

# **Sensitivity and uncertainty analysis in view of the parameter estimation of a SWAT model of the river Kleine Nete, Belgium**

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From ancient times on, mankind has always been influenced by water: the presence of water was essential for life, cities developed nearby rivers and streams, bad water quality caused diseases... And still, water plays an important role in everyday life. Nowadays however, we face a series of new hazards: extreme droughts and major flooding are caused by climate and land use changes, contaminated drinking water is jeopardizing the health of billions of people all over the world, oil and other pollution is endangering fish stock and birds, etc.

In order to work out measures and find solutions for these hazards, researchers and policy makers are using computer models and more specifically, environmental models. Although, these models have been massively improved over the past decades, they still remain a simplification of the reality and are prone to uncertainties in their results. These uncertainties are linked to measurements of input and output variables, the model structure and the parameters that regulate the model processes. In particular for decision makers, it is very important to reduce and quantify the uncertainties on the model predictions.

A possibility to do this is by identifying the important parameters and estimating their value. In this research, several algorithms to find the important parameters, to estimate the parameter values, to assess the uncertainties and help to improve the model are applied and evaluated for a hydrologic model. More specifically, different types of sensitivity analysis techniques are applied and compared, considering different types of water quantity and water quality variables for the evaluation and optimization of the model.

The techniques were applied for a model of the river Kleine Nete in Belgium. This model was build up with the Soil and Water Assessment Tool, a semi-distributed, physically based simulator that considers water quantity, water quality and agricultural management in river basins.