



## **Design of a decision tool for hydromorphological restoration of water bodies in Walloon Region**

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The pilot project WALPHY (LIFE + Environment LIFE07 ENV/B/000038, UE-funded) develops a structured approach aiming at improving hydromorphological quality of the upstream Meuse basin in order to achieve the "good ecological status" required by the Water Framework Directive (WFD 2000/60). It began in January 2009 for a period of 5 years.

River's biological recovery needs the recovery of river's structure and physical dynamics. Returning to "good ecological status" inevitably involves physical restoration of affected rivers. Physical component of aquatic environment acts as a limiting factor for their functioning. Three types of modification are key obstacles for river good ecological status: (i) fluxes alteration (discharge, sedimentation...), (ii) forms alteration (uniform facies...) and (iii) biotopes access alteration (lateral connections breaks, modification of the continuity upstream/downstream...). Therefore hydromorphology is needed to implement the WFD.

To respond to this legal necessity, we develop a unique, useful and suitable methodology in Walloon Region to determine and schedule river physical quality restoration works. This methodology has been applied on 3 "risk water bodies". The works are based on two axes : longitudinal continuity and transversal continuity.

The two first selected water bodies (Bocq river, eastern tributary of the Meuse) seem to be convenient for the restoration works which concern the longitudinal continuity due to the presence of dams and other obstacles usually between 1 and 3 m high. These works consist in dam management (weir removal or fish passage) taking into account hydromorphological (bedload transport) and biological (invertebrate or fish species free movement) impacts.

The third water bodies (Eau Blanche river, western tributary of the Meuse) presents straightened rivers with artificial banks, witch consequently own bad connections between the stream and its floodplain. This water bodies should therefore be appropriated for the works based on the transversal continuity recovery. They consist in enhancing straightened river channels, restoring meanders or bank restoration.

The first river restoration works will take place from summer 2010. A monitoring has already been undertaken to draw up the situation before the restoration works, witch will be able to compare to the situations during and after works. In addition, a natural site has been chosen to enable any comparison with the intervention sites. The geomorphological monitoring is based on physical and sedimentological parameters (substrate cartography, velocity measures, stream channel DEM, topography and sedimentological index). The ecological monitoring consists in analysing the physical and chemical parameters (turbidity, suspended sediment load). It also analyses the biological quality through 3 indicators: macrophytes, macroinvertebrates and fishes. Among other, a microhabitats method has been improved and applied on 3 intervention sites and 1 natural site. The microhabitats cartography results from both the flow velocity cartography and the substrate cartography. With this method, the physical quality of each intervention site could be compared with the natural site and above all with the future situation. Our method is also useful to inventory precisely invertebrates and to characterise fish habitats.