# 魚類群落水生植物棲地使用及地表逕流與伏流水交換的水質空間變異

# Aquatic Vegetation Habitat Use of Fish Assemblage and Spatial Variations in Water Quality of Surface-Hyporheic Water Exchange

國立成功大學水利及海洋工程學系碩士班

| 碩士 | 教授 | 碩士生 |
| --- | --- | --- |
| 陳品任 | 孫建平 | 黃秉弘 |
| Pin-Ren Chen | Jian-Ping Suen | Ping-Hung Huang |


## 摘　要

本研究於屏東縣萬巒鄉五溝水流域，選擇三個河段進行魚類生態調查，分別是一號水門區、屋背溝區、親水階梯與竹林區。探討五溝水常見魚種棲地偏好，使用適合度曲線計算台灣石賓、粗首馬口鱲、半紋小鉤、短吻紅斑吻鰕虎、台灣鬚鱲與橘尾窄口鉤等6種魚種流速、水深、底質粒徑大小之棲地偏好，並利用排序分析探討三個河段物種組成與環境變量的關聯性，使用複迴歸分析檢驗個別魚種與環境變量之相關性，並探討魚類群落水生植物棲地使用，分析其在水生植物有無以及原生或外來水生植物之棲地偏好。本研究分析魚類群落之水生植物棲地使用情形，台灣石賓、粗首馬口鱲與橘尾窄口鉤偏好沒有水生植物之棲地，台灣鬚鱲偏好無水生植物之棲地些微大於有水生植物之棲地，半紋小鉤與短吻紅斑吻鰕虎則偏好有水生植物之棲地；台灣石賓、粗首馬口鱲、半紋小鉤、台灣鬚鱲與橘尾窄口鉤偏好外來水生植物之棲地大於原生水生植物之棲地，短吻紅斑吻鰕虎則明顯偏好原生水生植物之棲地條件。在一號水門區設置水草復育區後，短吻紅斑吻鰕虎個體數有大幅度的增長，顯示種植原生水生植物對於短吻紅斑吻鰕虎物種之保育可能具有正面效益。本研究分析地表逕流與伏流水交換的水質空間變異，三個區域同為上湧段、平衡段與下滲段的水質均存在差異，相較於地表逕流與伏流水交互作用，周圍環境的不同造成水質的差異程度更為強烈。本研究分析同一河段地表逕流與伏流水交換上湧段、平衡段與下滲段水質差異，發現水質均無顯著差異，水溫均以下滲段高於上湧段，溶氧以下滲段大於上湧段。

關鍵詞：伏流水、魚類群落與水生植物、水質空間變異、適合度曲線

## Abstract

In this study, we selected three river segments in Wu-Gou-Shui, including First Water Gate, Wubeigou Zone, Water Park and Bamboo Zone. Through fish sampling and habitat

suitability index, we determined the fish community structure and the habitat preferences of common fishes in Wu-Gou-Shui. We tested the relationships between fish assemblages and environmental variables by ordination analysis and multiple regression analysis. We took aquatic vegetation habitat use into account and compared the occurrence probability of common fishes in aquatic vegetation habitat. We found that the occurrence probability of *Puntius semifasciolatus* and *Rhinogobius rubromaculatus* in the habitat with aquatic vegetation was higher than without aquatic vegetation. The occurrence probability of *Rhinogobius rubromaculatus* in the habitat with native aquatic vegetation was higher than with exotic aquatic vegetation. After the establishment of aquatic vegetation restoration area in First Water Gate, the number of *Rhinogobius rubromaculatus* increased largely. It might be meaningful for planting aquatic vegetation to *Rhinogobius rubromaculatus* conservation. We investigated the spatial variations in water quality of surface-hyporheic water exchange in First Water Gate, Wubeigou Zone and Water Park and Bamboo Zone. There were significant differences in water quality between different river segments in the same exchange mechanism. There were nonsignificant differences in water quality between upwelling zones, equilibrium zones and downwelling zones in the same segment. Our results indicated that the difference caused by environmental heterogeneity is more significant than by surface-hyporheic exchange. Water temperature and dissolved oxygen at downwelling zones were higher than at upwelling zones.

Keywords: Hyporheic zone, Fish assemblages and aquatic vegetation, Spatial variations in water quality, habitat suitability index