

Development of CASCADE-TOXSWA model to assess exposure at catchment scale

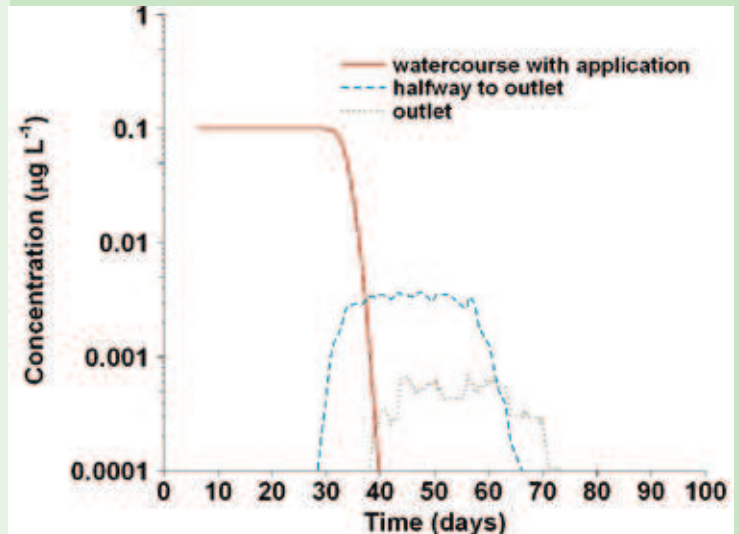
Theme: Risk assessment procedures for registration of plant protection products BO-06-010-002

Problem

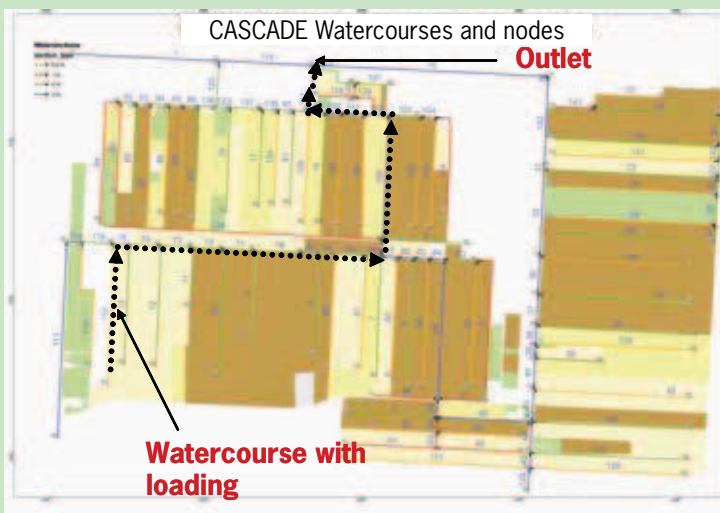
Under EU directive 91/414/EEC the exposure of aquatic organisms is assessed for a single watercourse. At present there is no procedure to assess the exposure at the catchment scale (10 km² or more). Exposure at this scale is important within the Water Framework Directive and ecotoxicological criteria from both EU directives must be met.

Approach

Based on the TOXSWA model to assess exposure at the local scale a first version of a model has been developed to assess the fate of a substance in a system of water courses: CASCADE-TOXSWA. The model has been parameterized for an example area in the North-East of the Netherlands (see below). This catchment was divided into 137 watercourses for which the course with time of the water depth and the discharge were calculated using the SWQN model. The first version of CASCADE-TOXSWA was used to assess the transport of a tracer in the catchment from the site of loading due to deposition by drift to the outlet of the catchment.



The concentration of the tracer in the water layer at the site of application, in a watercourse halfway to the outlet and at the outlet of the example area.



Example area in the North-east of the Netherlands.

Results

The results of the test run are shown above.

- The concentration at the outlet due to a single application was about a factor 100 lower than the initial concentration in the watercourse with drift deposition
- After 40 days concentrations in the watercourse with drift deposition dropped with a factor 1000; after 75 days, concentrations at the outlet decreased by a factor 10 compared to the peak concentrations

Future use in risk assessment

The CASCADE-TOXSWA model can be used to assess the exposure of tracers at the catchment scale. The next step in the development of the model is the inclusion of a sediment compartment to describe the exchange of mass of substance between the water layer and the sediment as well as the fate of the substance in the sediment subsystem. This new version of CASCADE-TOXSWA can be used to assess the fate of plant protection products in small catchments as required by the Water Framework Directive.

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