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**A Pilot Study on Macroinvertebrates as Bioindicators
and Development of a Macroinvertebrate Based Index
of Biotic Integrity (M-IBI) to Monitor Stream Health of
Colombo – Sri Jayewardenepura Canal System**

By

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ABSTRACT

Macroinvertebrates have been used as bioindicators for monitoring of stream (wetland) health since they are known to respond with a range of sensitiveness to many kinds of stressors. Main advantages of using macro-invertebrates for monitoring are; it provides a short to medium term record of the pollution history of the site and it is the simplest and the cheapest method of measuring the health with minimum impact to the system. Colombo canal system is comprised with several branches and outfalls to the sea while holding three main marshes. Due to the rapid urbanization and development of the area, the canal system has been heavily contaminated with pollutants. Current study was aimed to assess the habitat characteristics, water quality and macroinvertebrate diversity of the system and develop a Macroinvertebrate based Index of Biotic Integrity (M-IBI) which can be used to monitor the health of the canal system.

Macroinvertebrates were sampled using a D – framed kick net (with a 400 μ m mesh bag) from both banks about 10 meters distance. Samples were obtained from ten sampling stations (namely Kotte, Nawala, OUSL, Kirimandala Mw., Wellawatta, Orugodawatta, St. Sebastian, Beira Lake, Budhgamuwa nad Royal Park) representing main branches of the canal system during the period of Nov 2008 to June 2009. Habitat characteristics and water quality parameters were recorded.

Fifty three species of macroinvertebrates belonging to four main phyla (Arthropoda, Mollusca, Annelida and Platyhelminthes) were reported from the study. Royal Park station has shown the highest species richness which was 22 species (Average) while Kirimandala Mw recorded the highest macroinvertebrate density as 567 individuals per sample.

For the index development, considering the habitat characteristics and some water quality parameters ten stations were grouped into two as Reference sites and degraded sites. Then 41 candidate metrics were nominated for the selection process for the index development.

After following several statistical evaluation methods, ten metrics were qualified for M-IBI development. Those candidate metrics such as (1) overall species richness, (2) no of Hemiptera taxa, (3) No of Coleoptera taxa, (4) No of Crustacea taxa, (5) % of Diptera, (6) % Odonata, (7) No of intolerant taxa, (8) No of collector-gatherer taxa, (9) Shannon-wiener diversity index (H) and (10) Heterogeneity showed exceptionally strong discrimination between reference and degraded sites.

Then the validity of M-IBI developed was tested with a new set of data obtained from ten sites of the canal system in 2011. Among those ten sites there was no stream ranked as 'Excellent' but site at Heen marsh (near Royal park) ranked as 'Good', 6 sites (namely Nawala, OUSL bridge, Kirimandala Mw., Torrington, Kotte Lake & Buthdamuwa) ranked as 'Poor' and sites close to the sea and Kotte bridge were ranked as "very poor". These M-IBI scores were positively correlated with water quality parameters particularly with DO values ($r = 0.578$). Therefore this M-IBI shows potential of using it for biological monitoring and improving biotic integrity of streams and wetlands. The M-IBI is a tool that can be introduced to the students of universities and schools located in the neighbourhood and to the community. Also for any government authorities or institutes who would need this for monitoring the stream health of Colombo canal system.