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Riparian quality and habitat heterogeneity assessment in Cantabrian rivers

José Barquín[1,*], Diego Fernández[1], Mario Álvarez-Cabria[1] and Francisco Peñas[1]

[1] Environmental Hydraulics Institute, University of Cantabria, Avda. Los Castros s/n, 39005 Santander, Cantabria, Spain.

[*] Corresponding author: barquinj@unican.es

ABSTRACT

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In this study, we attempted to assess riparian quality and river habitat heterogeneity as part of the conservation status assessment of the Habitats Directive (EC, 1992) in the rivers included in the Nature 2000 network of Cantabria, Northern Spain. We chose the Qualitat del Bosc de Ribera (QBR) and the Riparian Quality Index (RQI) to assess riparian quality and the Índice de Habitabilidad Fluvial (IHF) and Habitat Quality Assessment (HQA) to assess the river habitat heterogeneity. The present study aims to compare the performance of the QBR and RQI for assessing riparian quality (RQ) and of the IHF and HQA for assessing river habitat heterogeneity (RHH). With a higher score in each index, the site has a higher likelihood of belonging to a reference condition and also of reaching a higher biological integrity. Thus, we used logistic binary regressions of RQ and RHH to determine the relationships between the attributes evaluated by each of the four indices and reference/non-reference conditions. We also looked into the relationships between RQ and RHH as well as between these indices and the local macroinvertebrate communities. We surveyed riparian vegetation and river habitat characteristics in a total of 285 river reaches, each 500 m in length, along the fluvial network of Cantabria. These data were combined with previous macroinvertebrate community records from a total of 52 river reaches, and the Index of Average Score per Taxon (IASPT) metric was calculated for comparison. Reference condition sites were selected in 10 river types for the purpose of the present study on the basis of (1) unaltered discharge, (2) non-intensive land uses and (3) no or minimal morphological changes. There were 96 river reaches that matched the reference conditions. QBR and RQI were sensitive to both reference and non-reference conditions in the official river types and were larger in reference conditions than in non-reference conditions for most of the river types. However, IHF and HQA could only differentiate some of the river types and could not distinguish between reference and non-reference conditions. Moreover, IHF and HQA did not have a similar response to human modifications across river types, as reference reaches presented larger or lower values than non-reference conditions depending on the river type. Finally, RQ was positively correlated to RHH, and IASPT increased with both. We concluded that RQI and HQA performed slightly better than QBR and IHF indices to distinguish between reference and non-reference sites in the rivers of Cantabria and that river habitat heterogeneity should not be used to assess river habitat quality.

Key words: River ecosystems, Hydromorphology, River health, River habitat quality, Ecological status.

RESUMEN

Calidad riparia y evaluación de la heterogeneidad del hábitat en ríos Cántabros

En este estudio se intentó evaluar la calidad riparia y la heterogeneidad del hábitat fluvial como parte de la evaluación del estado de conservación de la Directiva Hábitats (CE, 1992) en los ríos incluidos en la red Natura 2000 de Cantabria, norte de España. Entre los métodos existentes elegimos los índices Qualitat del Bosc de Ribera (QBR) y "Riparian Quality Index" (RQI) para evaluar la calidad de la ribera, y el Índice de Habitabilidad fluvial (IHF) y el "Habitat Quality Assessment" (HQA) para evaluar la heterogeneidad del hábitat fluvial. El presente estudio pretende comparar el rendimiento del QBR y RQI para evaluar la calidad ribereña (RQ) y del IHF y HQA para evaluar la heterogeneidad del hábitat fluvial (RHH). Cuanto mayor sea la puntuación de los índices en un tramo de río, más alta es la probabilidad de que pertenezca a una condición de referencia, y también de que alcance una mayor integridad biológica. Por lo tanto, se utilizó la regresión logística binaria elaborando un modelo para RQ y otro para RHH, con el fin de examinar las relaciones entre los atributos evaluados por