

Transport of pesticides in branched rivernetworks of small waterstreams

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In Germany the dominant surface water types near agricultural fields are small streams and ditches. These water bodies are especially vulnerable to pesticides.

In this work we present a prediction model based on transport equations for the pesticide exposure in networks of small surface water bodies.

For the computational analysis we established a discrete and topographic node network with an resolution of 25 meter per segment. The modelled nodes are derived from the natural river flow via spatial data bases. Each node has a degree of ingoing and outgoing arcs which route the incoming and outgoing water stream from and to the next node.

Further characteristics for river sections like width and depth of a stream and average flow velocity are calculated and can be configured in the network data model.

Every single node can be assigned with load information which consists of loading time, the specific substance and the loaded mass. The initial load information is assessed by a probabilistic approach for drift and a run-off model which was linked to a Geospatial Information System (GIS) evaluation on entrance points and run-off pathways from critical source areas. The load is routed through the modelled network in dependence of the average flow velocity.

For each segment in the network the concentration level will decrease and the length of the pesticide wave in flow direction will increase. The resulting concentration of a substance is summarized over all passing concentration levels.

Based on such results it is possible to analyse and compare different scenarios of risk management.