UNIVERSITI PUTRA MALAYSIA

THE EFFECTS OF CLIMATIC VARIATIONS ON PEAT SWAMP FOREST CONDITION AND PEAT COMBUSTIBILITY

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Doctor of Philosophy

April 2002

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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A study on the effects of climatic variations on peat swamp forest condition and peat combustibility was conducted in peat swamp forest of Sungai Karang Forest Reserve, Tanjong Karang, Selangor, Malaysia. The objectives of the study were to determine: 1). Climatic variations in the study area, 2). The effects of climatic variations on peat swamp forest condition; 3). Peat combustibility and its influencing factors, and 4). The effects of forest fire on peat swamp forest condition.

The study was conducted in compartment 127 during two periods, namely: October 1999 to January 2000 and May 2000 to October 2000, while, the study on forest fire effects was conducted in compartment 132 from October 1999 to January 2000.

Climatic water balance, drought occurrences analysis and drought index using Keetch-Byram Drought Index (KBDI) were used to describe climatic variations. Investigation on peat swamp forest condition included peat characteristics such as moisture content, pH, organic content, ash content. calcium, potassium, magnesium, sodium and water level. Heat content and combustion rate were measured to determine peat combustibility. All data obtained were analysed statistically by using multivariate cluster analysis, univariate and multiple regression.

The study defined dry season and wet season as a period when monthly rainfall is similar or less than 125 mm and more than 125 mm respectively. The area has two drought periods, namely: January, February, and March as the first period and May to August as the second period. Statistically, the season affected moisture content, bulk density, potassium, magnesium, sodium and water level. By using weekly rainfall prediction, the critical peat moisture content to fire is 355 %.

The high stages of KBDI in 1999/2000 were observed twice, namely on 25 and 26 April 2000. KBDI can be used in predicting moisture content and water level in the study area.

Based on the area burned, burning depth and ash color, forest fire occurred on 9 August 1999 was a light intensity fire. The fire, however, caused the decreasing of hydraulic conductivity and magnesium and the increasing of potassium and sodium.

Abstrak tesis yang dikemukakan kepada senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN VARIASI IKLIM TERHADAP KEADAAN HUTAN GAMBUT DAN KETERBAKARAN GAMBUT

Oleh

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Suatu kajian mengenai kesan variasi iklim terhadap keadaan hutan gambut dan keterbakaran gambut telah dijalankan di kawasan hutan gambut Hutan Simpan Sungai Karang, Tanjong Karang, Selangor, Malaysia. Tujuan kajian ini ialah untuk menentukan: 1). Variasi iklim di kawasan kajian, 2). Kesan variasi iklim terhadap keadaan hutan gambut; 3). Keterbakaran gambut dan faktor-faktor yang mempengaruhi, dan 4). Kesan kebakaran hutan terhadap keadaan hutan gambut.

Kajian ini dijalankan di kompatmen 127 dalam dua jangka masa, iaitu: Oktober 1999 sampai dengan Januari 2000 dan Mei 2000 sampai dengan Oktober 2000. Manakala, kajian mengenai kesan kebakaran hutan dijalankan di kompatmen 132 dari Oktober 1999 sampai dengan Januari 2000.

Variasi iklim menggambarkan keseimbangan air iklim, kejadian kemarau dan indeks kemarau dengan menggunakan Keetch-Byram Drought Index (KBDI). Keadaan hutan gambut meliputi kandungan lembapan, keasidan tanah (pH), ketumpatan pukal, keberkonduksian hidraulik, kandungan bahan organik, kandungan abu, kandungan kalsium, potassium, magnesium, sodium dan aras muka air. Kandungan haba dan kelajuan pembakaran diukur untuk menentukan keterbakaran gambut. Semua data dianalisis secara statistik dengan menggunakan analisis kluster multivariat, univariat dan regresi berganda.

