Development and Evaluation of a Methodology for Plant Selection for Floating Treatment Wetlands

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Constructed floating treatment wetlands (CFTW) are a new intervention to purify urban lakes that are polluted. The selection of appropriate plants for the CFTW is crucial and requires scientific methodology. The objective of this study was to develop an appropriate methodology for plant selection for FTWs for wastewater treatment. The study consisted of three phases: Criteria selection, screening system, and field study for verification. A literature review followed by preliminary screening using 5 criteria: plants available or not available in Sri Lanka, invasive/non-invasive, aquatic/terrestrial, perennial/annual, and adapted/not adapted to submerged conditions. Weighted scoring was adopted to select 3 plant types i.e., most, moderately, and least suitable for the field implementation. The selected 3 types of plants were used to establish the CFTW in Kandy Lake, Kandy. The plants were harvested after 40 days of planting for the assessment of total nitrogen (N), total available Phosphorous (P), and biomass. The data obtained were statistically analyzed using the pooled t-test in SAS software. Finally, the validation of the developed methodology was carried out. The literature review identified 50 plants used for the CFTW and 9 plants were screened which are suitable for Sri Lankan conditions. *Canna indica*, *Dracaena sanderiana*, and *Vetiveria zizanioides* (L.) were identified after weighted scoring as the most, moderately, and least suitable plants., respectively. The average biomass increases of *Canna indica*, *Dracaena sanderiana, and Vetiveria zizanioides (L.)* were 57.50%, 8.18%, and 30.18%, respectively, and their average nutrient removal rates were 88.82%, 2.89%, and 24.98% for N and 66.80%, -39.36%, and -50.20% for P, respectively. It is concluded that *Canna indica* is the best plant for FTWs under Sri Lankan conditions. Since this study considered nutrient removal efficiency as a parameter for the methodology, further studies are suggested on assessing the other relevant parameters for selecting plants for CFTW.

Keywords: *Canna indica,* Floating treatment wetland, Nutrient uptake, Plant selection, Sri Lanka

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