

## SURVEY OF THE COMPOSITION AND ABUNDANCE OF PLANKTON IN KOTMALE RESERVOIR

A.L. Warusawithana<sup>1</sup> and S.K. Yatigammana<sup>2\*</sup>

<sup>1</sup>*Postgraduate Institute of Science, University of Peradeniya*

<sup>2</sup>*Department of Zoology, Faculty of Science, University of Peradeniya*

### Introduction

Kotmale reservoir was constructed in the uplands of Sri Lanka under the Mahaweli Development Scheme, mainly for hydroelectric power generation. The reservoir receives water from Pundalu Oya, Puna Oya and Kotmale Oya, which brings nutrient rich surface runoff from a large area of land (~ 60,000 ha). The reservoir itself covers ~ 650 ha land and has  $172.9 \times 10^6 \text{ m}^3$  of water storage capacity at full supply level. Catchment area of the reservoir covers many vegetation types ranging from natural rain forest to agricultural lands. Upper area of the reservoir experiences high human disturbances including input of agricultural runoff and sand mining. The lower part of the reservoir appears to experience fewer disturbances due to the surroundings being declared as the reserved area of the reservoir. Past studies have shown that the Kotmale reservoir is moving toward the direction of eutrophication (Piyasiri, 1991). In addition it can face bottom anoxia as it is a relatively deep ( $Z_{\text{max}} \sim 87$  feet) reservoir. Therefore it has become important to monitor the conditions of the reservoir to maintain better health as it supports the economy of Sri Lanka in many ways. Microscopic organisms in aquatic systems are sensitive organisms that show rapid responses to environmental changes including eutrophication,

acidification, salinisation etc. In addition they respond to biological changes of the environment. Therefore understanding of the community structure of such organisms including Cladocera, Diatoms, Chironomids and other planktonic organisms will provide a better facility to understand past and present environmental conditions and the future directions of the reservoir. Thus the current study was designed to explore the use of planktonic organisms to detect environmental changes in the Kotmale reservoir. Initially it is important to know the species composition and the abundance of planktons before using them as environmental indicators. The current paper presents the results of the initial part of the study.

### Materials and Methods

Six sites that are known to experience different type of environmental conditions were identified in Kotmale reservoir, and named as Kot-1, Kot-2, Kot-3, Kot-4, Kot-5 and Kot-6. Plankton samples were collected using a plankton net and a dip net (50 $\mu\text{m}$  mesh size) from June 2008 to July 2009 from each sites. For the analysis of phytoplankton, samples were preserved using Lugols solution and for zooplankton samples were preserved using formalin. All the samples were kept under 4 °C until the analysis is done. Planktonic organisms

were identified under phase-contrast research microscope (Olympus CX 31). From each sample organisms were counted until at least a total of 500 individuals were found. The relative abundance of each species was calculated at each site. The procedure was repeated for each sample and mean value was taken to determine the species dominance at each site.

### Results and Discussion

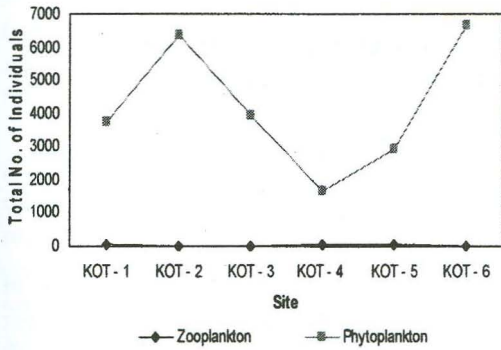
A total of ~83 different species were identified while most of them are phytoplankton. Among them, 8- Diatom, 19- Green Algae, 13- Blue Green Algae 21- Desmid species were identified while six remained as unidentified. Twenty five species of zooplankton belonging to the groups, Cladocera, Copepoda and Nematoda were also identified. However, the phytoplankton number was higher than the zooplankton number in all the sites (Figure 1). Order Desmidiales and Chroococcales were the dominant phytoplankton groups while order Cladocera was the dominant zooplankton group (Figure 2). The relative abundance of *Staurastrum cingulum*, *Aulacoseira granulata* and *Microcystis* were comparatively very high in Kotmale reservoir. The relative abundance of *Staurastrum cingulum* was 40 % in site Kot-6, *Aulacoseira granulata* was 31 % in site Kot-3 and *Microcystis* was 42 % in site Kot-5 (Figure 4). The dominance of *Microcystis* in site Kot-5 is an indication of that the region of the

reservoir is leading to eutrophic condition. Although *Aulacoseira granulata* is found in healthy reservoirs (Yuwadee, 2003), the high dominance also may be an indication of unhealthy ecosystem, because the diversity of plankton in site Kot-3 was very low. In addition among the zooplankton, the relative abundance of Cladocera was very high in Kotmale reservoir and it reached to 94 % in site Kot-5 (Figure 03). According to Yatigammana (2004) cladocera is a very good indicator organism found in aquatic systems. They are known to give signals of water level fluctuation, salinisation and eutrophication. Therefore the high abundance of cladocera species in Kotmale reservoir could be an indication of such situations. However, quantitative studies of dominance taxa are should be done to see the variation of the environmental condition of the Kotmale reservoir. In addition studies on environmental conditions of the study sites also should be completed to find ecological relationship between the plankton and the environmental variables. Therefore the next step of the research will be to complete the collection of the data of environmental conditions of the study sites and to quantify the plankton relationship to important environmental variables.

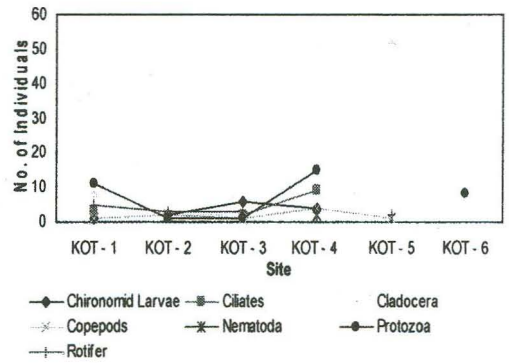
### Acknowledgement

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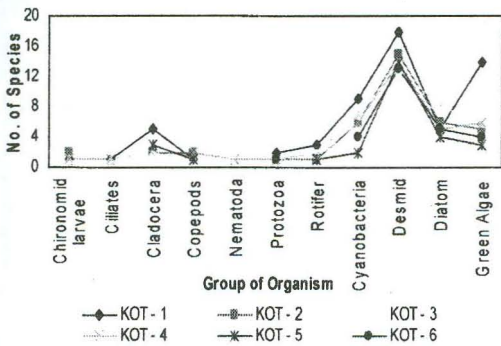




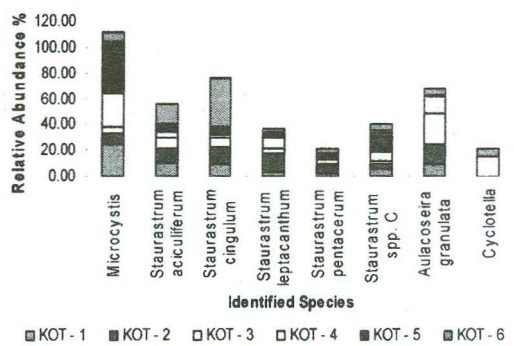
**Figure 1. Abundance of Phytoplankton and Zooplankton in six different sites**



**Figure 3. Distribution of Zooplankton in six different sites**



**Figure 2. Species Composition of identified biological groups in Kotmale reservoir**



**Figure 4. Distribution of organisms having relative abundance more than 20%**

**References**

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