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A combined monitoring and modelling approach to assess the impact of land use change on water quantity and quality in the Xiangxi Catchment (Three Gorges Region, China)

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The construction of the Three Gorges Dam in China induced a large scale land use change not only in the reservoir area itself, but also in the adjacent catchments. The Xiangxi is a 90 km long tributary of the Yangtze, whose lower reaches are now part of the Three Gorges Reservoir. The impoundment caused an uphill shift of agricultural areas from the valley bottoms to steep, formerly wooded slopes as well as the relocation of villages and towns and the construction of associated infrastructure. This leads to an increase in erosion, landslides and diffuse inputs of sediment and phosphorus to the rivers.

As part of the BMBF-funded Sino-German YANGTZE-Project these processes are currently assessed under the topic „Land Use Change – Erosion – Mass Movements“ by a total of five project groups from Germany together with cooperation partners from China. Among these, the Department of Hydrology and Water Resources Management at Kiel University focuses on the assessment of the impact of the land use change on water quantity and quality.

The main tool used for this study is the ecohydrological model SWAT (Arnold et al. 1998). Taking the Xiangxi Catchment as an example for catchments impacted by large dam projects and characterized by a scarce database, the response of the water balance as well as the sediment and phosphorus transport processes to the large scale land use change are simulated. Based on this, sustainable land use concepts will be developed from an ecohydrological point of view.

The input data required by the SWAT model were provided by the German project partners as well as Chinese cooperation partners and authorities. Additionally, the database is completed by the results of own field work. The field campaigns include the mapping of the channel morphology of Xiangxi River and sampling for the analysis of sediment and phosphorus concentrations in the water.