

COMPOSITION AND ABUNDANCE OF PLANKTON IN DIFFERENT REGIONS OF THE KOTMALE RESERVOIR

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Introduction

Kotmale reservoir was constructed under the Mahaweli Development Scheme. It receives water mainly from Pundalu Oya, Puna Oya and Kotmale Oya, which brings nutrient rich surface runoff mainly from agricultural lands. Catchment area of the reservoir covers many vegetational types ranging from natural rain forest to agricultural lands. Upper area of the reservoir experiences high human disturbances including intensive agricultural activities and sand mining. However, topographically lower part of the reservoir appears to experience low human disturbances as the catchment is declared as the reserved area of the reservoir. Further, it can face bottom anoxia which is common in tropical region, especially because of the deep bathymetry ($Z_{max} \sim 87$ feet). Therefore, it has become important to monitor the conditions of the reservoir to maintain better health of the system. Microscopic aquatic organisms show rapid responses to biological changes as well as environmental changes such as eutrophication, acidification, salinization etc. Understanding of the community structure of such organisms including Cladocera, Diatoms, Chironomids will provide a better facility to understand past and present environmental conditions and the future directions of the reservoir.

Thus, the current study was conducted to explore the possibility of using planktonic organisms to detect environmental changes in the Kotmale reservoir. Initially it is important to understand the species composition and abundance of planktons before using them as environmental indicators. The study provides information on planktons in different locations in Kotmale reservoir having different environmental conditions.

Materials and Methods

Twelve sites Kot-1 to Kot-12, known to experience different types of environmental conditions were identified in the Kotmale reservoir. From each site, plankton samples were collected using plankton and dip nets (10-50 μm mesh size) from June 2008 to July 2010 from each site. Phytoplankton and zooplankton samples were preserved using standard methods and held under 4°C until analysis. Planktonic organisms were identified under phase-contrast research microscope (Olympus CX 31). From each sample, at least 500 individuals were counted for calculation of the relative abundance. This procedure was repeated for each sample and the mean value was taken to determine the species dominance at each site.

Results and Discussion

A total of ~117 different plankton species were identified where most of them were phytoplankton. Among them were 16 spp of Diatom, 31 spp of Green Algae, 11 spp of Blue Green Algae and 25 spp of Desmid. Thirty two species of zooplankton belonging to the groups, Cladocera, Copepoda, Rotifera, Ciliata and Nematoda were also identified. The abundance of phytoplankton was higher than that of the zooplankton in all sites. Order Desmiales and Chroococcales were the dominant phytoplankton groups while Cladocera and protozoa were the dominant zooplanktons. The relative abundance of *Aulacoseira granulate*, *Staurastrum cingulum* and *Microcystis* was comparatively very high. The dominance of *Microcystis* in site Kot-5 (relative abundance ~41%) (Figure 1) may be an indication that the reservoir is heading towards eutrophic condition. Although *Aulacoseira granulate* is found in healthy reservoirs, its high dominance in site Kot-8 may be an indication of an unhealthy ecosystem, especially where there is a low diversity of plankton (relative abundance ~57%) (Figure 1). Among the zooplankton, the relative abundance of Cladocera was very high, mainly in site Kot-5 (Figure 2). According to Yatigamma (2004) Cladocera is a very good indicator organism found in aquatic systems which is known to give signals of water level fluctuation, salinization and eutrophication. Therefore, the high abundance of Cladocera could be an indication of such situations. However, quantitative studies of dominant taxa should be carried out to see their variation with

environmental condition of the reservoir. In addition, studies on environmental conditions are necessary to find ecological relationship between plankton and environmental variables.

Acknowledgements

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References

- Fernando, C.H. (2002), The freshwater zooplankton of Sri Lanka with discussion of Tropical freshwater zooplankton composition, *Int. Revue Ges. Hydrobiology*, 65: 85-125.
- Yatigamma, S. (2004). Development and application of Paleocological Approaches to Study the Impacts of Anthropogenic Activities on Reservoirs in Sri Lanka. Ph.D Thesis Queen's University, Kingston, Ontario, Canada, 178 Pp.

Appendix

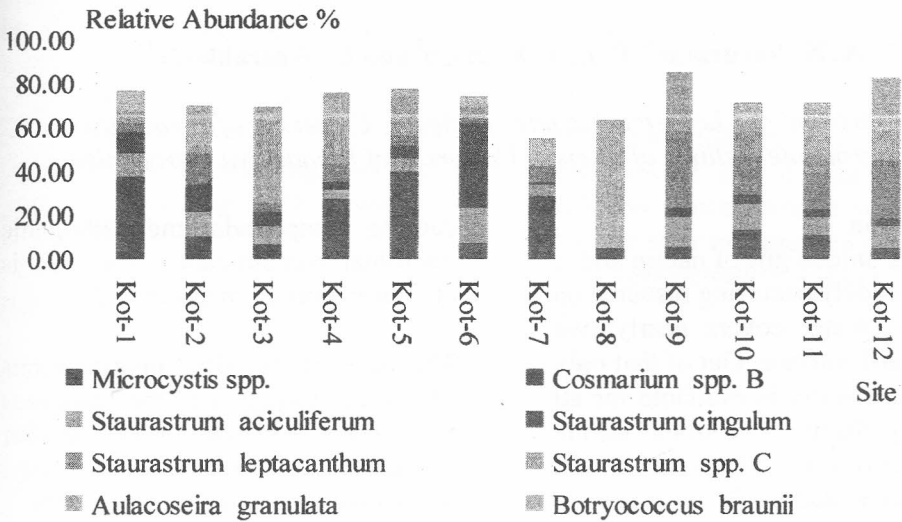


Fig. 1. Occurrence of organisms having a relative abundance > 20 % in the 12 different locations of the Kotmale Reservoir.

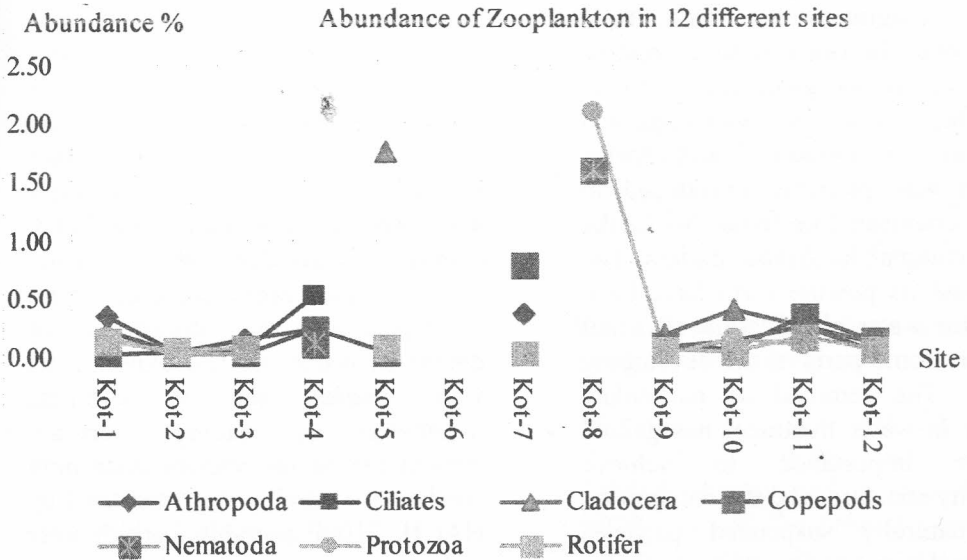


Fig. 2. Distribution of Zooplankton in the 12 different locations of the Kotmale Reservoir.