

Modelling water flows in irrigated areas – a case study in Zhanghe Irrigation System, China

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Abstract Hydrological modelling faces great difficulties in irrigated areas due to the highly dynamic water cycling processes caused by irrigation and drainage practices. This paper describes a study on process-based water balance modelling integrated with remote sensing/GIS spatial analysis in the Zhanghe Irrigation System, southern China. Irrigation water re-use through local water storage was analysed based on remote sensing interpretations and GIS spatial modelling. Time series evapotranspiration is estimated using a Simplified Surface Energy Balance (SSEB) algorithm with Landsat ETM+ imagery. The results are then fed into an irrigation diagnosis and planning tool OASIS to assess the water balance in the irrigated areas and the impacts on irrigation performance. The results revealed that the intensive canal system and local storage with irrigation management practices have significantly altered the hydrological processes of the region. Local storage, including farm ponds, contributed significantly to improve water productivity and sustain high yields at times of main canal failure. The study suggests that, to better model water flows in irrigated systems, a balanced modelling approach is required between simulating the complex hydrological processes and accounting water budget components.

Key words irrigation system; tank cascade; water balance; remote sensing