

## Quantification of water resources uncertainties in the Luvuvhu sub-basin of the Limpopo river basin

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### ABSTRACT:

In the absence of historical observed data, models are generally used to describe the different hydrological processes and generate data and information that will inform management and policy decision making. Ideally, any hydrological model should be based on a sound conceptual understanding of the processes in the basin and be backed by quantitative information for the parameterization of the model. However, these data are often inadequate in many sub-basins, necessitating the incorporation of the uncertainty related to the estimation process. This paper reports on the impact of the uncertainty related to the parameterization of the Pitman monthly model and water use data on the estimates of the water resources of the Luvuvhu, a sub-basin of the Limpopo river basin. The study reviews existing information sources associated with the quantification of water balance components and gives an update of water resources of the sub-basin. The flows generated by the model at the outlet of the basin were between 44.03 Mm<sup>3</sup> and 45.48 Mm<sup>3</sup> per month when incorporating  $\pm 20\%$  uncertainty to the main physical runoff generating parameters. The total predictive uncertainty of the model increased when water use data such as small farm and large reservoirs and irrigation were included. The dam capacity data was considered at an average of 62% uncertainty mainly as a result of the large differences between the available information in the national water resources database and that digitised from satellite imagery. Water used by irrigated crops was estimated with an average of about 50% uncertainty. The mean simulated monthly flows were between 38.57 Mm<sup>3</sup> and 54.83 Mm<sup>3</sup> after the water use uncertainty was added. However, it is expected

that the uncertainty could be reduced by using higher resolution remote sensing imagery.