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The road towards an EU-wide tiered approach assessment of pesticide concentration at drinking water abstraction locations - a combined approach of GIS analysis and modelling on catchment level

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The exposure assessment of plant protection products (PPP) at drinking water abstraction points is of growing interest for authorities, water suppliers, industry, and other stake holders and is hence particularly addressed in the EU regulatory framework (regulation 1107/2009). However, there is no generic guidance available on the derivation of drinking water abstraction concentrations in the EU. An exception is the national approach of the Netherlands, a simplistic but very solid first Tier approach, which considers edge-of-field PEC_{sw} , use intensity including cropping area within a drinking water catchment, application practice and dissipation in the water system amongst others. The Dutch approach underlies worst-case assumptions e.g. all agricultural land is connected and releases water to a water body. Our work explores the feasibility of a general tiered EU-wide approach to derive realistic PPP concentrations at drinking water abstraction points. Specifically, our goals are: (i) the characterization of EU-wide drinking water catchments, (ii) the identification of vulnerable catchments based on agricultural area or specific crops, (iii) to enable substance specific modelling for agricultural area/crop using a landscape-level assessment model.

On this account, we analyzed the European catchments for specific crops on the basis of the Water Framework Directive (WFD). The focus was on catchment characteristics (e.g. crop area, soil hydraulic properties) which have a strong impact on runoff as well as drainage generation and therefore on the mixing of PPPs in surface water. In a first step, the spatial variation of the mixing factor by crop area was investigated taking into account the stream course from headwater catchment to a larger main river. In the second step, we identified typical abstraction areas for surface water and groundwater using proxy data (e.g. protection zones and other proxy data) with the aim to explore the most vulnerable combinations in the EU. These data can then be used for the definition of specific (vulnerable) scenarios regarding the mixing of PPPs in surface water for a specific crop on EU level.

It is expected that these data in combination with landscape-level modelling using the Soil and Water Assessment tool (SWAT) can be used as starting point for a tiered exposure assessment to

derive generic mixing factors and drinking water concentrations at abstraction locations.