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Diversity of Plankton in Some Selected Reservoirs of Sri Lanka

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1. Introduction

Phytoplankton and zooplankton, tiny drifting plants and animals are vital components of the marine and freshwater aquatic food chains, and our water systems. These organisms are known to have cosmopolitan distribution and their abundance and diversity can vary in different regions. Although Sri Lanka does not experience large seasonal variations, the diversity of freshwater habitats can be considered as high. The reasons for these variations could be related mainly to the origin and geological locality of the reservoirs. Due to these reasons reservoirs experience various impacts of climatic changes, bedrock influences and maturity. Plankton, particularly phytoplankton, has long been used as indicators of water quality (Palmer 1969). The species assemblage of phytoplankton and zooplankton may be useful in assessing water quality (Gannon and Stemberger 1978). Because of their short life cycles, plankters planktons? respond quickly to environmental changes, and hence their standing crop and species composition are more likely to indicate the quality of the water mass in which they are found. Therefore the response time of plankton occurs at a meaningful scale compared with changes in water quality. The presence, abundance and diversity of these organisms provide important information of environmental conditions along temporal gradients. Thus, they can be used to predict past and future scenarios of the environment using present day data.

2. Materials and Methods

Plankton samples were collected from the selected sites of all the major climatic regions of Sri Lanka. Plankton nets of pore size 10 µm, 50 µm and 70 µm were used for sample collection. Preservation of samples was done according to the standard methods: acid Lugol's iodine was applied for phytoplankton analysis and formalin was applied for zooplankton. The identification of species was done using a research microscope (OLYMPUS CX 31) with phase contrast optics. Identificationkeys prepared by Yatigammana, 2004. Fernando, 1990, Abeywickrama, 1979 and Desikachary, 1959 were used. In addition photo micrographs available in international data bases were also used for the clarification and confirmation of the identification of taxa. Photo micrographic recordings were made for all the species observed.

3. Results and Discussion

Initially, information of planktons was obtained from 46 reservoirs distributed in different climatic regions of the country. The regions of the country where the study reservoirs were located are as follows: Nuwara Eliya(05), Anuradhapura(28), Kandy(04), Puttalam(03), Ampara (01), Batticaloa (01), Pollonnaruwa (01) & Matale (03). From these reservoirs a total of 90 plankton species were recorded. Among them 60 species were phytoplankton, 23 species were zooplankton and 07 species remained unidentified.

Considering the locations of the studied reservoirs, many of them are located in the dry zone (Anuradhapura district). Almost all the recorded Cyanobacteria species were observed from these reservoirs. In addition toxin producing species such as *Cylindrospermopsis raciborskii*, *Microcystis* sp. and *Peridinium* sp. were also recorded in dry zone reservoirs at relatively high abundance. It was also noted that when these toxin producing algae are present, the diversity of both zooplankton and phytoplankton was low. It could be due to the allelopathic activity of such organisms. However, a diatom species *Aulacosiera granulata* was found in all the reservoirs and was abundant in reservoirs in the Wet Zone. *Aulacosiera granulata* is known to be

very sensitive to nutrient levels of water and especially to phosphorus. Interestingly, zooplankton abundance and diversity were low in all the reservoirs which is an indication of the existence of immature ecological structures of the reservoirs which can be directly related to low water residence time, which is common to lentic systems that have high flushing rates. Another reason could be the cyanotoxins. The cyanobacteria *Microcystis* and *Anabaena* may produce intracellular toxins and release them into surrounding waters, especially when they are in a senescent growth phase or when an algicide has been applied (Iain and David 2008). High concentrations of cyanotoxins reduce the growth and reproduction of various zooplankton (DeMott *et al.* 1991; Gilbert 1994) . Warmer temperatures may exacerbate the effects of cyanotoxins on zooplankton. Thus the reservoirs located in Anuradhapura are facing the danger of water poisoning by cyanotoxins and also the occurrence of cyanobacterial and dinoflagellate (eg. *Peridinium*) blooms under favorable conditions. The very high abundance of Aulacosiera in this area is an indication of increased levels of phosphorus which is a strong inducing factor of cyanobacterial blooms.

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Table 1. Dominance of Planktons in Different Regions of Sri Lanka

Group	Organism	Dominant Area
Cyanobacteria	*Cylindrospermopsis raciborskii*	Anuradhapura, Ampara, Batticaloa
	Microcystis aeroginosa	Dambulla, Batticaloa
	Anabaena circinalis	Anuradhapura
	Merismopedia punctata	Pollonnaruwa
	Oscillatoria sp.	Anuradhapura, Batticaloa, Ampara
Diatoms	*Surirella* sp.	Anuradhapura, Puttalam
	Nitzschia sp.	Anuradhapura
	Gomphonema sp.	Puttalam
	Aulacosiera granulata	Ampara,Batticaloa,Puttalam,Anuradhapura, Girandurukotte, Dambulla, Kandy
Euglinoids	*Euglena* sp.	Puttalam, Villachchiya
	Phacus sp.	Puttalam, Villachchiya
Dinoflagellates	*Peridinium* sp.	Ampara
Rotiferans	*Brachionus* sp.	Puttalam, Villachchiya
	Keratella sp.	Puttalam, Villachchiya
Cladocerans	*Daphnia* sp, *Chydorus eurinotus*	Nuwaraeliya