

Chemical Analysis of Dry sediments in the Padaviya Reservoir, Sri Lanka

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Introduction: The Padaviya reservoir is a medium-sized irrigation reservoir in the Anuradhapura District. It was constructed by King Mahasena and restored recently in 1954. The reservoir is permanent, but subject to wide seasonal fluctuations in water level due to dry and wet climate conditions. Reservoir sediments have the ability to act as a sink and a source of nutrients and metals. Therefore, sediment analysis can provide useful information about the current status of the reservoir.

Materials and Methods: This study was conducted to obtain preliminary chemical composition data of sediments in the Padaviya reservoir using six surface samples and two core samples collected in the dry season. Total phosphorus content (TP) in the sediment was determined by the ignition-molybdovanadophosphate colorimetric method. In addition to TP, total organic matter content (TOM), sediment pH and acid soluble metal content were analysed using standard methods.

Results: Results obtained from this study show that the average TP in the surface sediment was $1,460 \pm 400 \text{ mg kg}^{-1}$. The measured concentration of metal expressed in the units of, mg kg^{-1} in the sediment were Mn ($1,849 \pm 253$), Mg ($2,421 \pm 445$), Cr (54 ± 17), Zn (52 ± 14) and Fe ($50,354 \pm 4838$). The order of abundance of metals in sediment is $\text{Fe} > \text{Mg} > \text{Mn} > \text{Cr} > \text{Zn}$. TOM and sediment pH ranged from 7% to 14% and 6.84 to 7.80 respectively.

Discussion: Nitrogen and Phosphorous (P) are the limiting nutrients for the growth of

algae in aquatic systems. Traditionally, it is assumed that P is the growth limiting nutrient in fresh waters compared to N. There is no significant change of TP with the depth of the sediment; however, surface sediments were slightly enriched with P compared to bottom sediments. Phosphorous can release back to the water column by dissolution and increasing the bioavailable pool of P. The acid soluble Fe concentration in the sediment was significantly higher than that of other metals. It is difficult to explain about the metal ion distribution in the sediments by a single natural or an anthropogenic process.

Conclusion: Sediments in the Padaviya reservoir contain excessive amounts of P which in return increase the phosphate concentrations in the overlying water column. Elevated amounts of phosphate in water can lead to eutrophication with detrimental effects on the reservoir as a result of rapid algal growth.

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