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Variation of Dissolved Oxygen, Temperature and pH with Respect to Depth along a Cross Section of the Padaviya Reservoir, Sri Lanka

Siriwardhana C.¹, Cooray P.L.A.T.^{2*} and Liyanage S.S.L.W.¹

¹*Department of Chemistry, University of Sri Jayewardenepura, Sri Lanka*

²*Central Instrumentation Facility of the Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka*

**atcooray@sjp.ac.lk*

Abstract

Water temperature, dissolved oxygen (DO) concentration, and pH are some of the most important physicochemical parameters in aquatic systems that significantly influence the overall quality of water. Only a limited number of studies have been carried out to study the changes of above mentioned parameters with respect to depth (depth profiles) of reservoirs in Sri Lanka. The depth profiles of DO, temperature and pH in the Padaviya Reservoir in the North Central Province of Sri Lanka were studied 26th March 2016. The profiles were investigated at five different sampling sites along a cross section which started from 8°48'57.63"N, 80°45'38.79"E and ended in 8°47'52.41"N, 80°46'21.75"E. Field portable DO and pH probes equipped with a 20 m cable were used for data collection. The probes were deployed to the water body and data was collected at two feet depth intervals from the surface. The vertical DO profile indicated that the amount of oxygen in water decrease with increasing depth of the water column. Similar observations were also made for temperature and pH profiles. DO profiles showed high oxygen concentrations from surface of the reservoir to a depth of approximately 16 feet and then, decreased rapidly from approximately 4 mg L⁻¹ to 0.5 mg L⁻¹ in less than a foot. Pearson correlation coefficient analysis suggested that there is a parallel relation between depth and DO. Temperature and pH data also indicated a similar distribution; however, the changes were not extreme as for DO. Statistical analysis (ANOVA) showed that there is significant difference between the temperature and DO (P<0.05) and also with pH and DO (P<0.05). All these data indicated that the surface of the reservoir is rich in oxygen and the benthic zone is anoxic. The DO and temperature patterns suggest that the Padaviya Reservoir is stratified. Lake stratifications have been observed and extensively studied in other countries; however, the stratified lakes are usually hundreds of meters deep. In this research, lake stratification was observed in a very shallow reservoir which is only 10 meters deep. The observations made along the studied cross section are presented in the following figure. The research is still in progress to understand the dissolved oxygen distributions in the Padaviya and other reservoirs in Sri Lanka.

Keywords: Dissolved oxygen, pH, Temperature, Padaviya reservoir