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

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Dissertation submitted to the Institute of Postgraduate Studies,
University of Malaya, Kuala Lumpur,
in partial fulfilment of the requirements for the
Degree of Master of Technology (Environmental Management)

INSTITUTE OF POSTGRADUATE STUDIES
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KUALA LUMPUR

2003



A511766815

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 $\mu\text{S cm}^{-1}$), 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 $\mu\text{g L}^{-1}$), 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 $102.5 \mu\text{S cm}^{-1}$), 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 $0.0039 \mu\text{g L}^{-1}$), ketumpatan sel (4490 hingga $69880 \text{ cells L}^{-1}$), 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.

ACKNOWLEDGEMENTS

I wish to express my sincere gratefulness to my supervisor, Professor Dr. Phang Siew Moi for her guidance and encouragement. I would like to thank Dr. Chu Wan Loy for his advice and guidance in the identification of phytoplankton.

Special thanks to Putrajaya Corporation which approved my application on using the lower Bisa area of Putrajaya Lake as my sampling location for this study. Not to forget also En. Akashah bin Haji Majizat of Putrajaya Corporation who helped me to get written approval from the authority and provided the necessary information regarding the study area.

I thank Joanna Tang, Jillian Ooi, Melor Ismail, Wong Ching Lee and staff in the main and IPS library for their assistance and support; and to my colleagues at Kuala Kubu site office who have been very understanding during the preparation of this thesis.

I wish to dedicate this dissertation to my wife Poh Geok, children (Le Xin, Le Zhen and Ming Xian) and parents for their moral support rendered to me through out the whole project.

TABLE OF CONTENTS	Page
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	ix
LIST OF TABLES	xi
LIST OF APPENDICES	xi
ABBREVIATIONS	xii
SYMBOLS AND UNITS	xiii
1.0 INTRODUCTION	1
1.1 Objectives	2
2.0 LITERATURE REVIEW	4
2.1 Phytoplankton	4
2.1.1 Algae as environmental indicators	4
2.2 Factors that influence phytoplankton distribution	5
2.2.1 Natural factors	5
2.2.1.1 Climate	6
2.2.1.2 Geology and physiography of the catchment area	7
2.2.1.3 Hydrology	7
2.2.2 Anthropogenic factors	7

2.3	Freshwater phytoplankton distribution patterns	8
2.3.1	Vertical distribution	8
2.3.1.1	Non-motile, negatively buoyant algae	9
2.3.1.2	Positively buoyant algae	10
2.3.1.3	Neutral buoyant algae	10
2.3.2	Horizontal distribution	10
2.3.2.1	Small-scale patchiness	11
2.3.2.2	Large-scale patchiness	11
2.3.2.3	Advectional patchiness	11
2.3.3	Temporal variations in abundance and composition of phytoplankton	11
2.3.4	Periodicity and change in phytoplankton composition	12
2.3.4.1	Seasonal periodicity of phytoplankton	12
2.3.5	Longer-term floristic changes	13
2.3.6	Seasonal succession	14
2.3.7	Grazing	16
2.4	Features of a lake controlling the production of phytoplankton	17
2.4.1	Thermal stratification and temperature	17
2.4.2	Light	17
2.5	Photosynthetic activity of phytoplankton	19
2.5.1	Light-limited photosynthesis	19
2.5.2	Light-saturated photosynthesis	19
2.5.3	Light-inhibited photosynthesis	19

2.5.4	The effects of temperature	20
2.5.5	The effect of carbon supply	20
2.6	Nutrient requirements	21
2.6.1	Nutrient uptake	21
2.6.2	Phosphorus availability	22
2.6.3	Nitrogen availability	23
2.6.4	Silicon availability	24
2.6.5	Other nutrients	24
2.7	Eutrophication	25
2.7.1	Natural eutrophication	27
2.8	Wetlands	27
2.9	Putrajaya wetlands and lake	29
2.9.1	Water quality	31
2.10	Studies of phytoplankton in the lakes	32
2.10.1	Tasek Bera	32
2.11	Putrajaya lake management	33
2.11.1	Catchment management and monitoring	34
2.11.2	Wetlands management and monitoring	34
3.0	MATERIALS AND METHODS	36
3.1	Location of study area	36
3.2	Sampling occasions and period	36
3.2.1	Sampling procedure	41

3.3	Physical and chemical parameters	41
3.4	Phytoplankton sampling	42
3.5	Laboratory analysis	42
3.5.1	Chlorophyll-a analysis	42
3.5.2	Chemical analysis	43
3.5.2.1	Dissolved orthophosphate	43
3.5.2.2	Ammonia	44
3.5.2.3	Silica as SiO ₂	45
3.5.3	Identification and quantification of phytoplankton	46
3.5.3.1	Microscope calibration	46
3.5.3.2	Phytoplankton counting techniques	46
3.6	Data Analysis	47
3.6.1	Shannon-Weiner Diversity Index	47
3.6.2	Margalef's Species Index	48
3.6.3	Sorensen's Coefficient	48
3.6.4	Frequency	48
3.6.5	Statistical Analysis	49
4.0	RESULTS	51
4.1	Field physical and chemical parameters	51
4.1.1	Temperature	51
4.1.2	pH	51
4.1.3	Conductivity	54

