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Benthic Macroinvertebrates as Environmental flow Indicators

- A case study: Gurugoda Oya, Sri Lanka

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Benthic macroinvertebrates are an important component of the river biota and are characteristic as stream health indicators. This research was focused on identifying the key physico-chemical parameters which explain the best macrobenthic community structure in the Hungampola South/ Morontota village section of the Gurugoda Oya and to ascertain whether benthic macroinvertebrates could be used as an environmental flow indicator in that region.

In the present study six sampling sites (sites A-F) were rationally established in the Hungampola South and Morontota village section in the Gurugoda Oya to capture the effects of different flow regimes on benthic macro invertebrates. Macroinvertebrates were collected using a standard D-framed dip net. Later on the material retained was wet sieved and the macroinvertebrates were identified to the nearest possible taxonomic category and enumerated in different taxonomic groups. Each time a biological sample was taken, the physico-chemical parameters of the overlying water immediately above the bottom were measured using standard sampling and analytical procedures. Distance based linear modelling was used to determine the key physico- chemical parameter/parameters that govern the macrobenthic invertebrate community structure using PRIMER V 6.1.16 statistical software equipped with PERMANOVA + V 1.0.6 statistical software.

The Distance based Linear Model (DistLM) identified three influential environmental variables to the prediction of macrobenthic invertebrate community composition in the Hungampola South/ Morontota village section of Gurugoda Oya. The three governing factors are dissolved oxygen content, flow velocity and volume flow rate of water. A cumulative percentage of 44.0%, of the total variation of the physico-chemical parameters could be explained with the interplay of these three parameters by the model. Although the result of the present study revealed that the dissolved oxygen content, flow velocity and volume flow rate of water are the principle governing factors in this area, it has to be noted that, realistically it is an interaction of numerous physico-chemical and biotic factors in the hydro climatic region. Therefore, it can be reasonably concluded that benthic macroinvertebrates could be used as environmental flow indicators in the Hungampola South/Morontota village section of the Gurugoda Oya.

Keywords: Environmental flow, benthic macroinvertebrate, Distance based Linear Model