Geophysical Research Abstracts
Vol. 18, EGU2016-7040, 2016
EGU General Assembly 2016

Water consumption and allocation strategies along the river oases of Tarim River based on large-scale hydrological modelling

Yang Yu (1,2), Markus Disse (1), and Ruide Yu (2)

(1) Technical University of Munich (TUM), Chair of Hydrology and River Basin Management, Munich, Germany (yang.yu@tum.de), (2) Chinese Academy of Sciences (CAS), Xinjiang Institute of Ecology and Geography, Urumqi, China (yysnowcs@163.com)

With the mainstream of 1,321km and located in an arid area in northwest China, the Tarim River is China's longest inland river. The Tarim basin on the northern edge of the Taklamakan desert is an extremely arid region. In this region, agricultural water consumption and allocation management are crucial to address the conflicts among irrigation water users from upstream to downstream. Since 2011, the German Ministry of Science and Education BMBF established the Sino-German SuMaRiO project, for the sustainable management of river oases along the Tarim River. The project aims to contribute to a sustainable land management which explicitly takes into account ecosystem functions and ecosystem services. SuMaRiO will identify realizable management strategies, considering social, economic and ecological criteria. This will have positive effects for nearly 10 million inhabitants of different ethnic groups. The modelling of water consumption and allocation strategies is a core block in the SuMaRiO cluster.

A large-scale hydrological model (MIKE HYDRO Basin) was established for the purpose of sustainable agricultural water management in the main stem Tarim River. MIKE HYDRO Basin is an integrated, multipurpose, map-based decision support tool for river basin analysis, planning and management. It provides detailed simulation results concerning water resources and land use in the catchment areas of the river. Calibration data and future predictions based on large amount of data was acquired. The results of model calibration indicated a close correlation between simulated and observed values. Scenarios with the change on irrigation strategies and land use distributions were investigated. Irrigation scenarios revealed that the available irrigation water has significant and varying effects on the yields of different crops. Irrigation water saving could reach up to 40% in the water-saving irrigation scenario. Land use scenarios illustrated that an increase of farmland area in the lower reach gravely aggravated the water deficit, while a decrease of farmland in the upper reaches resulted in considerable benefits for all sub-catchments. A substitution of crops was also investigated, which demonstrated the potential for saving considerable amounts of irrigation water in upper and middle reaches. Overall, the results of this study provide a scientific basis for decision-making on the water consumption and allocation strategies in this arid region.