

A Geographic Information System (GIS)-based study on regional pesticide deposition

Theme: Water Framework Directive

BO-06-006-003

Problem

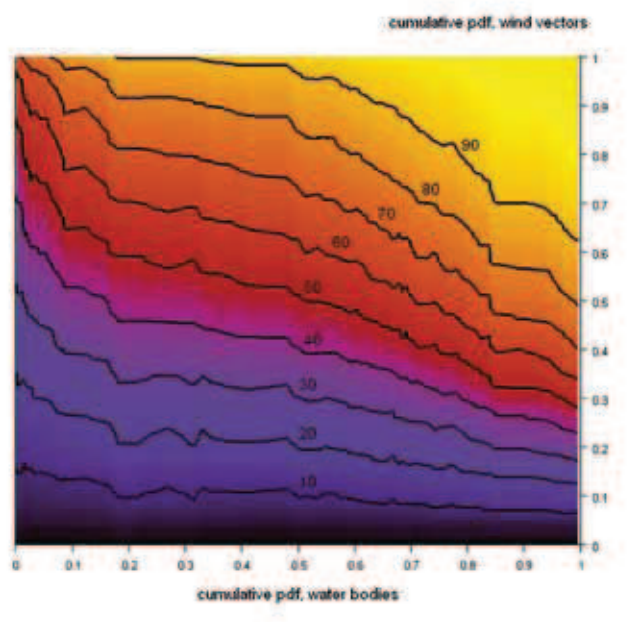
Spray drift is still a major factor in contaminating surface waters in Europe. Many drift studies describe the single-field case only. A more realistic approach demands scaling-up to a regional study of drift hazards.

Approach

The Cascade Project describes the modelling of spray drift and pesticide fate for a network of interconnected water bodies in a rural area.

The Cascade Drift Model calculates the spatial and temporal distribution of spray drift deposits onto the water bodies in a realistic way. Results of the Drift Model are used as input for **the Cascade Fate Module**, which models the fate of pesticides in water bodies. For the current set-up of the project a 10 km² pilot region was selected with primarily agricultural use. The region is well described geographically and hydrologically using GIS (TOP10Vector, LGN4).

An Agricultural module is being developed to implement spray events in time for the different crops in a specific region.



Cumulative Probability Density Functions of water body dimensions and lengths in the Netherlands and spray drift based on 10 years distribution of wind speed and wind direction to determine the 90-percentile predicted environmental concentration of surface water.

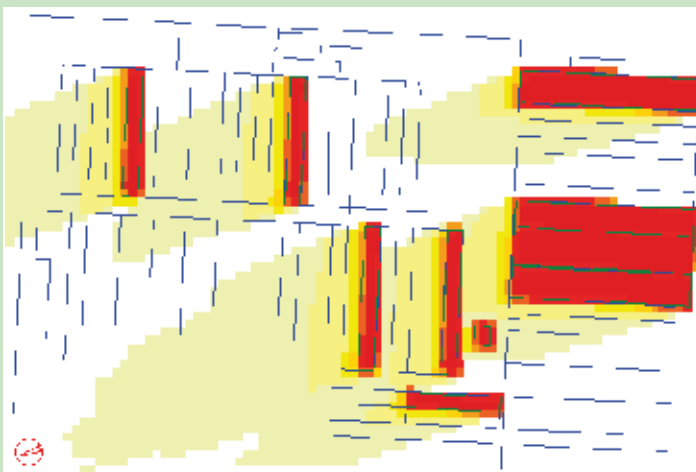
Results

The prototype of Cascade Drift Model works well. Spray drift onto a network of water bodies can be computed under varying circumstances. The set up of the implementation of an Agricultural module is being discussed.

First sensitivity and uncertainty analysis give an impression of the effect of wind speed, wind direction and waterway dimensions on spray drift deposition in surface water. Additional field measurements have been done to quantify the variation in spray drift deposition alongside a field edge. Spray drift deposit at surface water distance varies depending on place alongside the field, sprayer boom movement and variation in wind speed and direction by more than fivefold.

Future use in risk assessment

The Cascade Drift Model offers a more realistic insight in the problem of spray drift onto surface waters. Extension to other representative regions is possible when geographical information will be available for those regions.



Map of sprayed potato parcels (blue shaded) and water body segments loaded with drift deposits (blue segments, thickness of line refers to amount of drift deposition); wind direction east.

Henk Jan Holterman, Jan van de Zande & Jan Huijsmans

Contact: Henk Jan Holterman
Plant Research International
P.O. Box 16, 6700 AA Wageningen, the Netherlands
T +31 317 48 06 90 - F +31 317 48 10 47
henkjan.holterman@wur.nl - www.pri.wur.nl

This project is part of the BO research programme Plant Health of the Ministry of Agriculture, Nature and Food Quality