Development of Transient Habitat Modeling for Macrozoobenthos in a Restored Stream

sengdavanh thepphachanh[1] and Jürgen Stamm[1]

[1]Technische Universitat Dresden Fakultat Bauingenieurwesen

September 12, 2022

Abstract

In addition to the hydromorphological pressure onto the ecological conditions of free flowing river courses, increasing water temperature is affecting the water bodies, particularly by changing freshwater community compositions. The low discharge of numerous European rivers in the dry and hot hydrological year 2022 prove this relevance. Therefore, ecological assessment tools such as habitat modeling should take into account these factors to assess the quantity and quality of habitats. In this paper, the habitat modeling tool "Transient River Habitat Modeling for Macrozoobenthos" (TRiMM), was improved by incorporating a fuzzy logic approach and adding water temperature to the set of parameters determining habitat suitability for macrozoobenthos. Habitat relevant parameters, including hydromorphological factors (depth, velocity, mineral, and organic substrate) and water quality factor (temperature), are combined in the habitat model so that it can broaden river physical conditions and their interactions with biological indicators. Habitat modeling employed the mentioned parameters to simulate suitability for the macrozoobenthos in a small river in central Saxony, Germany. Due to its deteriorated condition, this river was selected as a representative for thousands of kilometers of small rivers across the region, which have been restored. The model simulated the status quo of river conditions from spring to summer for three macrozoobenthos species (*A. fluviatilis*, *E. danica,* and *G. fossarum*). The results showed that the natural flow resulted in dynamic habitat suitability both spatially and temporally, which differs for each species. Remarkably, the five-parameter model (depth, velocity, temperature, mineral, and organic substrate) generally performed better compared to a similar model without temperature.

Hosted file

`Development of Transient Habitat Modeling for Macrozoobenthos in a Restored Stream.docx` available at https://authorea.com/users/481210/articles/568381-development-of-transient-habitat-modeling-for-macrozoobenthos-in-a-restored-stream