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MACRO-DB

A pesticide risk assessment tool for drinking water protection zones in Sweden

CONCLUSION

MACRO-DB is a web-based decision-support tool that allows end-users to perform fast and reliable pesticide risk assessments for drinking water abstraction zones in Sweden.

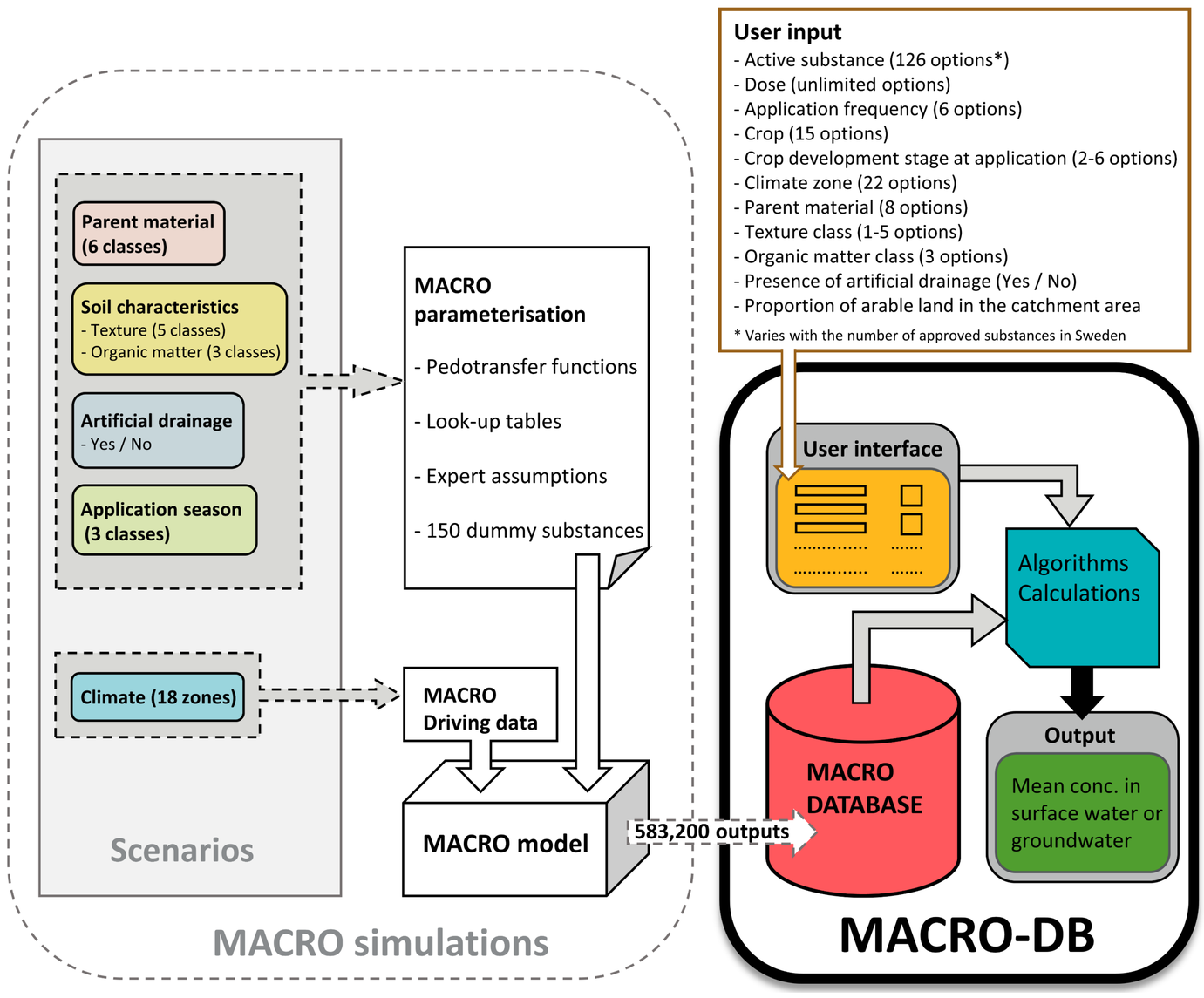
INTRODUCTION

In Sweden, permits are required for pesticide use within abstraction zones. Easy-to-use models that account for site-specific conditions and run on widely available input data are needed to support local authorities in their decision-making.

MATERIALS & METHODS

The physically-based MACRO model was parameterized for representative application scenarios using pedotransfer functions including an approach to predict the strength of preferential flow. The estimated 20-year average concentrations of hypothetical compounds in leachate to groundwater and surface water were stored in a database.

MACRO-DB results for actual application scenarios are calculated by interpolating the active ingredient within the substance parameter space of the database and accounting for the actual substance dose, crop interception and dilution.



Schematic view of MACRO-DB including the pre-preparations and simulations with MACRO v.5.2.

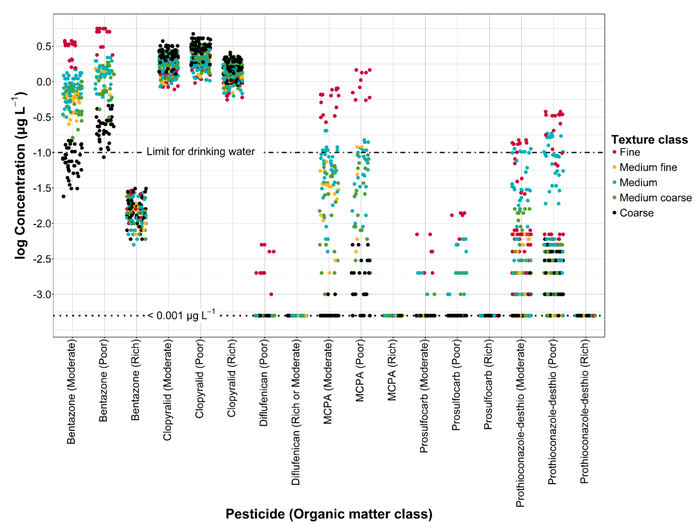


Figure. Estimated 20-year average pesticide (or metabolite) concentrations leaching to groundwater in two Swedish counties for all approved combinations of crops and doses for six common pesticides. Soils assumed to have zero flow at the base of the profile are excluded.

RESULTS

In a qualitative comparative assessment, MACRO-DB clearly distinguished between substances detected in Swedish groundwater at concentrations exceeding the limit for drinking water and those that are not. Model outputs were also in general agreement with monitoring data from sites corresponding to simulated scenarios and matched or were more protective (>0.1 µg L^{-1}) than the national pesticide approval procedure.

Table. Mean of detected concentrations (µg L^{-1}) in Swedish groundwater (1986 – 2014).

Bentazone	Clopyralid	Diflufenican	MCPA	Prosulfocarb	Prothioconazole-desthio
1.2	1.2	No findings	39	0.02	No findings

Additional information

MACRO-DB: https://macrodb.slu.se/shinyMACRO_DB/

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