STUDIES ON THE PHYTOPLANKTON IN THE LOWER BISA AREA OF PUTRAJAYA LAKE, PUTRAJAYA

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ABSTRACT

Putrajaya Lake is one of the most well planned lakes located within the Federal Territory of Putrajaya. Water quality monitoring was conducted from December 2000 to March 2001 to assess the physical and chemical parameters, and biotic variables. Temperature (27.6 to 31.7 °C), pH (6.03 to 7.90), conductivity (68.5 to 102.5 $\mu S\ cm^{-1}$), dissolved oxygen (5.0 to 6.8 mg L^{-1}), secchi depth (0.10 to 1.20 m), dissolved orthophosphate (0.0006 to 0.0077 mg L^{-1}), ammoniacal nitrogen (0.0015 to 0.0923 mg L^{-1}) and silica (3.18 to 9.28 mg L^{-1}); and chlorophyll-a (0.0004 to 0.0039 $\mu g\ L^{-1}$), cell density (4490 to 69880 cells L^{-1}), species richness (0.631 to 1.386) and Shannon-Wiener's diversity index (0.478 to 2.014) were measured at the Lower Bisa area of Putrajaya Lake. A total of 27 species of phytoplankton (15 species of Chlorophyta, 11 species of Chrysophyta and one species of Pyrrhophyta) were found in the area.

In two-way ANOVA analysis, conductivity, chlorophyll-a and cell density were significantly different on spatial and temporal factors. Silica, secchi depth and species richness were significantly different in spatial factor but temperature, pH, dissolved oxygen, dissolved orthophosphate, ammoniacal nitrogen, and Shannon-Wiener's Index were significantly different in temporal factor.

Multiple regression analysis showed that Shannon-Wiener's Index was influenced by conductivity, cell density was influenced by secchi depth and silica, and species richness affected by silica concentration. Cluster analysis was used to isolate groups of sampling stations based on environmental parameters, biotic variables and species composition.

ABSTRAK

Tasik Putrajaya merupakan salah satu tasik yang paling terancang yang terletak di kawasan Wilayah Persekutuan Putrajaya. Pemonitoran kualiti air dijalankan dari Disember 2000 hingga Mac 2001 untuk menilai parameter fizikal and kimia serta biotik. Suhu (27.6 hingga 31.7 °C), pH (6.03 hingga 7.90), konduktiviti (68.5 hingga 102.5 μS cm^{-1}), oksigen terlarut (5.0 hingga 6.8 mg L^{-1}), kedalaman secchi (0.10 hingga 1.20 m), ortofosfat terlarut (0.0006 hingga 0.0077 mg L^{-1}), ammoniakal nitrogen (0.0015 hingga 0.0923 mg L^{-1}), silika (3.18 hingga 9.28 mg L^{-1}); dan klorofil-a (0.0004 hingga 0.0039 μg L^{-1}), ketumpatan sel (4490 hingga 69880 cells L^{-1}), kekayaan spesies (0.631 hingga 1.386) dan indeks ketumpatan Shannon-Weiner (0.478 hingga 2.014) yang terletak di kawasan bawah Tasik Bisa Putrajaya. Sejumlah 27 spesies fitoplankton (15 spesies Chlorophyta, 11 spesies Chrysophyta dan satu spesies Pyrrhophyta) terjumpa di kawasan ini.

Bagi ujian ANOVA dua-hala, konduktiviti, klorofil-a dan ketumpatan sel menunjukkan perbezaan yang ketara terutamanya terhadap faktor kawasan dan faktor masa. Silika, kedalaman secchi dan kekayaan spesies menunjukkan perbezaan yang ketara terutamanya dari segi faktor kawasan tetapi suhu, pH, oksigen terlarut, ortofosfat terlarut, ammoniakal nitrogen dan indeks Shannon-Weiner menunjukkan perbezaan yang ketara dari segi faktor masa.

Analisis `Multiple regression' menunjukkan indeks Shannon-Weiner dipengaruhi oleh konduktiviti, ketumpatan sel dipengaruhi oleh kedalaman secchi dan silika serta kekayaan spesies dipengaruhi oleh kepekatan silika. Analisis `Cluster' digunakan untuk mengasingkan stesen pensampelan berdasarkan parameter persekitaran, biotik dan komposisi spesies.

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ABBREVIATIONS

APHA - American Public Health Association

ANOVA - Analysis of variance

CO_2 - Carbon dioxide

FWS - Free water surface

MARDI - Malaysia Agriculture Research and Development Institute

NH_3-N - Ammoniacal nitrogen

OEDE - Organisation for Economic Co-operation and Development

O-PO_4 - Orthophosphate

SF - Subsurface flow

TNB - Tenaga Nasional Berhad

UPM - Universiti Putra Malaysia

UPGMA - Unweighted Pair Group Mehod Average

UV - Ultra violet

SYMBOLS AND UNITS

°C - degree Celsius

cells L^{-1} - cells per litre

d - Margalef's Species Index

H' - Shannon-Weiner Diversity Index

μg - microgram

mg - miligram

nm - nanometre

mm - milimetre

L - litre

mgL^{-1} - miligram per litre

μ S cm^{-1} - micro Siemens per centimetre

OD_{630} - optical density at 630nm

OD_{645} - optical density at 645nm

OD_{665} - optical density at 665nm