



Spatial Analysis Of Pesticide Use In Agriculture And Emissions To Water

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For over more than a decade, concentrations of plant protection products in surface water have been monitored in Flanders. Some active substances are detected frequently (in up to 94% of monitoring locations for some substances) in surface water and exceedance of legal limits occurs regularly (up to 22% of monitoring locations depending on the substance). The aim of this study is to investigate the relationship between the use of plant protection products in agriculture and the impact on surface water quality. Their emissions towards the surface water are calculated with a high spatial resolution and compared to measured surface water concentrations.

In a first step, the spatial distribution of the agricultural use of plant protection products is estimated from detailed crop maps for Flanders, combined with results from a survey on the use by farmers on different crops. Crops are aggregated to 12 different crop groups and 22 substances are investigated in the study. Relevant combinations of active substances and crop groups are defined, based on the survey, a consultation of authorized products and expert knowledge. All this information has been extrapolated to Flanders using among others spatial correlation techniques. This results in 12 raster maps with a resolution of 1 hectare, where every map represents the spatial distribution of the yearly use of a specific active substance for the whole of Flanders, taking the crop differences into account.

Next, emission factors are calculated for different transport routes: drift, direct losses, volatilization, interception, erosion, drainage and leaching. From the maps of yearly use and the emission factors, emissions to surface water are calculated as the sum of drift, direct losses, erosion and drainage. The calculated substance emission is compared to measured concentration in surface water for a number of selected upstream areas with homogeneous clusters of crops (and therefore substance use). Calculated emissions are distributed over the year using crop calendars and guidelines on the application of the substances in order to compare with concentration peaks measured in surface water.

Methods, results and an outlook for further research are discussed.