ABSTRACT

Tasek Bera, located in southwest of Pahang state, is Malaysia's largest freshwater swamp and lake system. It is one of the remaining examples of a lowland alluvial riparian swamp system. Tasek Bera was designated as Malaysia's first "Wetlands of International Importance" under the Ramsar Convention in November 1994. The water quality of Tasek Bera was monitored from April to October 1998 to assess environmental conditions affecting phytoplankton assemblages. Measurement of physical and chemical parameters at selected sites ranged as follows : pH (4.45 to 6.73), temperature (25.3 to 33.3 °C), dissolved oxygen (0.40 to 5.80 mgL^{-1}), water depth (0.15 to 5.40 m), Secchi depth (0.14 to 2.19 m), conductivity (11.20 to 129.60 $\mu S.cm^{-1}$), dissolved orthophosphate (0.0000 to 0.0095 mgL^{-1}), nitrate (0.000 to 5.600 mgL^{-1}) and ammoniacal-N (0.000 to 2.9132 mgL^{-1}). In general, most of the sites are relatively undisturbed. However, nitrate, ammoniacal-N, conductivity and turbidity were quite high at some of the sites.

A total of 326 species of phytoplankton, including 42 unidentified species, were found in the study. This consisted of 150 species of Chlorophyta, 90 species of Chrysophyta, 36 species of Euglenophyta, three species of Pyrrhophyta, three species of Xanthophyta and two species of Cyanophyta. Chlorophyll-a concentration ranged from 0.000 to 7.3437 mgm^{-3} while primary productivity was measured at a maximum of 0.8573 $mgO_2^{-1}l^{-1}hour^{-1}$. Cell counts ranged from 1.34 to 400.275 $cells.L^{-1}$.

In the two-way analysis of variance, primary productivity and transparency were significantly different among sampling stations. Chlorophyll-a levels, Shannon-Weiner Diversity Index (H') values, Margalef's Species Index (d) values, Species Evenness (J) values, phytoplankton cell counts, conductivity and pH were significantly different among sampling occasions. Multiple regression analysis showed that pH and nitrate contributed significantly to chlorophyll-a concentration. Conductivity contributed significantly to Shannon-Weiner Diversity Index (H') values, Margalef's Species Index (d) values, Species Evenness (J) values and phytoplankton cell counts. Water depth, transparency and temperature contributed significantly to primary productivity. Cluster analysis was used to segregate sampling stations based on biotic parameters as well as environmental parameters.

Pollutant-tolerant species identified were *Trachelomonas* sp., *Gomphonema parvulum, Navicula* sp., *Peridinium* sp. and *Euglena acus*. This research looks into the feasibility of using phytoplankton assemblages as indicators of environmental change due to anthropogenic effects, particularly of agricultural activities.

ABSTRAK

Tasek Bera, yang terletak di barat-daya negeri Pahang, merupakan paya air tawar serta sistem tasik yang terbesar di Malaysia. Ia merupakan satu-satunya daripada contoh paya riparian aluvial tanah rendah yang tinggal. Tasek Bera diisytiharkan sebagai tanah lembab berkepentingan antarabangsa yang pertama di Malaysia di bawah Konvensyen Ramsar dalam November 1994. Kualiti air Tasek Bera dikaji dari April hingga Oktober 1998 untuk menilai bagaimana komposisi fitoplankton dipengaruhi oleh keadaan persekitaran.

Ukuran bagi parameter fizikal dan kimia di stesyen-stesyen tertentu adalah seperti berikut : pH (4.45 to 6.73), suhu (25.3 to 33.3 °C), oksigen terlarut (0.40 to 5.80 mgL^{-1}), kedalaman air (0.15 to 5.40 m), kedalaman Secchi (0.14 to 2.19 m), konduktiviti (11.20 to 129.60 $\mu S.cm^{-1}$), ortofosfat terlarut (0.0000 to 0.0095 mgL^{-1}), nitrat (0.000 to 5.600 mgL^{-1}) dan ammoniakal-N (0.000 to 2.9132 mgL^{-1}). Pada amnya, kebanyakan stesyen kurang mengalami gangguan secara relatif. Namun, nitrat, ammoniakal-N, konduktiviti dan tubiditi di sesetengah stesyen didapati agak tinggi.

Sebanyak 326 spesies phytoplankton, termasuk 42 spesies yang tidak dikenalpasti telah dijumpai dalam kajian ini. Ia merangkumi 150 spesies Chlorophyta, 90 spesies Chrysophyta, 36 spesies Euglenophyta, tiga spesies Pyrrhophyta, tiga spesies Xanthophyta serta dua spesies Cyanophyta. Kepekatan klorofil-a berjulat antara 0.000 hingga 7.3437 mgm^{-3} manakala produktiviti primer mempunyai nilai maksimum 0.8573 $mgO_2^{-1}l^{-1}jam^{-1}$. Kiraan sel fitoplankton berjulat antara 1.34 hingga 400.275 $sel.L^{-1}$.

Dalam ujian ANOVA dua hala, produktiviti primer dan ketelusan air didapati berbeza secara signifikan di kalangan stesyen-stesyen. Kepekatan klorofil-a, nilai Indeks Diversiti Shannon-Weiner (H'), nilai Indeks Spesies Margalef (d), nilai Indeks Kesamarataan Spesies (J), kiraan sel fitoplankton, konduktiviti dan pH didapati berbeza secara signifikan di antara masa penyampelan. Analisis `multiple regression' menunjukkan bahawa pH serta nitrat menyumbang secara signifikan terhadap kepekatan klorofil-a. Konduktiviti menyumbang secara signifikan terhadap nilai Indeks Diversiti Shannon-Weiner (H'), nilai Indeks Species Margalef (d), nilai Indeks Kesamarataan Spesies (J) serta kiraan sel fitoplankton. Kedalaman air, ketelusan air serta suhu menyumbang secara signifikan terhadap produktiviti primer. Analisis kluster digunakan untuk mengasingkan stesyen penyampelan berdasarkan parameter biotic dan persekitaran.

Spesies toleran terhadap pencemaran yang telah dikenalpasti termasuklah *Trachelomonas* sp., *Gomphonema parvulum*, *Navicula* sp., *Peridinium* sp. and *Euglena acus*. Kajian untuk menilai kesesuaian menggunakan komposisi fitoplankton sebagai penunjuk kepada perubahan dalam keadaan persekitaran akibat kesan antropogenik, terutamanya aktiviti pertanian.