

# Coupled modelling of macroinvertebrate communities and river hydraulic habitat under climate change scenarios for the Loire river basin, France

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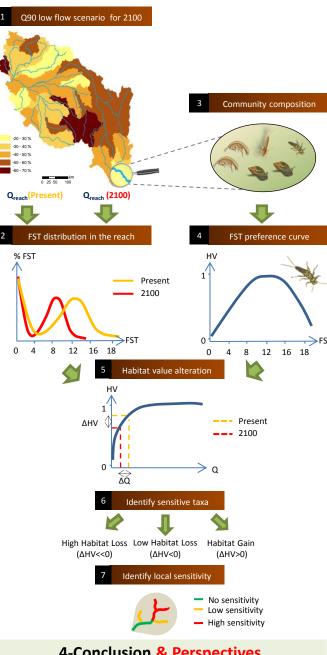
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#### 1-Introduction

Human induced-physical habitat alterations are the main threat to aquatic ecosystems. In a context of climate change, these alterations could be exacerbated by extreme low flows aggravation. Changes in low flow regime should affect macroinvertebrates hydraulic habitats (e.g. bottom shear stress described by FST-hemispheres (Statzner et al., 1989)), inducing modifications of community structure (richness and functional traits). In this study, we point out ecological responses to shifts in habitat availability, regardless of other pressures (e.g. water pollution, abstraction) and highlight the most sensitive taxa. Thus, we provide a map of ecological sensitivity to low flows aggravation in connection with the natural hydromorphological features.

#### 2-Methods Least-impacted sites selection with macroinvertebrate surveys (2008-2013) Variables Climate Topography Land use Loire River Hydrology 120 sites 1 Hydrological model SDM\* Scenarios of low flow alterations by 2100 in 47 subcatchments in the Prediction of taxa composition in a Loire River watershed given reach (Moatar et al., 2010) \*Species Distribution Model LOCAL SCALE SHEAR STRESS **Hydraulic models Biological model** Simulation of shear stress distribution Simulation of habitat value in function in a reach for a given discharge of shear stress for a given species (Lamouroux et al., 1992) (Dolédec et al., 2007; mean width Mérigoux et al., 2009) mean depth

#### 3-Expected Results



## **4-Conclusion & Perspectives**

Thanks to these results, we provide a frame for further studies to better understand how the effects of climate change on macroinvertebrate community could be exacerbated (or not) by other anthropogenic pressures (e.g. abstraction).



Antropogenic pressures Climate change sensitivity



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Habitat model

Prediction of habitat alteration for a given taxon at the reach scale