

結合魚類多樣性及棲地品質之連通性指數於結構物移除順序的決定

Prioritizing Barriers Removal Using River Connectivity Indices with Fish Biodiversity and Habitat Quality

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摘 要

本研究主要探討利嘉溪上游支流大南北溪的河川連通性，並對河川的連通狀況進行量化。為了恢復溪流生態環境以及營造生態友善空間，研究區域進行了結構物調降計畫，本研究將針對研究區域內結構物調降前後的河川連通性進行量化，並且對結構物的移除順序提出建議。本研究計算了研究區域內的樹狀連通性指數(DCI)、物種多樣性指數及棲地碎形維度，將三者結合後發展出整合性計算河川連通性的方法，稱之為綜合連通性指數(CCI)。

結果顯示研究區域內的河川連通性受結構物影響嚴重，河川棲地也因為結構物的影響而存在嚴重的破碎化。在尚未進行結構物調降前大南北溪的 DCI 值為 13.65%，CCI 值為 37.56%。根據 CCI 的計算結果，移除優先順序 1 到 3 的結構物分別為「十號潛壩」、「二號防砂壩」及「七號潛壩」。經調降過後許多結構物已不存在通過障礙的狀況，大南北溪的 DCI 值增為 23.65%，CCI 值增為 40.13%。根據 CCI 的計算結果，移除順序 1 到 3 的結構物分別為「新固床工」、「七號潛壩」及「一號防砂壩」。結果顯示結構物的調降對河川縱向連通性有良好的改善，連通性的增加將有利於水生生物在河川中進行移動並恢復生態環境。根據本研究的研究結果，將對低矮壩結構物對於魚類通過率以及河川縱向連通性之影響有更進一步的了解，其結果也能作為河溪復育之參考。

關鍵詞：縱向連通性、物種多樣性、樹狀連通性指數、棲地碎形維度、河川恢復工程

Abstract

In this study, we discuss the river connectivity of the Dananbei Stream. The longitudinal connectivity index values have been calculated before and after the barriers lowering, and the suggestion of the barriers removing priority is made accordingly. The Dendritic Connectivity

Index (DCI), Biodiversity Index and Mean Patch Fraction Dimension are applied to develop a new method of the longitudinal connectivity that is called Comprehensive Connectivity Index (CCI). Before lowering the barriers, the DCI value was 13.65%, and the CCI value was 37.56%. Based on the results of CCI, the barriers removing priority 1 through 3 were, "No. 10 Submerged Dam", "No. 2 Check Dam" and then "No. 7 Submerged Dam". Then after lowering some of the barriers, the DCI value is increased to 23.65%, and the CCI value to 40.13%. According to the new factor of CCI, the barriers removing priority 1 through 3 become, "New Groundsill Work ", "No. 7 Submerged Dam" and then "No. 1 Check Dam". The result shows that the longitudinal connectivity is significantly affected by the barriers, and lowering the barriers could improve the connectivity positively. Based on this study, we learned more about the impact of low-head dam on fish passability and longitudinal connectivity of the river, and these results can also be used as a reference for river restoration.

Keywords : Longitudinal connectivity, Biodiversity, Dendritic Connectivity Index(DCI), Mean Patch Fraction Dimension (MPFD), River restoration