

Application of a Constructed Floating Wetland for Treatment of Wastewater: A Case Study in Horana Export Processing Zone in Sri Lanka

G.M.Kavindi^{1,2*}, S.K.Gunatilake², S.S.R.M.D.H.R. Wijesekara², and N.P.N. Shyamal¹

¹Environment Management Department, Horana Export Processing Zone, Horana 12400, Sri Lanka.

²Department of Natural Resources, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka.

*madukagamage96@gmail.com

Constructed floating wetland (CFW) has been a popular phytoremediation based water treatment method for water purification purposes since the turn of the century. Natural macrophytes form floating hydroponic mats on the water's surface and a root system that acts as a natural filter. This study was conducted at Horana Export Processing Zone to evaluate the potential use of floating wetland plants of *Cyperus iria*, *Heliconia psittacorum* and *Canna indica* for removing pollutants from wastewater. The CFW unit (size of 0.75 m × 0.46 m × 0.15 m (L×W×H)) was made with coconut husk chips, rice hulls, and soil media. Triplicate CFW with varying plant densities and three units without plants as control treatment were established in 90 L tanks. Water samples were collected over an 8 week period for analysis. Water quality parameters (BOD, COD, TSS, TDS, Nitrates, Phosphates and Heavy metals (Pb, Cr, Ni)) were measured once a week. One Way ANOVA Repeated measure analysis (95% confidence interval) with Tukey's Post Hoc Test was carried out. *Canna indica* showed high removal efficiency in TSS, COD, Cr, Ni and nitrates as 58.1%, 73.0%, 72.0%, 86.6%, and 59.5%, respectively. *Cyperus iria* showed high reduction efficiency in BOD (56.7%) and phosphates (87.2%). *Heliconia psittacorum* showed high reduction efficiency in TDS (71.6%), Pb (58.0%). The results of the study suggested the selected *Cyperus iria*, *Heliconia psittacorum*, *Canna indica* could be potential plant species used in the CFW system to improve treated wastewater quality.

Keywords: Biofilms, Constructed Floating Wetland, Hydroponic Mats, Macrophytes, Phytoremediation