



## **Modelling hydrological processes and analysing water-related ecosystem services of Western Siberian lowland basins**

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For discussing and planning sustainable land management of river basins, stakeholders need suitable information on spatio-temporal patterns of hydrological components and ecosystem services. The ecosystem services concept, i.e. services provided by ecosystems that contribute to human welfare benefits, contributes comprehensive information for sustainable river management. This study shows an approach to use ecohydrological modelling results for quantifying and assessing water-related ecosystem services in three lowland river basins in Western Siberia, a region which is of global significance in terms of carbon sequestration, agricultural production and biodiversity preservation.

Using the ecohydrological model SWAT, the three basins Pyschma (16762 km<sup>2</sup>), Vagai (3348 km<sup>2</sup>) and Loktinka (373 km<sup>2</sup>) were modelled following a gradient from the landscape units taiga, pre-taiga to forest steppe. For a correct representation of the Siberian lowland hydrology, the consideration of snow melt and retention of surface runoff as well as the implementation of a second groundwater aquifer was of great importance. Good to satisfying model performances were obtained for the extreme hydrological conditions.

The simulated SWAT output variables of different hydrological processes were used as indicators for the two regulating services water flow and erosion regulation. The model results were translated into a relative ecosystem service valuation scale. The resulting ecosystem service maps show different spatial and seasonal patterns. Although the high resolution modelling results are averaged out within the aggregated relative valuation scale, seasonal differences can be depicted: during snowmelt, low relevant regulation can be determined, especially for water flow regulation, but a very high relevant regulation was calculated for the vegetation period during summer and for the winter period. The SWAT model serves as a suitable quantification method for the assessment of water-related ecosystem services on different spatial scales and ecoregions of the Western Siberian lowlands.