Assessment of water resources in a monsoon-driven environment - Experience from the Western Ghats, India

Paul D. Wagner (1), Shamita Kumar (2), Peter Fiener (1), and Karl Schneider (1)

(1) Hydrogeography and Climatology Research Group, Institute of Geography, University of Cologne, D-50923 Köln, Germany (paul.wagner@uni-koeln.de / Fax.: +49 221 470 5124), (2) Institute of Environment Education & Research, Bharati Vidyapeeth University, Pune 411043, India

Monsoon regions are characterized by a pronounced seasonality of rainfall, which largely defines the hydrological regime. Sustainable management of the water resources depends on accounting for the temporal dynamics and spatial variability of the water resources as well as understanding the demand for and management of water resources by different stakeholders. The Soil and Water Assessment Tool (SWAT) is a semi-distributed and process-based public domain model, which can be used to analyze effects of land use and climate change as well as water management effects upon the available water resources. Particularly fast growing regions such as Pune (India) depend heavily upon the water resources generated in the upstream area of the Western Ghats. Equally, upstream water use strongly determines the water use potential in the downstream region. Based upon our model results for the meso-scale catchment of the Mula and the Mutha Rivers (2036 km^2), located in the Western Ghats upstream of the city of Pune, we discuss challenges and opportunities of utilizing a process-based model in data scarce regions. Evaluation of the model results has led to identification of processes and parameters requiring regional model adaptation. The original forest growth model did not suitably simulate the annual leaf area index (LAI) dynamics in the Western Ghats and was therefore modified. Moreover, data on water management procedures were unavailable, while their effects were obvious in runoff measurements. By comparing measured and modeled runoff, we investigated the potential to assess information on dam management. Significant improvement of the model accuracy was achieved by adapting process descriptions and assessing management parameters.