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The Impact of Organic Contamination on the Dynamic Equilibrium of Dissolve Oxygen in Selected Water Bodies in South East Sri Lanka

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Abstract

Domestic and other related waste disposals lead to degrade the rate of equilibrium of dissolved oxygen (DO) in the water bodies. The aim of this study is to investigate the contributions of the organic contamination throughout the measured parameters of dissolved sulfide, chemical oxygen demand (COD), nutrient level and salinity in dynamic equilibrium of DO. The selected parameters were observed over a period of six month and the correlations were studied among them for randomly selected two water bodies (WB) with different type of waste effluents. Results indicated that the measured DO has good negative correlation with COD ($r^2 > 0.8$), dissolved sulfide and nutrient levels in the both stations implies a strong impact on the dynamic equilibrium of DO. Also, the measured DO demonstrated poor negative correlations ($r^2 < 0.5$) with salinity indicate salinity as a less important parameter for the dynamic equilibrium of DO.

The measured data were utilised in estimating the oxygen transfer efficiency, α and β values. Particularly, in Karaivahu (WB) and Allai (WB) exhibited low levels of partial pressures imply higher level of α and lower β values. However, which were found to be in the range of 8.67 – 16.88 and 0.99 – 1.02 respectively. The nutrient and COD values were observed in the range of 0.0 - 10.0 mg/L and 0 - 900 mg/L respectively. This concluded that the COD level significantly contributes to the variation of DO throughout the surface active substance in the water bodies.

Keywords: Dissolved oxygen, Chemical oxygen demand, Dissolved sulfide, Nutrient level, Salinity