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Evaluation of the FOOT-CRS tool – first results

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In the EU-project FOOTPRINT three pesticide risk assessment and management tools were developed, for use by three distinct end-user communities at three different spatial scales: policy makers and registration authorities at the national/EU scale, water managers and local authorities at the catchment scale, and farmers and extension advisors at the farm scale.
In the tool FOOT-CRS (Catchment and Regional Scale), which has been programmed as an add-on in ArcGIS 9.3, the emphasis is on i) identifying the areas most contributing to the contamination of water resources by pesticides, and ii) defining and/or optimising action plans at the scale of the catchment. In contrast to the national-scale tool FOOT-NES, where pesticide concentrations in hypothetical edge-of-field surface water bodies are calculated, FOOT-CRS uses the actual surface water network. For the calculation of pesticide inputs into surface waters via surface runoff and erosion, a routing to the surface water network is performed on a grid basis, and the pesticide load reduction during transport in overland flow by reinfiltration or redeposition is explicitly calculated. Subsequently, the fractions of pesticide surface runoff loss and pesticide erosion loss from a cell that finally reach the surface water network are computed for each cell. This information is crucial for determining the sites where the establishment of additional mitigation measures will be most effective. Drift input calculation is done on a vector basis, considering mitigating landscape elements like hedges and riparian vegetation. FOOT-CRS produces several types of output:
i) maps and spatial cumulative distribution functions (CDFs) of pesticide leaching concentrations (PECgw)
ii) maps and spatial CDFs of pesticide losses from fields and pesticide inputs into the surface water network
iii) temporal CDFs of Predicted Environmental Concentrations in surface water (PECsw) at the catchment outlet (i.e. for one point in space), for different pesticide input pathways. These CDFs can e.g. be used to determine the return period of a given peak exposure concentration.

In this talk, first results of a stepwise evaluation of the FOOT-CRS tool against experimental data from the Rohr catchment in the Swiss plateau will be presented. Modelled pesticide losses from fields and inputs into surface water bodies as well as pesticide concentrations at the catchment outlet will be compared with measured data obtained by the EAWAG during a controlled application experiment in 2000.
In the first evaluation step, the output of a standard FOOT-CRS simulation (with a 20-year FOOTPRINT weather time series for the appropriate climate zone) will be compared statistically with the measured data, to check the plausibility of the FOOTPRINT results and the representativeness of the FOOTPRINT weather series for the Rohr catchment. This step will thus allow the evaluation of FOOT-CRS as a whole.
The second evaluation step involves a non-standard FOOT-CRS simulation, using a modified version of FOOT-CRS with the original weather time series observed during the experiment (and thus with new underlying MACRO and PRZM simulations) and with a daily output resolution (as opposed to monthly maximum values). Here, a direct comparison of simulated and measured time series can be performed. This evaluation step will allow an evaluation of the FOOT-CRS model structure and parameterisation.
Additionally, the effect of the resolution of the spatial input data (e.g. the DEM) on the FOOT-CRS results will be explored.