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Parameter and input data uncertainty estimation for the assessment of water resources in two sub-basins of the Limpopo River Basin.

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The demand for water resources is rapidly growing, placing more strain on access to water and its management. In order to appropriately manage water resources, there is a need to accurately quantify available water resources. Unfortunately, the data required for such assessment are frequently far from sufficient in terms of availability and quality, especially in southern Africa. In this study, the water resources of two sub-basins of the Limpopo River Basin – the Mogalakwena in South Africa and the Shashe shared between Botswana and Zimbabwe – are estimated using a hydrological model. A model is a simplification of an entity of the real world and is thus inevitably an imperfect approximation of a complex reality. In southern Africa water use data are among the most unreliable sources of data because available databases generally consist of licensed information and use is generally unknown. Therefore, model parameter estimation and input data are significant sources of uncertainty that should be quantified. Thus, the study assesses how uncertainties in model parameterisation and model input data affects the estimation of surface water resources of the sub-basins. Farm reservoirs and irrigated areas data from various sources were collected and used to run the model. Results indicate that the total model output uncertainty is higher for the Shashe sub-basin which is more data scarce than the Mogalakwena sub-basin. The study illustrates the importance of including uncertainty in the water resources assessment process to provide baseline data for decision making in resource management and planning.