4.1.4	Dissolved oxygen	54
4.1.5	Secchi depth	54
4.1.6	Dissolved orthophosphate	58
4.1.7	Ammoniacal nitrogen	58
4.1.8	Silica	58
4.2	Biotic variables	62
4.2.1	Checklist of phytoplankton and abundance	62
4.2.2	Cell density	62
4.2.3	Species richness	74
4.2.4	Shannon-Wiener's Index	74
4.2.5	Chlorophyll-a	74
4.3	Frequency	78
4.4	Two-way ANOVA	78
4.5	Multiple regression	78
4.6	Cluster analysis	79
5.0	DISCUSSION	83
5.1	Field physical and chemical parameters	83
5.2	Biotic variables	85
5.3	Effect of environmental parameters on biotic variables	88
5.4	General discussion	88
6.0	CONCLUSION	89
REFERENCES		90
APPENDICES		97

LIST OF FIGURES

	Page	
Figure 1	Location of study area within the Federal Territory of Putrajaya	3
Figure 2	Location of sampling stations	37
Figure 3	Water sampling site at station I	38
Figure 4	Water sampling site at station II	38
Figure 5	Water sampling site at station III	39
Figure 6	Water sampling site at station IV	39
Figure 7	Water sampling site at station V	40
Figure 8	Temperature for each station	52
Figure 9	Mean values of temperature for each station	52
Figure 10	pH for each station	53
Figure 11	Mean values of pH for each station	53
Figure 12	Conductivity for each station	55
Figure 13	Mean values of conductivity for each station	55
Figure 14	Dissolved oxygen for each station	56
Figure 15	Mean values of dissolved oxygen for each station	56
Figure 16	Secchi depth for each station	57
Figure 17	Mean values of secchi depth for each station	57
Figure 18	Dissolved orthophosphate for each station	59
Figure 19	Mean values of dissolved orthophosphate for each station	59
Figure 20	Ammoniacal nitrogen for each station	60
Figure 21	Mean values of ammoniacal nitrogen for each station	60
Figure 22	SiO ₂ for each station	61

Figure 23	Mean values of SiO ₂ for each station	61
Figure 24	<i>Trachelomonas</i> sp.	65
Figure 25	<i>Uronema confervicolum</i>	65
Figure 26	<i>Scenedesmus bijuga</i>	66
Figure 27	<i>Ankistrodesmus falcatus</i>	66
Figure 28	<i>Ceratium hirundinella</i>	67
Figure 29	<i>Dinobryon sertularia</i>	67
Figure 30	Cell density for each station	73
Figure 31	Mean values of cell density for each station	73
Figure 32	Species richness for each station	75
Figure 33	Mean values of species richness for each station	75
Figure 34	Shannon-Wiener's Index for each station	76
Figure 35	Mean values of Shannon-Wiener's Index for each station	76
Figure 36	Chlorophyll-a for each station	77
Figure 37	Mean values of chlorophyll-a for each station	77
Figure 38	Cluster analysis based on average environmental variables	81
Figure 39	Cluster analysis based on average biotic variables	81
Figure 40	Cluster analysis based on phytoplankton species composition	82

LIST OF TABLES		Page
Table 1	Baseline water quality parameters of Sg. Bisa Catchment Area	32
Table 2	Description of water sampling stations	36
Table 3	List of phytoplankton at station I to V	63
Table 4	Phytoplankton abundance (cells L ⁻¹) at station I	68
Table 5	Phytoplankton abundance (cells L ⁻¹) at station II	69
Table 6	Phytoplankton abundance (cells L ⁻¹) at station III	70
Table 7	Phytoplankton abundance (cells L ⁻¹) at station IV	71
Table 8	Phytoplankton abundance (cells L ⁻¹) at station V	72
Table 9	Results of multiple regression analysis	80

LIST OF APPENDICES		Page
Appendix 1	Physico-chemical water quality data	97
Appendix 2	Biotic variables	98
Appendix 3	Two-way ANOVA results	99

ABBREVIATIONS

APHA - American Public Health Association

ANOVA - Analysis of variance

CO₂ - Carbon dioxide

FWS - Free water surface

MARDI - Malaysia Agriculture Research and Development Institute

NH₃-N - Ammoniacal nitrogen

OEDE - Organisation for Economic Co-operation and Development

O-PO₄ - Orthophosphate

SF - Subsurface flow

TNB - Tenaga Nasional Berhad

UPM - Universiti Putra Malaysia

UPGMA - Unweighted Pair Group Method Average

UV - Ultra violet

SYMBOLS AND UNITS

$^{\circ}\text{C}$ - 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

$\mu\text{ S cm}^{-1}$ - micro Siemens per centimetre

OD₆₃₀ - optical density at 630nm

OD₆₄₅ - optical density at 645nm

OD₆₆₅ - optical density at 665nm