

## Urban lake physicochemical parameters seasonal and vertical variability within the context of ecological disturbance theory

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### ABSTRACT

The aims of this study are threefold: (1) to determine the seasonal, vertical and lateral variations in the concentrations of physicochemical water quality parameters [pH, dissolved oxygen (DO), temperature, total dissolved solids (TDS), NH<sub>3</sub>-N, PO<sub>4</sub>, PO<sub>4</sub>-P] in the Varsity Lake Malaysia, (2) derive a discriminant function that highlights the metals that contributed or had the greatest effect on the seasonal variation and (3) assess the extent to which the water quality has degenerated base on two water quality guidelines. The water samples were analysed using standard methods while the variations in physicochemical parameters concentration were analysed using discriminant analysis method. The results of Wilks' Lambda *F*-test and canonical discriminant function showed a highly significant seasonal variation in five parameters ( $P < 0.001$ ; DO, pH, temperature, TDS, NH<sub>3</sub>-N; and strong significant variation in two parameters ( $P < 0.05$ ; PO<sub>4</sub>, PO<sub>4</sub>-P) with the wet season having greater concentrations. Based on the standardised discriminant function and structure matrix, DO, pH, and TDS were the parameters with the most significant discriminant power, thus made the highest effect on the seasonal differences in concentration. Significant vertical variations were detected for DO, pH, temperature and TDS. But NH<sub>3</sub>-N and PO<sub>4</sub> concentrations did not vary significantly with depth. DO and pH failed the Malaysian National Water Quality, while Temperature out rightly failed the water quality guidelines. From the theoretical perspective, it is predicted that the lake will experience seasonal, vertical and lateral ecological disturbances. The parameters that contribute most to the ecological disturbances are DO, pH, PO<sub>4</sub> and PO<sub>4</sub>-P.

**Keywords:** Physicochemical parameters; Malaysia water quality; Stormwater contamination; Seasonal water quality variability; Ecological disturbances; Urban lake pollution

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