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Spatial and temporal analysis of priority zones to mitigate pesticide pollution in a small catchment

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The use of pesticides during agricultural production can negatively influence water quality and be a threat to aquatic ecosystems. Pesticides can enter the environment through different pathways such as runoff, erosion, drift or point losses and be diffused in the environment. Hence, there is an increased interest in the implementation of targeted mitigation measures in agriculture to reduce the environmental impact of pesticides and to reach the desired surface water quality at a certain location.

Identifying priority areas to implement mitigation measures is an important step in the development of a management strategy to reduce pesticide loads in surface water at catchment level. The study of the spatial and temporal variation of the risk zones for pesticide pollution is relevant when long-term measures have to be implemented within a catchment. Some agricultural areas undergo yearly variations in parcel size, shape and crop rotation that could represent a change in the associated risk and the contribution of pesticide towards the surface water. A thorough understanding of the spatial and temporal variations in parcel size, parcel shape and crop rotation in the study area is needed to suggest specific measures at the field scale to reduce pesticide impacts. The long-term analysis in the identification of risk zones also requires the consideration of implementation of (mitigation) measures and field observations that can modify the calculated risk.

Our methodology includes very detailed landscape data like topography, crop cover, use of pesticide, erosion risk and connectivity among other relevant factors to derive theoretical risk. Parcel scale is considered in this study for a catchment in SE Flanders (Belgium). Best practices and management decisions for reducing pesticide pollution are developed primarily to be implemented by individual farmers within field limits expecting an overall improvement at larger scale. Therefore the local practices and the microscale within a catchment have been included in this methodology.

We will demonstrate for a case study how microscale variations can be included in a methodology to identify priority zones to target mitigations measures in a small catchment and how field validation of the risk zones can be performed.