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Methodology of a hydro-geomorphological river typology in the Euregio Meuse-Rhine.

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The achievement of the rivers good ecological status of rivers for 2015 requested by the European Water Framework Directive (WFD 2000/60) led the competent authorities of the Member States to establish the concept of Ecological Quality Status, determined by biological, physico-chemical and hydromorphological elements. To assess the hydromorphological quality of surface waters, homogeneous units of management, called "water bodies" by the authorities, had to be defined. Numerous studies use qualitative and quantitative variables that have proven difficult to transpose, export or compare. Most existing river typologies, often created or adapted in a hurry to meet timing of WFD, are moderately accurate and effective at local scale. Currently, the implementation of operational programs (e.q. restoration works) requires methods to define (i) precisely natural or quasi natural reaches and (ii) catchment-scale homogeneous sectors based on geomorphological and hydrological elements.

In this framework, we set up a river network sectorization method based on three variables namely the main confluences (locating the main breaks in watershed area), the slope breaks (describing additional profile discontinuities) and finally a the sinuosity index. GIS routines were developed to make this method semi-automatic at he whole network level.

Next, a hydro-geomorphological method for river typology has been developed, based on factorial and non-factorial (clustering) multivariate analysis of quantitative varialbes only. The measurement sites were selected by stratified random sampling based on the Strahler hierarchy within each of the subbasins. In each case, 17 morphological or dynamic variables related to the channel forms, the bedload granulometry, the floodplain width and the location in the basin are measured. The data set is extracted from accurate 10 m x 10 m DEM or obtained by direct field measurements using a simplified protocol.
The measures were done in 115 sites distributed over 2,100 km^2. Hierarchical classification allows us to obtain a multi-level typology according to the scale needed for each particular study. We kept a 2-level typology (6 main types and a 12 subtypes) to describe respectively regional and local hydro-geomorphological river systems.

The selection of the most influential variables and a regional differentiation based on our results open the way for an automatic characterization of rivers, especially including unit stream power.