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“Filling gaps and removing traps  
for sustainable resource management”

## Evaluating Groundwater Management Options in a Semi-Arid and Rapidly Urbanising Area Using a Socio-Hydrological Model

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### Abstract

In areas where water resources are under stress due to high population growth and related increasing agricultural production, water resource management becomes increasingly important. Understanding water user behaviour thereby is the basis to analyse potential outcomes of different management options to ensure sustainably managed resources. Socio-hydrological models which combine natural processes with human decision making to evaluate policy designs have been improved considerably in recent years. However, these models often rely on data which is either at a highly aggregated level for the natural processes or human decision making is not calibrated with micro-level data. In this study, a socio-hydrological model is elaborated which represents observed farmer irrigation practices and local (geo)hydrological conditions. The model is then calibrated with observed farmer behaviour and hydrological and soil information in the study area. Data comes from 600 agricultural households and 6 experimental plots in the vicinity of the Indian megacity Bengaluru. The region is characterised by a drastic drop in groundwater levels which is partly a consequence of intensive irrigated agriculture. The socio-hydrological model is used to evaluate changes in climate condition and in irrigation behaviour on groundwater resources and welfare implication for rural households. Preliminary results show that the modeled groundwater level approximates the stated groundwater level of the farmers in the survey. Moreover, a change in irrigation behaviour is more dramatically on the resource than changing climatic conditions. In a next step, different management option will be incorporated and evaluated.

**Keywords:** Groundwater management, India, policy evaluation, socio-hydrological model