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Ecohydrological research in the Poyang lake region in China

Britta Schmalz (1,,), Nicola Fohrer (,,), Sonja Jähnig (,,), Qinghua Cai (,,), Katrin Bieger (,,)
(1) Ecology Centre, CAU Kiel, bschmalz@hydrology.uni-kiel.de, () FAX: 00494318804607

The presented concept of the DFG project “Integrated modelling of the response of aquatic ecosystems to land use and climate change in the Poyang lake region, China” is part of the NSFC/DFG-Joint funding programme "Land Use and Water Resources Management under Changing Environmental Conditions".
The aim of our project is the development of an integrated modelling methodology to assess the impact of fast environmental changes on aquatic ecosystems in the example catchment of the Changjiang (6260 km^2) in the Poyang lake area (China). Joint measurement and sampling campaigns will be the basis for integrating three different models: we aim to model a dynamic DPSI(R)-system, for the first time coupling the models SWAT (catchment processes), HEC-RAS (in-stream processes) and MAXENT/BIOMOD (biological responses). Major drivers (climate, land use, channel alteration) are model input data, while the main pressures on the ecosystem (water balance, nutrients, sedimentation) are defined and represented in the model algorithms of SWAT and HEC-RAS. Based on the multiple pressures, we aim to dynamically assess the changes of the state of habitat parameters (e.g. flow, depth, substrate) in the model output. Finally, the impact of the state on the aquatic eco-systems will be evaluated by analysing shift of distribution ranges modelled by MAXENT/BIOMOD and changes in biodiversity or ecosystem health indicators of benthic invertebrates, an important group in freshwater ecosystems. Joint scenario runs considering climate or land use changes will particularly enhance understanding (1) how landscape processes and nutrient cycles interact with ecohydrological and aquatic system properties and (2) how the impact of land use, climate and hydromorphological change on aquatic ecosystem properties can be assessed.