Changes in the ecological quality of streams ecosystems under global changes: what about reference conditions?

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Résumé

Threatened by climate change and by many anthropogenic pressures, streams are among the most endangered ecological systems. In order to preserve these ecosystems, the European Water Framework Directive (WFD) was implemented in 2000, requiring all member states to achieve good ecological status for their water bodies. Thus, it is necessary to assess their current status and identify sites where management measures need to be implemented. The WFD requires that bioassessment methods evaluate the ecological status of water bodies by comparing Biological Quality Elements (BQEs) between an observed versus a reference situation, based on taxonomic and functional metrics expressed as Ecological Quality Ratio (EQR). These reference values were established from communities observed in reference conditions. For French streams and rivers, a reference network was implemented over a three-year period (2005-2007) based on sites subject to very minor or no anthropogenic pressures. However, the overall effect of global change may also impair aquatic communities in reference sites and thus influence the BQE-based metric values of reference communities. The aim of this work is to assess the influence of climate change on the reference communities observed in French streams and its consequences on the results of the ecological status assessment of such waterbodies at the mainland France scale based on a multi-BQE approach. We first compiled an original and exhaustive database of the biological data for the four BQEs routinely monitored (i.e. fish, invertebrates, diatoms and macrophytes) in the French reference network (around 450 sites). Each site sampling event was associated with abiotic data to characterise environmental conditions and anthropogenic pressures, based on

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hydroclimatic data, hydromorphological characterisation, physico-chemical monitoring and land-use description. We will present the preliminary results of our analyses focusing on the temporal trends in abiotic conditions as well as values of BQE-based metrics for sites of the reference network. Results consider river types (i.e. defined by hydro-ecological regions and river size), as they could exhibit different patterns of response. The temporal trends in abiotic and biotic conditions in reference sites have also been related. The results of these analyses will be used to take account of the effects of climate change when assessing the ecological status of streams with the national methods currently used.

Mots-Clés: anthropogenic pressures, temporal trends, fish, invertebrates, diatoms, macrophytes, European Water Framework Directive, climate change, reference