Conceptual and Modelling Studies of Integrated Groundwater, Surface Water, and Ecological Systems
(Proceedings of Symposium H01 held during IUGG2011 in Melbourne, Australia, July 2011) (IAHS Publ. 345, 2011).
127-132

Resolving uncertainties in the source of low flows in South African rivers using conceptual and modelling studies

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Abstract Low flows play an important role in the eco-hydrology of any natural system and within South Africa are mainly derived from near-surface interflow or deeper groundwater processes. In South Africa there is much uncertainty about the dominant source of low flows in any specific basin. Understanding surface–groundwater interactions and determining the source of low flows are important for sustainable water management strategies and the integrated exploitation of ground and surface water resources; a critical issue for water-stressed regions. This study uses a monthly rainfall–runoff model that includes surface–groundwater interactions in which low flow responses can be simulated either as interflow or groundwater discharges to the river (or both). If the model is to provide useful information for integrated water management any uncertainties in the simulated source of low flows need to be resolved. The paper explores different approaches to resolving these uncertainties (using limited water quantity and quality data) in three basins where the surface–groundwater interaction processes are assumed to be different.

Key words hydrological modelling; low flows; surface–groundwater; wetlands