

**MACROPHYTE BIOLOGICAL INDEX FOR RIVERS (MBIR) APPLICATION
FOR AN ECOLOGICAL ASSESSMENT OF WALLOON RIVERS,
PRELIMINARY INVESTIGATIONS**

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According to the water Framework Directive (WFD, European Union 2000) in defining the overall ecological status of rivers, 80 sites were analyzed in Walloon network. Within each sample, macrophyte data were gathered at species level and the main water quality parameters were collected from 2007 to 2008.

Two approaches were involved: on the one hand, methods of ordination and classification were applied (Principal Component Analysis and Multiple Factorial Analysis) and aquatic macrophyte community indexes were used on the other hand.

Regarding this last approach, Macrophyte Biological Index for Rivers (IBMR or MBIR), was used to define the ecological status of the macrophyte community in response to eutrophication pressure. Four trophic qualities have been detected in all monitored stations. 54% of the sites showed a good quality, the Ardennes region in leading position and only 3% of the sites showed a poor one.

Principal Component Analysis (P.C.A. CISIA, 1991) was used to study the correlations between the physico-chemical variables. Multiple Factorial Analysis (M.F.A.) enables a simultaneous analysis of the three compartments (Escofier & Pagès, 1985). It was made possible to gather the species according to their ecological affinities and to point out their indicator values in relation to some abiotic parameters. Therefore, a typology based on this analysis was outlined. The dendrogram of the Cluster Analysis (H.C.A) gave three clusters determined by active variables of each compartment that defined functional parts of the Walloon network: firstly, *Chiloscyphus polyanthos*, *Pelli epiphyllous*, *Amblystegium fluviatile* and some rheophile species (*Fontinalis antipyretica*, *Fontinalis squamosa* and *Rhynchostegium riparioides*, *Ranunculus penicillatus*, *Myriophyllum alterniflorum*, ...) showed a low mineralization and a low eutrophic status (Ardennes). Secondly, *Potamogeton pectinatus* and the alga *Cladophora* sp. proved to be more often eutrophicated in lowland-stream waters on the silty region. Thirdly, *Cinclidotus riparius*, *Fissidens crassipus*, *R. fluitans*, *Elodea nuttallii*, *Pellia endivifolia* appeared to be dominated in nitrogen (N-NO₃) concentration sites (Condroz rivers).

Thanks to these approaches, we were able to assess the trophic status of Walloon watercourses and to set up a first step in a floristic typology which characterizes the Walloon natural regions. A considerable variation of the macrophyte community structure was found. We particularly found that there was a shift from a predominance of species mosses and liverwort, which

dominate in the Ardennes streams to more species rich communities dominate by vascular plants in the lowland streams. However, to meet the WFD objectives, further investigations should be led, to characterize the different stream types defined in the Walloon Region, to describe type-specific reference conditions and future assessment systems will be based on a deviation from these defined reference conditions.