Kajian ini memperolehi musim kering dan musim tengkujuh masing-masing sebagai suatu jangka masa ketika hujan bulanan sama dengan atau kurang daripada 125 mm dan lebih daripada 125 mm. Kawasan kajian mempunyai dua jangka masa kering, iaitu: Januari, Februari dan Mac sebagai jangka masa yang pertama dan Mei sehingga Ogos sebagai jangka masa yang kedua. Secara statistik, musim memberi kesan terhadap kandungan lembapan, ketumpatan pukal, potassium, magnesium, sodium dan aras muka air. Dengan menggunakan penafsiran hujan mingguan, kandungan lembapan gambut yang kritikal terhadap kebakaran hutan ialah 355 %.

Tahap yang tinggi dari KBDI pada 1999/2000 telah diperolehi sebanyak dua kali, iaitu pada 25 dan 26 April 2000. KBDI boleh digunakan untuk menafsirkan kandungan lembapan dan aras muka air di dalam kawasan kajian.

Berdasarkan luas kawasan terbakar, kedalaman kebakaran dan warna abu, kebakaran hutan yang berlaku pada 9 Ogos 1999 adalah kebakaran hutan yang ringan. Kebakaran itu, bagaimanapun, boleh menurunkan keberkonduksian hidraulik dan magnesium dan mempertingkatkan potassium dan sodium.

ACKNOWLEDGEMENTS

Praise be to Allah The Almighty for His blessing, which enable me to come this far. I wish to sincerely appreciate the endless advise, encouragement, kindness and patience of my major supervisor, Dr. Ahmad Ainuddin Nuruddin. I am deeply indebted to him for critical reading of this dissertation. I would like to express my sincere gratitude to my supervisory committee members, Dr. Jamaluddin Basharuddin, Assoc. Prof. Dr. Lai Food See and Assoc. Prof. Dr. Mohd Rashid Mohd Yusof for their suggestions, interest, encouragement and support. Sincere appreciation is extended to Prof. Dr. Johann G. Goldammer of Fire Ecology Research Group Freiburg University, Germany as the independent examiner for his critical reading, invaluable comments and suggestions and to Dr. Mohd. Azani Alias of Faculty of Forestry Universiti Putra Malaysia for being the chairman of my viva.

Sincere appreciation is due to State Forestry Department of Selangor for its permission to conduct the study in Sungai Karang Forest Reserve, Tanjong Karang, Selangor, Malaysia; Malaysian Meteorological Service for providing climatological data; Malaysian Agriculture Research and Development Institute of Tanjong Karang for providing additional climatological data and Forestry Department Head Quarters of Peninsular Malaysia for its permission to use Sungai Karang GIS Map.

I wish to acknowledge for invaluable assistances of Mr. Mohd. Yusoff Yaacob, Mr. Mahamud Jusoh, Mr. Hadriman Khair and Mr. Abu Bakar in the field

works; Mr. Agus Sutejo for constructing the combustion test box; Mr. Achmad Fauzi Isa, Mr. Win Myint, Mr. Kholis Abdurrachim Audah, Miss Azmar Hana Elliany Azhar and Mr. Mohd Saidy Mohd Yussof in the laboratory works and Miss Maiyastri in statistical analysis.

I also owe a depth of deep gratitude to Laboratory of Photogrammetry of Faculty of Forestry Universiti Putra Malaysia (UPM), Mr. Ismail Adnan Abdul Malek (Head) for providing me facilities and constant support, Laboratory of Soil Science and Laboratory of Wood Chemistry of Faculty of Forestry UPM and Department of Chemical Engineering of Universiti Malaya for their permissions to conduct laboratory works.

To Faculty of Forestry Bogor Agricultural University Indonesia, Prof. Dr. H. Yusuf Sudo Hadi, the Dean, for his support and encouragement, Prof. Dr. Sutrisno Hadi and Dr. H. M. Yahya Fakuara for their recommendation to pursue Ph.D program, Dr. Bambang Hero Saharjo, for providing me some literatures, encouragement and support, Mr. Istomo for peat lectures and literatures, Prof. Dr. H. Cecep Kusmana, Miss Erna Suzanna and all members of Laboratory Forest Influences for their encouragement and support, I remain grateful. I appreciate all members of Faculty of Forestry Universiti Putra Malaysia, Miss Fauziah Abu Bakar, Mrs. Salmah Salleh and Mrs. Saodah Yusof, for their invaluable helps and unforgettable friendship.

