river basin. This hampers interpretation and decision making for water quality management in the Meuse catchment. Here, application of water quality models is very useful to obtain complementary information and insights. Modelling allows accounting for temporal and spatial variability in discharge and concentrations as well as distinguishing the contribution from conversion processes. In this study, a model for the river Meuse was developed and applied to assess the contribution of tributary and transnational influxes, glyphosate degradation and other sources to the AMPA pollution.