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A Comparative Assessment of Water Pollution in Beira Lake and Ihalagama Lake in the Western Province of Sri Lanka

Perera, K.A.B.P.[*], Perera, H.A.C.C.

Department of Zoology and Environmental Management, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka
*chinthap@kln.ac.lk

Abstract

Urban Lakes have been subjected to water quality degradation due to various anthropogenic stressors. Beira Lake is a landmark in Colombo City, Sri Lanka, and Ihalagama Lake in Ragama, Sri Lanka, were selected to assess the comparative water pollution in urban lakes. Monthly water samples were collected from September 2023 to February 2024, two sites each at Beira and Ihalagama Lakes, assessing the in-situ (Calibrated multiparameter HACH/ Model) and ex-situ parameters. Data analysis was done using One-way ANOVA followed by Tukey's pairwise comparison using MINITAB 17.0. The mean Conductivity of Beira Lake (185.76±7.91 µS/cm) was significantly higher than in Ihalagama Lake (152.24±3.60 µS/cm). Mean concentrations of nitrates (1.73 mg/L) and phosphates (1.07 mg/L) were significantly higher in Beira Lake than Ihalagama Lake. Biological Oxygen demand concentrations ranged between 5.23 mg/L and 8.43 mg/L in Beira Lake and from 1.09 mg/L to 3.87 mg/L in Ihalagama Lake. The highest Chemical oxygen demand concentrations reported in Beira Lake were 856.0 mg/L and 469.0 mg/L in Ihalagama Lake. Mean chemical oxygen demand and biological oxygen demand concentrations were significantly greater in Beira Lake where the ambient water quality standards for aquatic life declared by CEA for BOD and COD were as follows 4 mg/L and 15 mg/L. The proposed water pollution index (WPI) contains a scale of 04 categories including excellent (WPI < 0.5), good (WPI = 0.5–0.75), moderately polluted (WPI = 0.75–1) and highly polluted (WPI is >1) based on the standard permissible limits of water quality suitable for aquatic life in Sri Lanka. The WPI of Beira Lake and Ihalagama Lake varied 1.856, and 0.357 respectively. Beira Lake falls into the highly polluted aquatic ecosystem category, while Ihalagama Lake indicates an excellent water quality suitable for aquatic life. The principal component analysis biplot reflects positive correlations between phosphate, nitrate and BOD and nitrate. This study concludes the ecological impacts of deteriorating water quality caused by sewage, municipal wastages and anthropogenic runoff leading to uncontrolled eutrophication. This study proposes continuous monitoring of water quality parameters and regulatory measures to prevent pollutant emissions.

Keywords: *Beira lake, Central Environmental Authority, Ihalagama lake, Water pollution index*

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