



## **Geomorphological reference condition definition as a basis for river restoration and river management: the example of Oiartzun, Oria and Urumea River basins (Basque Country)**

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The application of hydrogeomorphology as a tool for river management and decision making on reference condition definition for river restoration is presented. Water Framework Directive (2000/60/CE) requires the identification of reference conditions and attainable target images, to achieve the good ecological status, taking into account the direct and indirect changes in the basin and river course. Data collection was done through an exhaustive fieldwork and GIS tools. Based on geomorphological homogeneous river reaches identification (waterfall, bedrock, step-pool, cascade, coluvial, run, riffle-pool, heavily modified), the hydrogeomorphological assessment of all of them in relation to its “natural” condition allowed the identification of those with a good or very good hydrogeomorphological condition, considered as reference condition. The loss of hydrogeomorphological quality was closely linked to sociodemographical pressure, due to artificial elements in the river course, floodplain and land use changes on the basin. The assessment done based on pressures and impacts allowed the proposal of specific restoration objectives which facilitated the identification of the elements that degrade the hydrogeomorphological quality of the reaches, and helped the identification of specific restoration actions. In addition it was possible to set the reaches with the potentiality of being restored, those reversible and those that due to its high degradation were considered irreversible, and therefore not able to be restored, except for some rehabilitation or mitigation measures.

The application in two basins, Oria and Oiartzun, concluded that 36% of the reaches could recover their geomorphological good status and a 40% could be considered as reference condition for other reaches. This geomorphological based reference condition definition could be linked and complete with ecological data.