COMPARATIVE STUDY OF PLANKTONS IN SELECTED DOMESTIC WATER SUPPLY RESERVOIRS IN KANDY DISTRICT

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Introduction

Irrigation systems of Sri Lanka have a very ancient history, and man-made reservoirs are a part of schematic irrigation marvels. These systems have been in close association with human communities for a long time. However, due to recent intensification of human activities, many reservoirs are subjected to several types of pollution. Additionally, some terminal reservoirs now show signs of salinization, which may be related to high water residence times and evaporation especially in the Arid and Dry zones. Furthermore, the introduction of lacustrine fish, over the past few decades, into most reservoirs was carried out as a long-term solution for the protein requirement in Sri Lanka, this altered the ecological characteristics of the reservoir ecosystems. Possible stressors on reservoirs in Sri Lanka are complex, and involve watershed disturbances, changes in climate and alterations due to the establishment of fisheries. Hence there is an urgent to better understand how water quality and aquatic communities have changed over the past several decades. This information would help to assess and implement proper management strategies to avoid an escalating environmental damage.

Freshwater planktons are useful bioindicators that can be used in environmental research to infer limnolological changes such as eutrophication, salinisation and water-level fluctuations both qualitatively and quantitatively (Bos and Cumming, 2003). In addition, these organisms have been used to understand complex changes in food webs, such as competition and predation (Charles *et.al*,1994). Furthermore, they have been used to infer changes in habitat, including changes in the abundance of macrophytes, temperature and oxygen (Pennak, 1946). Habitat alteration can directly or indirectly be related to environmental changes such as climate (Verschuren *et al*, 2000) and pollution. Therefore, changes in the structure of plankton communities can be used to better understand environmental changes in lakes and reservoirs. However, before using them as biological indicators it is important to understand the taxonomy of these important organisms. Therefore this study was conducted to determine the diversity and ecology of planktons in few selected reservoirs in Kandy district of Sri Lanka.

Materials and Methods

The study was conducted for a period of six months from January 2010 – June 2010. Samples were collected two months a time in the morning hours to avoid diurnal variations. From the six selected reservoirs

(Dunumadalawa, Rosneath, Parakatawella, Kundasala, Walala, Sikurapotha) sample were collected using plankton net with a pore size of 10 µm. and were preserved and kept at 4°C until identification. Planktons were identified to generic level and to species level where possible. Environmental variables of the study sites were also measured at each sampling event. Temperature(T), Conductivity(C), Turbidity were measured using appropriate field instruments. Laboratory analysis was conducted for Dissolved Oxygen (DO), total Nitrogen and Total Phosphorus. The distribution of the plankton and their relationship to measured environmental variables were determined using cluster analysis, rank-abundance curves, Shanon-Weiner index and regression analysis.

Results

A total of 46 species of planktons were recorded from all sis study sites (Table 1), these includes 38 species of phytoplankton belonging to 34 genera with four unknown species and eight genera of zooplanktons. Calculations of the relative abundance showed that phytoplankton (0.94) was more abundant than zooplanktons (0.06). Among the phytoplanktons *Aulacoseira* spp. was the most abundant, *Microsystis* spp. was found in four reservoirs and was in high abundance in Rosneath, a drinking water reservoir which supply water to Kandy city.

Composition analysis showed different similarity levels and distant levels between the study reservoirs. Highest similarity of 67.7 % was observed between Dunumadalawa and Rosneath reservoir while least similarity level of 57.5 % was observed between Parakatawella and Walala reservoirs. In abundance analysis Sikurapotha reservoir had the highest Shannon Weiner diversity index of 2.54 and in Rosneath reservoir, the least (0.98). Rank abundance curves for five reservoirs showed log normal distribution (Figure 1). The relative abundance of phytoplankton increased from January to June. Regression analysis indicated that phytoplanktons are positively related to total phosphorus level ($p = 0.028$ and coefficient = 0.5273 at 95 % confidence) while zooplankton showed a negative relationship ($p = -0.029$ and coefficient = 0.5251 at 95 % confidence).

Discussion

The study showed that phytoplankton was the dominant group of planktons in all the reservoirs which is an indication of high primary production. But high dominance of more than 90% of the relative abundance of species such as *Aulacoseira* and *Microsystis* is an indication of eutrophication. According to the composition analysis the different similarity levels in plankton composition found among the reservoirs. However, reservoirs have much higher similarity levels of composition. Rank abundance curves suggest that relative abundance of each species in the six reservoirs is determined by a variety of environmental conditions. The total phytoplankton count shows a positive relationship with total phosphorus levels while zooplankton shows a negative relationship. However none of the planktons show any strong relationship with other measured environmental variables (Temperature (T), Conductivity(C), Salinity, Secchi disk depth). The difference of the abundance of species may be an indication in their preference to different environmental variables. The dominance of *Microsystis* spp in four reservoirs gives warning signals to risk of exposure of human communities to algal toxinsAn

Conclusion

This study suggests that plankton community in the selected six reservoirs is dominated by phytoplankton. Abundance difference appears to be due to physic-chemical parameters.

References

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Appendix

Table 1. Total number of planktons species in the six different reservoirs studied

	Parakatawella	Sikurapotha	Walala	Kundasala	Dunumadalawa	Rosneath
zooplankton	4	6	5	7	3	1
phytoplankton	10	19	13	24	6	5
Total	14	25	18	31	9	6

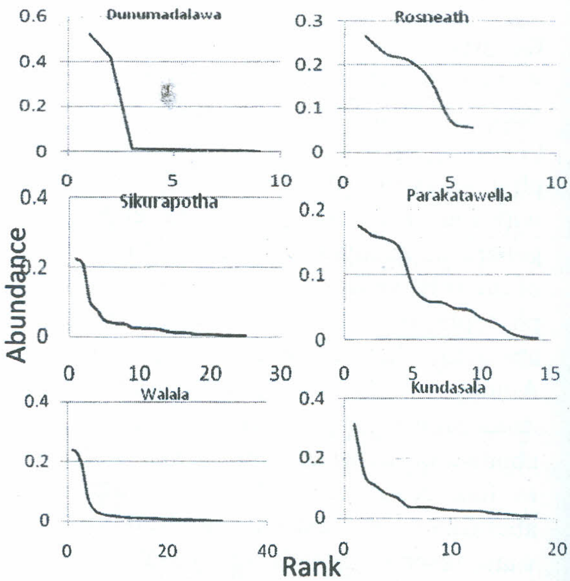

Fig. 1. Rank abundance curves of planktons in different reservoirs