Effectiveness of Lake Remediation towards Water Quality: Application in Varsity Lake, University of Malaya, Kuala Lumpur

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ABSTRACT

Surface water quality monitoring is an important tool for enhancing the water body management system. This study focuses on the water quality of a lake based on rehabilitation work completed in 2014. This lake suffers from eutrophication and water quality degradation due to the increase in pollution rates and water source scarcity. Nine points were selected to represent the water quality status for the study area. Two river tributaries that pass through the University Malaya (UM) campus have been considered due of its potential as a water source for the lake. Field and laboratory analysis were conducted to understand the transport of water quality parameters. The data variations were analyzed using a multivariate statistical method to determine the significant differences between the lake and river. Based on the Malaysian Water Quality Index (WQI) and cluster analysis, the results indicated that the lake and river have different physico-chemical characteristics and the lake water has a better quality than the river. Comparison of the concentration for BOD, TSS, PO$_4^{3-}$ and NO$_3^-$ between year 2009 and current study proved that the water quality has improved by 99.8% proving that the lake remediation is effective.

Keywords: Eutrophication; lake water; physico-chemical; remediation; water quality

INTRODUCTION

It is crucial to measure the water quality in terms of physical, chemical and biological parameters (Sargaonkar & Deshpande 2003). There is an abundance of studies worldwide that are related to the physico-chemical characteristics of freshwater (Hu et al. 2008; Lermontov et al. 2009; Rajendran & Mansiya 2015; Sharma et al. 2015; Sun et al. 2016; Wong & Hu 2013). In Malaysia, the lake and river water systems are treated as a source of freshwater. The study of the lake and river are important because it is an interactive component of watersheds and the physico-chemical conditions of these ecosystems reflect the land use patterns and physical characteristics of the landscapes in which they are embedded (Morrice et al. 2008; Udo 2007).

Lakes are subjected to additional influences from human activities associated with water regulation, diversion and consumption (Gao et al. 2011). Due to continuous accumulation of pollutants in lakes, primarily from surface run-off and excessive fish feeding, the nutrient level of pond water will gradually increase. As a result, the lake usually suffers from eutrophication and certain amounts of those nutrients will even cause algal blooms (Orderud & Vogt 2013). Eutrophication of surface water bodies is a worldwide phenomenon (Izmest’eva et al. 2016), creating difficult challenges to all involved in water management and imposing severe environmental costs (Pretty et al. 2003) due to water quality deterioration (Prepas & Charette 2005; Smith et al. 2006, 1999). A multidisciplinary approach is required to deal with this problem. Numerous approaches