Further thanks go to all my friends in UPM, Indonesian Students Association (PPI) and International Students Association (UPMISA), Mr. And Mrs. Fredian Tony, Mr. And Mrs. Ageng S. Heriyanto, Dr. Anang Sudarna, Mr. Muhammad

Ajir Abdi Munif and family, Mr. Joko Prihatno, Mr. Iwan S., Dr. Maria Viva Rini, Mrs. Rifia Amalia, Mrs. Tengku Laila Kamaliah, Mrs. Endang Purwati, Miss Nor Farikhah Haneda, Miss Azilah Abdul Jalil, Mrs. Parichehr Hanachi, Miss Evelyn V. Bigcas, Miss Kiyoko Honjo, with special gratitude to Mrs. Harini Boekari Ajir for their invaluable helps, prayer and support. A number of people have been continuously very supportive to me. To all of those and the many more to whom I apologize for not naming here, I am very grateful.

Special thanks are due to Dr. Jason Greenlee for giving me a free subscription of International Journal of Wildland Fire for the period of 1998-2001, Prof. Dr. William H. Frandsen for providing me his publications on peat fire, Prof. Dr. Jörg Lunderstädt of Göttingen University Germany for his recommendation to pursue Ph.D program, and Dr. Edith C. Cedicol of SEARCA for her support and encouragement.

I am very thankful to SEAMEO SEARCA for its kind financial support that has allowed me to study and extend my scientific career in Malaysia, International Tropical Timber Organization for financial support in the final stage of my study and IRPA Project for partly financial support in the field and laboratory facilities.

Finally, I would like to dedicate this dissertation to my parents (H. Hamzah Zainuddin and Lilis Darazah), my sister (Anita Zaitunah) and my brothers (Ahmad Muflih, Rafiq Adnan, Edwin Solahuddin and Rusli Ridwan). Their endless prayer, love, patience and understanding have been a great source of encouragement to me and have been very supportive.

TABLE OF CONTENTS

		Page
ABSTRACT		ii
ABSTRAK		iv
ACKNOWLEDGEMENTS		vii
APPROVAL SHEETS		x
DECLARATION FORM		xii
LIST OF TABLES		xv
LIST OF FIGURES		xx
CHAPTER		
1	INTRODUCTION	1
	Background	1
	Justification	3
	Objectives	5
	Hypotheses	5
2	LITERATURE REVIEW	6
	An Overview of Peat lands and Peat Characteristics	6
	Peat lands	6
	Peat Characteristics	8
	Forest Fire : Behaviour and Effects	13
	Forest Fire Behaviour and Its Influencing Factors	14
	Effects of Forest Fire	29
	Peat Fire	33
	Drought Index and Fire Danger Rating	37
	Drought Index	37
	Fire Danger Rating	40
	Forest Fire Incidences in Malaysia	43
3	METHODOLOGY	45
	Description of Study Area	45
	Location	45
	Climatic Condition	49
	Peat Characteristics	54
	Vegetation Condition	59
	Duration of Study	61
	Peat Swamp Forest Condition	62
	Sampling Techniques	62
	Moisture Content	63
	pH	63
	Bulk Density	63

	Heat Content	64
	Ash and Organic Matter Content	64
	Inorganic Matter Content	65
	Hydraulic Conductivity	66
	Water level	67
	Peat Combustibility	67
	Combustion Test	68
	Climatic Variations	69
	Climatic Water Balance	69
	Drought Index	70
	Other Secondary Data	70
	Data Analyses	71
4	RESULTS AND DISCUSSIONS	73
	The Effects of Climatic Variations on Peat Swamp Forest Condition	73
	Climatic variations in the study area	73
	Drought Occurrences and Drought Index	82
	Peat Characteristics	93
	Water Level	127
	Discussions	130
	Peat Combustibility and Its Influencing Factors	136
	Heat Content	137
	Combustion Rate	140
	Discussions	145
	The Effects of Forest Fire on Peat Swamp Forest Condition	152
	Fire Occurrences in Sungai Karang Forest Reserve	152
	Peat Characteristics	155
	Water Level	186
	Discussions	188
	Important Findings Contributed by this Study	189
5	CONCLUSIONS AND RECOMMENDATIONS	193
	Conclusions	193
	Recommendations	195
	REFERENCES	196
	APPENDICES	214
	BIODATA OF AUTHOR	258

