Feasibility of using Freshwater Fish Species to Monitor the Water Quality of Inland and Brackish Wetlands: An analysis of the Bolgoda River System

By
Dhanasekara Mudiyanselage Deepanee Chalinika Bopitiya

A thesis submitted in partial fulfillment of the requirement for the Degree of Master of Science in Environmental Science of the University of Colombo, Sri Lanka.

516675

Year 2003

Abstract

The Bolgoda River system is well known for its rich species diversity and aesthetic beauty. Owing to it specific location, the Bolgoda river system is subjected to a myriad of impacts arising out of anthropogenic activities.

The research study was carried out investigate the diversity and distribution of freshwater fish species in the Bolgoda river system with the objective of assessing the feasibility of using freshwater fish species to monitor water quality.

During the study, water quality, freshwater fish diversity and distribution were surveyed for a period of four months from May to August. After selecting the sampling stations, fish species inhabiting these sites were caught using castnets and hand nets and water samples were collected from these sampling stations at the time of capturing fish. These samples were tested for salinity, dissolved oxygen (DO), biochemical oxygen demand (BOD), phophates, nitrates, pH and temperature.

Study revealed that salinity, DO, and BOD are the key parameters that have an effect on the distribution pattern of the freshwater fish species. Salinity has a negative correlation to fish species diversity with a majority of freshwater fish inhabiting low salinity regions. In contrast DO has a positive correlation to fish species diversity. Between BOD and DO there exists a significant positive correlation at $p < 0.05$. Therefore as the value of BOD:DO ratio increased, the number of freshwater fish species inhabiting a particular site declined.

During the study, 22 fish species were identified of which 16 species were freshwater dispersants. The Margalef species richness index highlights that the fish species of sampling sites vary and according to relative abundance of fish species caught, most abundant species freshwater fish species were *Etroplus suratensis* and *Sarethorodan mossambicus*. Both species were captured from all sampling stations while *Rasbora caverii, Oryzias melastigma and Awaous grammepomus* were also commonly found but had a comparatively low relative abundance. Other freshwater species were not commonly located and mostly found in locations south of Dampe. For example, *Puntius sinhala, P. bimaculatus, P. amphibius* and *Aplocheilus dayi.* These species have a negative correlation to salinity at $p < 0.05$. *P. sinhala and P. bimaculatus* also had a negative correlation to BOD.

The study indicated that salinity and BOD:DO ratio were the main factors determining the species diversity and distribution of freshwater fish species. Analysis of information on fish species distribution and water quality highlighted two species that were more sensitive to changes on these two key factors. They were *P. sinhala and P. bimaculatus.*

According to literature there exists a criteria that can be used to identify indicator species for biological monitoring schemes. This study identifies *P. sinhala* as a potential freshwater fish species that can be used to assess the water quality of the Bolgoda River system. However detailed studies, based on the stated criteria, are required to be conducted to confirm the suitability of *P. sinhala.*