# Design and optimisation of novel configurations of stormwater constructed wetlands

Christopher Kiiza

United Kingdom (KiizaCJ@cardiff.ac.uk)

Constructed wetlands (CWs) are recognised as a cost-effective technology for wastewater treatment. CWs have been deployed and could be retrofitted into existing urban drainage systems to prevent surface water pollution, attenuate floods and act as sources for reusable water. However, there exist numerous criteria for design configuration and operation of CWs. The aim of the study was to examine effects of design and operational variables on performance of CWs. To achieve this, 8 novel designs of vertical flow CWs were continuously operated and monitored (weekly) for 2years. Pollutant removal efficiency in each CW unit was evaluated from physico-chemical analyses of influent and effluent water samples.

Hybrid optimised multi-layer perceptron artificial neural networks (MLP ANNs) were applied to simulate treatment efficiency in the CWs. Subsequently, predictive and analytical models were developed for each design unit. Results show models have sound generalisation abilities; with various design configurations and operational variables influencing performance of CWs. Although some design configurations attained faster and higher removal efficiencies than others; all 8 CW designs produced effluents permissible for discharge into watercourses with strict regulatory standards.