



## **Quantification of hydromorphological alteration of water courses from regional models across the French territory for their evaluation and their ecological restoration**

C. Bilodeau (1), F. Gob (1), M.B. Albert (2), J. Belliard (2), and J.M. Baudoin (3)

(1) UMR 8591 Laboratoire de Géographie Physique CNRS, Université Paris 1, Meudon, France, (2) IRSTEA, UR Hydrosystèmes et bioprocédés, Antony, France, (3) ONEMA, Direction générale, Vincennes, France

The European Water Framework Directive demands that ‘hydromorphological’ conditions of water courses support ‘good ecological status’. In this context, there is a strong need of methods that integrate geomorphology, hydrology, and ecology. First, it’s essential to define a “good hydromorphological status”, by developing reference models from a large sample of water courses considered as natural as possible. The hydromorphological alteration of water courses can then be evaluated from these reference models. Finally, the relationship between hydromorphology and biological communities should be precised. In this framework, the ONEMA (French National Agency for Water and Aquatic Ecosystems) has applied the national protocol CARHYCE to assess hydromorphological characteristics at reach scale of water courses from the entire French surveillance monitoring network, since more than 2 years. The database CARHYCE holds information on a large number of physical measurements (widths, depths, discharges, etc.) from hundreds of French water courses. From this dataset, our study aims to build reference models, based on the morphological parameters and the geometry of the riverbed at the bankfull stage of rivers considered not to have been disturbed by anthropic activities. By dividing the French territory into homogenous zones in terms of geology, relief and climate, reference stations may be spatially grouped and regional reference models may therefore be proposed. Regarding water courses considered as altered, divergence from the reference models may be quantified and the hydromorphological state of the sectors may therefore be evaluated. Physical alterations highlighted can be compared with biological data of aquatic communities, and in particular for fish and macro-invertebrates. The aim is to isolate the most structuring hydromorphological parameters and thus define the hydromorphological indicators supporting biology. In this way, the links between anthropogenic alterations and the hydromorphology of water courses and their biota may be enriched by information gleaned from a wide diversity of environments and a large number of sites throughout the French territory.