

Small scale distribution predictions of stream macroinvertebrates under consideration of catchment properties and landscape processes

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Benthic communities in freshwater ecosystems are affected by factors beyond the stream network: environmental processes and catchment properties, including anthropogenic disturbances. Catchments are well defined portions of the landscape which serve as logical research units not only from a hydrological, but also from an ecological perspective. By applying species distribution models (SDMs) it is possible to identify which factors determine riverine species' ranges and how ongoing global change has and will continue to modify these ranges. To capture the great variability in the climate, the topography, the hydrology, the hydraulics and the land use of a catchment, SDMs should be built at small scales (<100m). We present three different models which differ in the modeled extent, in the variety of predictors used and in the scale at which the predictors are applied. Such freshwater SDMs built at small scales produce models with very good performance indicators and specific results concerning the influence of the environmental predictors on the predicted distribution of single species or the community. Ideally the models integrate a diverse array of predictors and apply them either for a reach or a subcatchment, depending on the scale at which each predictor influences the macroinvertebrate community. The results can be drawn upon to derive specific conservation measures aimed at the management of freshwater ecosystems at the catchment scale.