

A transdisciplinary approach for modelling macroinvertebrate habitats in lowland streams

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Abstract Manifold anthropogenic influences are the main cause of river habitat degradation and extensive regeneration needs to be conducted to achieve the aims of the Water Framework Directive in Europe. As the outcome of river and stream rehabilitation measures is sometimes difficult to foresee, a GIS-based approach consisting of an eco-hydrologic, a hydraulic and a GIS mapping submodel is suggested for creating an integrated catchment and an in-stream modelling system to dynamically depict the influence of abiotic changes on the habitat quality. The Driver–Pressure–State–Impact–(Response) concept is utilised to depict the complex cause–effect chain of hydromorphological changes on macroinvertebrate habitats in lowland streams. A first application of the three submodels has been conducted in the North German Kielstau catchment and first results of modelling and mapping the impact on selected habitat parameters are displayed. Further work needs to be done in linking the submodels and in assessing the impact of the altered state on the macroinvertebrate fauna by parameter functions derived from a knowledge-based database and sampling schemes.

Key words DPSI; hydrological model; hydraulic model; GIS; parameter functions; hydromorphology; macroinvertebrate; lowland