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Modelling of catchment inflows into Lake Victoria: Uncertainties in rain-runoff modelling for Nzoia River

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Climate and soil characteristics vary quite considerably around the Lake Victoria basin in East Africa which results in high spatial and temporal variability in catchment inflows into the lake. However, the data available for estimating the inflows are usually sparsely distributed and error prone. As a result modeled estimates of the flows are highly uncertain. This could explain early difficulties in reproducing the lake water balance. A new approach for estimating the catchment inflow was developed that implicitly takes into account the various sources of data and modelling uncertainties. Monte Carlo simulation within the GLUE framework was applied to WASMOD model using uniformly sampled parameter sets. The performance of the model was assessed by comparing simulated flow and observed flow using two performance criteria. By splitting the input data into calibration and prediction stages, we assessed the predictive uncertainty using a Bayesian averaging method. The approach was tested on River Nzoia, one of the main rivers that flow into Lake Victoria. The results showed that the proposed approach reveals some interesting possibilities in modeling catchment inflows. Model performance was good with Nash-Sutcliffe values that were as high as 0.85. For data covering the period 1973-1989, simulated flows bounded measured flows 86% of the time. However, the model failed for data covering the period 1990-1995 and our investigation showed that this was probably caused by uncertainties in measured flow.