Section 2

Executive Summary of the Project:

Use of natural wetlands for pollution abatement has gained attention due to its low operational and maintenance cost when compared to conventional environmental techniques in current use for the purpose. Iriyawetiya wetland is ideally located to receive waste and storm water from the populous Kiribathgoda urban area and hence it was considered important to study its potential use for waste water treatment. Objective of the present study therefore was to determine the sediment, organic matter, nutrient and heavy metal (pollutant) removal potential of Iriyawetiya wetland and also to identify effective wetland plant (macrophyte) species that are able to remove nutrients and heavy metals from water and sediment that can be used in wastewater treatment systems.

Except for phosphorus, Iriyawetiya wetland was revealed to contain high levels of nitrogenous nutrients and heavy metals, i.e. Al, Fe, Cd, Cr, Cu, Mn, Ni Pb and Zn at the inlets through which waste and storm water reaches the wetland. Although average BOD_3 (20.1 ± 3.6 mg/l) and COD (50.4 ± 8.8 mg/l) at the inlets were lower than that of a polluted water, indicating low organic matter content in wetland waters, the average dissolved oxygen (DO) content showed a low average value (2.9 ± 0.2 mg/l) than in a non-polluted water that would have caused due to low densities of phytoplankton and green algae. DO contents however showed a progressive increase towards the outlet. Other pollutants too were progressively decreasing in content towards the outlet, revealing that the wetland abates pollutants in waste/ storm water that passes through it.

The percentage reduction of turbidity, total dissolved solids (TDS) and electrical conductivity was 99% while that for the heavy metals were, Fe (93.5%) Cu (92.25%) Mn (85.32%), Zn (83.6%) Cd (78.5%), Al (77.6%), Ni (71.54%), Pb (68.4%) and Cr (55.71%), indicating the wetlands high efficiency in removing sediment and metal pollutants from the water that moves across it.

According to the values obtained for bioconcentration factor (BCF), *Alocasia macorrhiza* (rooted emergent plant) revealed to be a hyperaccumulator of Fe with a BCF of 85 while floating species, *Pistia stratiotes,* (83) *Salvinia molesta* (73) and *Eichhornia crassipes* (60) ranking second best macrophyte species for the task. *E. crassipes* and *P. stratiotes* were revealed to be the best Ni and Mn accumulators while rooted emergent species, *Limnocharis flava* (BCF = 1821), *Isachne globosa* (BCF = 1817) were the hyperaccumulators of Pb, indicating removal capacities of these plants in removing sediment pollutants. The best Cd, Cr and Cu removers are the floating species, *S. molesta, E. crassipes,* indicating their potential to be used for industrial/ agricultural waste water treatment.

Hydroponically grown *P. stratiotes* removed more than 75% of initial Fe in the artificial waste water within 6 days while *E. crassipes, I aquatica* and *L. flava* indicated to be candidate species for phtoremediation for Cd . *I aquatica* revealed the best species for Cr removal as it has removed > 50% within 6 days and 75% within 9 days. *L. flava* and *E. crassipes* remove more than 50% of low initial Cu content within 6 days. *I. aquatica* is the best accumulator of Pb while *Jussiaea repens* is the only species that removes > 50% of Mn within 14 days, indicating the variation that exists among the phytoremediation potential of wetland macrophytes