



Comparison and Validation of Hydrological E-Flow Methods through Hydrodynamic Modelling

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Abstract

Flow regime determines physical habitat conditions and local biotic configuration. The development of environmental flow guidelines to support the river integrity is becoming a major concern in water resources management. In this study, we analysed two sites located in southern part of Portugal, respectively at Odelouca and Ocreza Rivers, characterised by the Mediterranean climate. Both rivers are almost in pristine condition, not regulated by dams or other diversion construction. This study presents an analysis of the effect on fish habitat suitability by the implementation of different hydrological e-flow methods. To conduct this study we employed certain hydrological e-flow methods recommended by the European Small Hydropower Association (ESHA). River hydrology assessment was based on approximately 30 years of mean daily flow data, provided by the Portuguese Water Information System (SNIRH). The biological data, bathymetry, physical and hydraulic features, and the Habitat Suitability Index for fish species were collected from extensive field works. We followed the Instream Flow Incremental Methodology (IFIM) to assess the flow-habitat relationship taking into account the habitat suitability of different instream flow releases. Initially, we analysed fish habitat suitability based on natural conditions, and we used it as reference condition for other scenarios considering the chosen hydrological e-flow methods. We accomplished the habitat modelling through hydrodynamic analysis by using River-2D model. The same methodology was applied to each scenario by considering as input the e-flows obtained from each of the hydrological method employed in this study. This contribution shows the significance of ecohydrological studies in establishing a foundation for water resources management actions.

Keywords: ecohydrology, e-flow, Mediterranean rivers, river conservation, fish habitat, River-2D, Hydropower.