Impact of Land Use on Water Quality of Sungai Kenyana and Its Tributaries, Mukah, Sarawak

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ABSTRACT

A study was conducted in Sg. Kenyana and its tributaries, Mukah, Sarawak, a peat swamp river in order to determine the impact of land use on water quality in the river. This area has a great potential for eco-tourism and it also plays important roles as natural habitat for Asian Arowana. However, the influence of big scale oil palm plantation which also includes huge area of land clearing activities has change the natural condition of the river. *In-situ* data and water samples were collected at six sampling stations from 15th until 18th March 2013. *In-situ* data included pH, temperature, Dissolved Oxygen (DO) and turbidity. Analysis for Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), ammoniacal nitrogen (NH_3-N), nitrate (NO_3-N), orthophosphate (PO_4^{3-}), Total Coliform Counts (TCC) and Faecal Coliform Counts (FCC) were conducted in the laboratory. The range values of water quality parameters obtained are as follows: pH (4.36 – 5.87), temperature (28.13 – 28.57 °C), turbidity (35.8 – 95.0 NTU), Do (0.08 – 4.32 mg/L), COD (40.5 – 70.4 mg/L), BOD (1.21 – 1.90 mg/L), TSS (24.23 – 56.44 mg/L), ammoniacal nitrogen (0.490 – 1.261 mg/L), nitrate (0.1 – 0.2 mg/L), orthophosphate (0.036 – 0.105 mg/L), TCC (1,028 – 2,750 count/100 mL) and FCC (333 – 1,111 count/100 mL). Overall, the results show that the physical-chemical parameters of water in Sg. Kenyana were in normal range (Class I and II) except for DO, ammoniacal nitrogen, FCC and turbidity (Class III – moderate) and COD and pH (Class IV – bad). However, the low values of pH and DO are normal for peat water (black water). The Water Quality Index (WQI) was calculated to determine the state of water quality in Sg. Kenyana. Based on WQI, Sg. Liwak was categorised under Class IV while Sg. Kenyana and Btg. Mukah were categorised under Class III. Out of six physicochemical parameters of water in Sg. Kenyana that are required for WQI calculation, four of them were in Class III and IV (pH, DO, COD, and ammoniacal nitrogen) while the other two were in Class I and II (BOD and TSS).

Keywords: water quality parameters, land use, Water Quality Index (WQI), peat swamp river.

ABSTRAK

Satu penyelidikan telah dijalankan di Sg. Kenyana dan anak-anak sungainya di Mukah, Sarawak, yang merupakan sungai paya gambut untuk menentukan kesan penggunaan tanah ke atas kualiti air di sungai tersebut. Kawasan ini mempunyai potensi yang tinggi untuk dijadikan sebagai eko-pelancongan dan ia juga memainkan peranan yang penting sebagai habitat semulajadi bagi ikan Arowana. Data in-situ *dan sampel air telah diambil di enam stesen persampelan dari 15 hingga 18 Mac 2013. Data* in-situ *adalah termasuk pH, suhu, oksigen terlarut (DO), dan kekeruhan. Analisis untuk permintaan oksigen kimia (COD), permintaan oksigen biologi (BOD), jumlah pepejal terampai (TSS), ammoniakal nitrogen (NH_3-N), nitrat (NO_3-N), ortofosfat (PO_4^{3-}), jumlah kiraan koliform (TCC) dan kiraan koliform fekal (FCC) akan dilakukan di makmal. Nilai-nilai julat untuk parameter kualiti air adalah seperti berikut: pH (4.36 – 5.87), suhu (28.13 – 28.57 °C), kekeruhan (35.8 – 95.0 NTU), DO (0.08 – 4.32 mg/L), COD (40.5 – 70.4 mg/L), BOD (1.21 – 1.90 mg/L), TSS (24.23 – 56.44 mg/L), ammoniakal nitrogen (0.490 – 1.261 mg/L), nitrat (0.1 – 0.2 mg/L), ortofosfat (0.036 – 0.105 mg/L), TCC (1,028 – 2,750 koloni/100 mL) dan FCC (333 – 1,111 koloni/100 mL). Secara keseluruhan, keputusan tersebut menunjukkan parameter fizikokimia bagi air di Sg. Kenyana berada dalam lingkungan normal (Kelas I dan II) kecuali DO, ammoniakal nitrogen, FCC dan kekeruhan (Kelas III - sederhana) dan COD dan pH (Kelas IV - teruk). Walau bagaimanapun, nilai pH dan DO yang rendah adalah normal bagi air tanah gambut (air hitam). Indeks Kualiti Air (WQI) yang telah dikira untuk menentukan kualiti air di Sg. Kenyana. Berdasarkan kepada WQI, Sg. Liwak dikategorikan di bawah Kelas IV manakala Sg. Kenyana dan Btg. Mukah dikategorikan di bawah Kelas III. Empat daripada enam parameter fizikokimia yang diperlukan untuk menentukan WQI di Sg.Kenyana berada di Kelas III dan IV (pH, DO, COD, dan ammoniakal nitrogen) manakala dua lagi berada di bawah Kelas I dan II (BOD dan TSS).*

Kata Kunci: parameter kualiti air, kegunaan tanah, Indeks Kualiti Air (WQI), sungai paya gambut.