以出流機率法評估濕式滯留池除污效率

林鎮洋[1]　劉秀鳳[2]　陳彥璋[3]　王建清[4]　陳起鳳[5]

摘　　要 集水區暴雨管理與非點源污染控制之中，濕式滯留池爲廣泛應用之結構性 BMP（best management practice）措施。本研究針對兩處不同類型的非點源污染來源，分別爲瓷土礦場與茶園農地，設計以溼式滯留池爲主的複合型 BMP 設施。礦場場址共有三個單元，爲溼式滯留池、石籠過濾池與人工濕地；農地場址除配置滯留池外，另增加密植式與開放式的人工濕地，以及植栽浸潤床。礦場 BMP 處理設施之平均除污效率爲懸浮固體爲 75.9%、溶解性鐵爲 71.5%，而農地場址的總磷去除效率爲 55.6%、總氮爲 34.3%。出流機率法（effluent probability method）不僅能計算污染去除率，更進一步由排序後的機率圖顯示溼式滯留池對不同污染物不同濃度的去除效果。結果顯示懸浮固體物與氨氮在高濃度的入流狀況下，有較佳的去除率，但總磷的入流濃度大小並不影響其去除效果。

關鍵詞：非點源污染，濕式滯留池，出流機率法，結構性 BMP。

Evaluation of the Pollution Reduction of Wet Detention Pond

Jen-Yang Lin[1]　Hsiu-Feng Lin[2]　Yen-Chang Chen[3]　Chien-Ching Wang[4]　Chi-Feng Chen[5]

ABSTRACT Wet detention ponds are widely as structural BMPs (Best Management Practices) in nonpoint sources control and stormwater management. To estimate the effectiveness of wet detention ponds, two case studies are designed for controlling the nonpoint source pollution from mine drainage and agricultural land. In the two cases, the compound BMPs with different treatment units are set for specific functions. For the clay mine site, a wet detention pond, a basin with gabions of small rocks and a constructed wetland are placed to remove the high suspended solids and acidity in mine drainage. As well as a wet detention pond, two constructed wetlands and a planted infiltrative bed are utilized in the agriculture case study for nutriment removal. Eventually, the Effluent Probability Method (EPM) which reveals more information than classic evaluation methods is applied to evaluate the performance of the wet detention ponds. The total treatment system of the mine case

〔1〕國立台北科技大學土木系教授兼水環境研究中心主任（通訊作者）
　　Professor, Department of Civil Engineering, National Taipei University of Technology; Director, Water Environment Research Center, National Taipei University of Technology. (Corresponding Author)
　　Email: jylin@ntut.edu.tw
〔2〕經濟部水利署台北水源特定區管理局課長
　　Section Chief, Taipei Water Management Office, Water Resources Agency, Ministry of Economic Affairs.
〔3〕國立台北科技大學土木系副教授
　　Associate Professor, Department of Civil Engineering, National Taipei University of Technology.
〔4〕國立台北科技大學環境規劃與管理所碩士
　　Graduated Student, Institute of Environmental Engineering and Management, National Taipei University of Technology.
〔5〕國立台北科技大學水環境研究中心助理研究員
　　Research Assistant, Water Environment Research Center, National Taipei University of Technology.

facilitating the mean pollution removal rate for suspended solid (SS) is 75.9% and 71.5% for dissolved iron. The mean removal rate of 55.6% for total phosphorus (TP) and 34.3% for total nitrogen (TN) are contributed from BMPs in the agriculture case study. Besides the removal rates of different pollutants, EPM displayed higher treatment efficiency in higher inflow concentration of SS and TN, but there is no such relationship in TP removal.

Key Words: nonpoint sources pollution, wet detention pond, effluent probability method, structural BMP.