

摘要

河川的自淨作用對於水質淨化是非常重要的，在過去的研究中，指出可利用水族生物環境檢測法(Aquatic Organisms environment Diagnostics, 簡稱 AOD)估算河川所需的放流量，藉由稀釋作用的機制達到水質淨化的目的。除此之外，植生在河川水質淨化也是相當重要的一環，在以往的研究顯示，植生對於河川中營養鹽的去除與氮元素的轉換等等皆有非常大的幫助，所以本研究將以水族生物環境檢測法探討植生在河川自淨作用中的影響。

本研究主要是利用水族生物環境檢測法作為量化水質的檢測工具，針對貫穿竹北市核心都會區的豆子埔溪進行水質的檢測，計算出單位比例及單位面積的植生所能提供的淨化效率，以提供日後豆子埔溪管理規劃之參考。在水質和植生比例及面積的相關性分析中，得知植生的面積或比例皆與 AOD 值變化量呈現正相關，而且是一自然對數曲線的關係，也就是當植生在河道中的比例或面積越高時，淨化效果會越高，但最終將達到飽和。所以藉由此一自然對數曲線數學方程式，可以讓我們了解保留多少植生的比例或面積能夠提升多少 AOD 值。以竹北高中為例，若竹北高中的水質要適合粗糙沼蝦的生存，必須將 AOD 值提升 541%，但在推算之後即使植生增加至 100% 僅可回復 269%，所以必須利用其他的方式減低水中污染的含量，才可能使粗糙沼蝦克服水質的因素存活下來。

灌溉及排水用的渠道因為灌溉取水的需求，或是保持排水的順暢，必須將河道中的植生去除。本研究所得到的水質淨化效率方程式，提供日後在去除河道內的植生的時候，可以使用此方程式計算應該留下若干比例的植生，在水質淨化和水資源利用之間取得了一個平衡點。

Abstract

The self-purification of the creeks is very important for water quality to purify. Among past research, point out the usable Aquatic Organisms environment Diagnostics (abbreviated as AOD) estimate the flow rate that the creeks need , achieves the purpose that water quality purifies with the mechanism which dilutes function . In addition, plant is very important in water-purification. Show in past research, all there is very great help in conversion with the nitrogen element and nutrition salt in the creeks. In this study, we investigate the affection of plants on the water self-purification by using AOD.

This study is mainly to use AOD as the measuring tool of water quality of quantization. We measure the water quality of the Dou-zih-pu creek in Jhubei. Calculate the plant can offer the purification efficiency of unit's proportion and unit's area. In order to offer the reference of small stream management project of the Dou-zih-pu creek in the future. We get the changing amount presents positive correlation with AOD value to the proportion or area of plant, and it is a Napierian logarithm curve. Take an example, if we want let the water quality in Jhubei senior high school for *Macrobrachium asperulum* to live. We must improve AOD value by 541%, but after calculating even the proportion of plant is 100% can only reply 269%. We must use other ways to lower the content that water pollutes. And *Macrobrachium asperulum* overcome the water quality to survive.

In order to irrigate farmland conveniently or drain water smoothly, we must clear plants in watercourse. This study provides a better model for leaving some proportion of plants for water self-purification. The equations in this study make a balance between water-purification and water-conservation.