



## Harmonised Framework for Spatially Distributed Leaching Modelling of Pesticides Initiative: A 2022 Update

### ABSTRACT

Spatially distributed leaching modelling (SDLM) of pesticides is a methodology to estimate leaching potential over a large spatial extent such as national or European level. SDLM can help setting groundwater monitoring programs in context. It is described in the FOCUS groundwater report and foreseen to be used as higher tier leaching risk assessment as well as supporting monitoring studies. SDLM is already used as a higher tier assessment in the national authorization procedure in some EU countries and will probably become more important in future.

At the SETAC Europe 2020 online meeting, the initiative was officially formalised as a SETAC working group, consisting of a triad of members from regulatory agencies, academia, and industries. A steering committee manages the effort to develop harmonized guidelines for spatial distributed leaching modelling across Europe and published a problem definition document describing the aim and scope of the work. In 2021 subgroups for Geodata and Modelling were established with each a specific focus.

The Geodata subgroup is evaluating datasets that can be used to generate a spatial modelling scheme and associated scenarios. Data reviewed fall in several established INSPIRE metadata categories such as Agricultural, Meteorological, Land Cover, Hydrography, Soil, and many other categories. All data are evaluated for spatial coverage, resolution, temporal aspects, period covered, version control, accuracy, and frequency of updates. Data availability is assessed as well to ensure that all SDLM stakeholders can use the same datasets when developing their SDLM framework. The Geodata group primarily focusses on pan-European datasets that cover the EU27 and the UK.

The modelling subgroup is evaluating the models to be used in the SDLM context. Specific attention is paid to runoff processes and the interaction with substance transport to groundwater. Pesticide leaching models developed for regulatory purposes do not consider these processes. In a spatial context, ignorance of runoff may lead to unrealistic leaching patterns, so options were evaluated how to include runoff in a harmonised way into the models (e.g., using the runoff curve number approach). The modelling subgroup is further investigating how other lateral loss processes, such as drainage, can be included. As the SDLM teams continue to work, this presentation provides an update to interested parties.

### Modelling Group Status

Review and **define the elements of a modelling framework** as well as to develop a methodology to **use such a framework** to

- put results from monitoring studies to assess leaching according to Tier 4 into context, and
- to assess the leaching risk according to Tier-3B of the EU leaching assessment

#### The objectives are:

- To review the **processes** that need to be included in the model components of the framework;
- To develop a methodology to derive a **schematisation** for the model framework using a statistically sound clustering procedure;
- To develop a **first version** of the model framework;
- To prepare a **series of tests** to demonstrate the use of the modelling framework;
- To review options for common platforms, maintenance and version control;
- Evaluate **suitability of models** to be used within the SDLM framework.

#### Aim of the framework:

- Provisional exposure assessment goal like in FOCUS (2000)
- Tier-3B: Calculation of the 90th-overall percentile in FOCUS zones
- Tier-4: Preselection of vulnerable areas for groundwater monitoring sites. The actual selection of sites requires more detailed assessments
- Put results from monitoring studies in wider context

#### Models

Currently two models are considered for the framework

- PEARL
- PELMO

#### Lower Boundary Conditions

- The current version of SDLMS (EuroPEARL/EMF) use a free drainage condition and doesn't consider losses through lateral flow processes
- After discussion in the modelling subgroup, it was concluded that the first version of the framework should not consider drainage

#### Inclusion of additional process

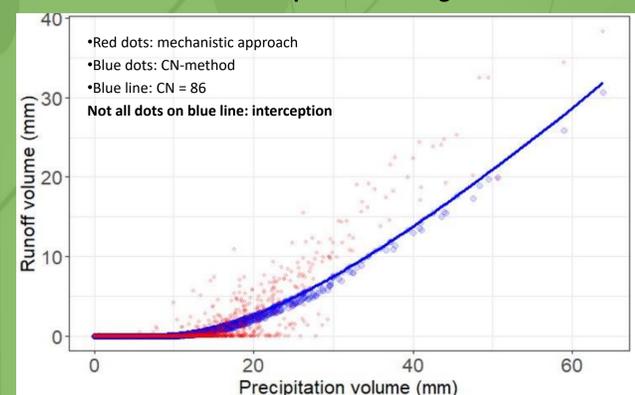
The working group discussed the following additional processes

- Runoff
- Drainage
- Preferential flow

### Criteria for including additional processes are:

- Parameterisation should be possible with both PEARL and PELMO, because results from these two models are needed in the FOCUS context
- The process should make the assessment more realistic
- Data to parameterise the process must be available

### Runoff as predicted using PEARL



The group agreed that for the check and comparison of the RCN approach with PELMO, PEARL and PRZM all FOCUS runoff scenarios (R1 – R4) should be used together with the crops winter cereals (not R2), maize and vine

### Summary from the 10<sup>th</sup> European Modelling Workshop

During the EMW10 the SETAC EMAG-Pest SDLM team provided a detailed overview of the ongoing effort. Presentations included:

1. Introduction (Anton Poot)
2. Overview of Geodata (Gerco Hoogeweg)
3. Overview of Modelling (Aaldrik Tiktak)
4. Discussions with Q&A (Bernhard Jene)

During the EMW10 the following was discussed:

1. The SDLM should consider including all relevant process such as drainage, macropores, preferential flow, lateral flow, and fluctuating water table.
2. Allow for regional specific models that include one or more of the locally important processes
3. Is the proposed spatial resolution of 1-km sufficient or too coarse for European and Zonal Modeling and how does that compare the national-level models?
4. Do we need to include 2 models, or can SDLM focus on one model that accounts for all relevant processes?

The next SDLM meeting is scheduled for the week of October 18, 2022.