

Relevance of hydraulic shortcuts for transport of plant protection products in rural landscapes

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Agricultural plant protection products (PPPs) can enter surface waters through various pathways and impair the water quality. In the past, numerous studies were conducted for certain entry paths such as surface runoff, direct drift into water bodies or preferential flow to drainage systems. Man-made hydraulic shortcuts (e.g. road storm drains collecting drift onto roads or manholes of drainage systems) might also play a major role for PPP inputs into surface waters. However, they have been largely overlooked in the past.

In this study we investigate for the first time the relevance of such shortcuts for the PPP transport in Switzerland. In a survey we will compile the different types of shortcuts that exist. For selected field sites we will quantify the density of these different shortcut types using a combination of field surveys and GIS analyses. Afterwards we will extrapolate these local results to the national scale and create a nationwide assessment of the shortcut density in Switzerland.

In a next step we will assess the loads of PPPs lost to surface waters through hydraulic shortcuts using a mass flow analysis approach. The processes to be modelled are drift deposition on roads, the occurrence of overland flow reaching shortcuts and the functioning of the different shortcut types. Depending on the type of shortcut analysed, also other processes like photolysis or sorption might play an important role. The results of the mass flow analysis should reveal if PPP losses through hydraulic shortcuts are relevant with respect to a) the total loads in comparison to other transport pathways and b) the concentrations caused in surface waters in comparison other transport pathways and to ecological risk factors.

In a last step we want to verify our results by measuring PPP transport through hydraulic shortcuts at selected field sites. The findings of this study will lead to recommendations for authorities and practitioners how to deal best with such hydraulic shortcuts.