Assessment on Water Quality and Trace Metal Concentrations of an Urban Lake in Kuching Reservoir Park

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ABSTRACT

A study of the water quality and trace metal concentrations of an urban lake in Kuching Reservoir Park (or known as *Taman Budaya*) was conducted for three months, from October 2014 to December 2014. Four sampling stations were selected to represent the open water body in the lake. A total of 16 water quality parameters and 5 trace metals were measured and compared as stipulated in the Malaysian Department of Environment - Water Quality Index (DOE-WQI). In addition, classification according to the Interim National Water Quality Standard (INWQS) was applied. With respect to INWQS, the mean values of physical and chemical variables were temperature: 29.76±0.29 ^{o}C; pH: 7.69±0.22; dissolved oxygen (DO): 5.07±0.39 mg/L; total suspended solids (TSS): 204±167.68 mg/L; total dissolved solids (TDS): 84.78±7.47 mg/L; turbidity: 53.8±12.10 NTU; biological oxygen demand (BOD): 1.13 ±0.20 mg/L; chemical oxygen demand (COD): 21.5±0.20 mg/L; nitrite: 0.09±0.02 mg/L; nitrate: 1.0 ±0.28 mg/L; and ammoniacal-nitrogen (AN): 0.05±0.02 mg/L were within the normal range of Class IIB for recreational purposes with an exception of concentration in the lake. Whereas trace metals concentrations were in decreasing order: zinc>manganese>lead>chromium>arsenic. Results showed that based on Malaysian WQI, the lake water status in Kuching Reservoir Park is classified as Class III with the mean value of 65.30, which is considered as moderate water quality. Recommended best management practices (BMPs) are phosphorus removal by using alum as the chemical precipitant, lake flushing and aeration by the adaptation of floating fountain. Three aspects of lake management involving the public's participation and awareness, institutional cooperation between DBKU as the main authority and research institutions as well as better enforcement by the legislative were crucially emphasized.

Key words: Urban lake, Kuching Reservoir Park, Water Quality Index, trace metals concentration, best management practices.

Kajian Kualiti Air dan Logam Berat di Tasik Bandar, Taman Budaya Sarawak

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Abstrak

Satu kajian tentang kualiti air dan logam berat bagi satu tasik bandar di Taman Budaya telah dijalankan selama tiga bulan, iaitu dari Oktober 2014 hingga Disember 2014. Empat stesen pensampelan telah dipilih bagi mewakili kawasan air terbuka di tasik tersebut. Sejumlah 16 perimeter kualiti air dan 5 logam berat dipilih dan Indeks Kualiti Air (IKA) diambil dan diklasifikasikan berdasarkan Piawai Interim Kualiti Air Kebangsaan (INWQS). Berpandukan piawai pada INWQS,nilai purata perimeter kualiti air bagi pembolehubah-pembolehubah fizikal dan kimia seperti suhu: 29.8±0.29 ^{o}C; pH:7.69±0.22; oksigen terlarut (DO): 5.07±0.39 mg/L: TSS: 204±167.68 mg/L; TDS: 84.78±7.47 mg/L; NTU: 53.8±12.10; BOD: 1.13±0.20 mg/L; COD: 21.5±0.20 mg/L; nitrit: 0.09 ±0.02 mg/L; nitrat: 1.0 ±0.28 mg/L; ammoniakal nitrogen: 0.05±0.02 mg/L adalah dalam julat normal dengan kecuali tahap kepekatan fosforus di tasik itu. Manakala tahap logam berat dalam keadaan turutan menurun iaitu: zink> mangan>plumbum>kromium>arsenik. Berlandaskan piawai IKA Malaysia, status air tasik di Taman Budaya Sarawak diklassifikasikan sebagai Kelas III, iaitu dianggap sebagai kualiti air yang memuaskan . Antara langkah pemuliharaan tasik yang dicadangkan ialah penyingkiran fosforus dengan menggunakan alum sebagai agen pemendakan kimia, proses pengepaman tasik serta pengudaraan dengan menggunakan penyesuaian air pancutan. Tiga aspek pengurusan tasik iaitu penglibatan dan kadar kesedaran orang awam mengenai kepentingan tasik bandar, kerjasama institusipengajian tinggi dan badan kerajaan iaitu DBKU sebagai pihak pengurusan dan institusi penyelidikan serta penguatkuasaan undang-undang yang teratur dan terancang amatlah ditekankan.

***Kata kunci**: Tasik bandar, Taman Budaya Sarawak, kualiti air, pemuliharaan tasik.*