Aquatic Life Health Quality Assessment of the Bolgoda Canal and Waga Stream with respect to Selected Physico-chemical Parameters and Bioindicators

F.S. Idroos[1] and P.M. Manage*[1]

[1] *Department of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*

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Abstract

The relationship between some physico-chemical parameters and bioindicators in Bolgoda canal and Waga stream in Colombo, Sri Lanka was assessed from February to July 2010. The objective of the study was to evaluate the quality of aquatic health in the two water bodies using some physico-chemical parameters and bioindicators. Physico-chemical parameters of the Water bodies were measured. Macro invertebrates and phytoplankton were studied as biological indicators. Quantification of macro invertebrates were carried out and Pollution Tolerant Index (PTI) of Bolgoda canal and Waga stream was calculated according to the standard manual published by the United States Environmental Protection Agency (USEPA). Macro invertebrate component in the Bolgoda canal represented both moderately pollution tolerant (*Nepa cinerea,* Zygopteran nymphs) and pollution tolerant (*Planorbella trivolvis*, *Promacea bridgesi*, *Gerris* sp, *Lethocerus americanus*, *Plea frontalis*, *Cerithiidae* sp, *Tubifex tubifex*) organisms while in Waga stream only pollution sensitive organisms (*Paludomous loricatus*, *Paludomous zeylanicus*, *Cylindrostesthus productus*, Plecopteran nymphs, Psephenidae larvae, *Aegla* sp, Ephemeropteran nymphs) were reported. The PTI value of Bolgoda canal ranged from 17.00 to 19.90 where as in Waga stream was ranged from 34.00 to 39.60 indicating poor and good water quality respectively. The phytoplankton composition of both water bodies were analyzed using Shannon Wiener Diversity Index (SWDI). SWDI for phytoplankton in Bolgoda canal was ranged between 0.674±0.36 and 1.513±1.80 and in Waga stream was ranged from 1.89±0.72 - 3.01±1.89 indicating low and high diversity respectively. Data analysis by Principle Component Analysis (PCA) showed that physico-chemical parameters, PTI and SWDI of the sampling locations in Bolgoda canal and Waga stream were clustered into three distinct groups according to the site selection. Regression analysis showed temperature, pH, DO, nitrate concentration and BOD had a significant effect on the PTI value of the Bolgoda canal and Waga stream.

Key words: *Physico-chemical parameters, Bioindicators, Pollution Tolerant Index (PTI), Shannon Wienner Diversity Index (SWDI), Principal Component Analysis (PCA).*

1. Introduction

Biological monitoring or bio- monitoring, is the use of biological response to assess changes in the environment, generally changes due to anthropogenic causes (Ramakrishna, 2003) and is a valuable assessment tool that is receiving increased use in water quality monitoring programs (Kennish, 1992). Bio- monitoring involves the use of indicators, indicator species or indicator communities such as benthic

*Correspondence: path@sjp.ac.lk
Tel: +94 11 2804515
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