LIST OF TABLES

Table		Page
2.1	Distribution of peat lands in South East Asia (Maltby 1997)	6
2.2	Hydraulic conductivity classes	11
2.3	Peat characteristics in various sites	12
2.4	Mean moisture content, correlation coefficients and confidence intervals for duff and woody fuels in various timelag fuels from 20 Sierra Nevada conifer species (after van Wagtendonk and Sydoriak 1985)	16
2.5	Silica-free ash content of some shrubs and trees leaves (after Saharjo 1999)	18
2.6	Percentage of lightning caused fires in various countries	27
2.7	Forest fire effects on physical soil properties in various soil type	31
2.8	Forest fire effects on chemical soil properties in various soil type	32
2.9	The available fire danger rating system by countries	42
2.10	Forest fire incidences in Malaysia for period 1975 - 2000	43
3.1	Monthly mean climatic condition in Tanjong Karang, Selangor for period of 1968 - 1998	54
3.2	Independent t-test for peat characteristics in burned and unburned areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	56
3.3	Morphological features of peat soil in burned and unburned areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	58
3.4	Relative Density, Relative Frequency, Relative Dominancy and Important Value Index of some species in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	61
3.5	Mean possible duration of sunlight in the study area expressed in units of 30 days of 12 hours each	69
4.1	Climatic normals for Tanjong Karang, Selangor	74

4.2	Classification of drought occurrences (Chanda and Dhar 1972)	83
4.3	Drought occurrences by year and month for Tanjong Karang, Selangor	84
4.4	The long-term (1968-1998) climatic water balance (millimeters) for Tanjong Karang, Selangor	86
4.5	Mean moisture content in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	94
4.6	Analysis of variance for moisture content with season, plot and peat layers as independent variables	96
4.7	Climate condition of Sungai Karang Forest Reserve, Tanjong Karang, Selangor during study period	99
4.8	Mean pH value in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	100
4.9	Analysis of variance for pH value with season, plot and peat layers as independent variables	103
4.10	Mean bulk density in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	104
4.11	Analysis of variance for bulk density with season, plot and peat layers as independent variables	106
4.12	Mean hydraulic conductivity in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	109
4.13	Analysis of variance for hydraulic conductivity with season, plot and peat layers as independent variables	111
4.14	Mean organic and ash contents in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	113
4.15	Analysis of variance for organic content with season, plot and peat layers as independent variables	114
4.16	Analysis of variance for ash content with season, plot and peat layers as independent variables	115

4.17	Mean inorganic contents in different season, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	118
4.18	Comparison of inorganic content of peat in several studies	121
4.19	Analysis of variance for calcium content with season, plot and peat layers as independent variables	122
4.20	Analysis of variance for potassium content with season, plot and peat layers as independent variables	123
4.21	Analysis of variance for magnesium content with season, plot and peat layers as independent variables	124
4.22	Analysis of variance for sodium content with season, plot and peat layers as independent variables	125
4.23	Mean water level in unburned area I (UA I) in different season and plots in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	128
4.24	Analysis of variance for water level with season and plot as independent variables	128
4.25	Summary of mean peat swamp forest conditions in different season in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	131
4.26	Summary of mean peat characteristics at various peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	131
4.27	Summary of mean peat swamp forest conditions in various distances toward the canal in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	132
4.28	Best fitting model equation for bulk density and pH	133
4.29	Peat heat content at various moisture content in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	139
4.30	Mean peat combustion rate at various moisture content and fuel texture in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	142
4.31	Peat combustion rate at various moisture content and silica addition in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	143

4.32	Mean peat combustion rate at various fuel textures in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	145
4.33	Possible effects of forest fire on peat characteristics in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	156
4.34	Mean moisture content in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	157
4.35	Analysis of variance for moisture content with area, plot and peat layers as independent variables	158
4.36	Mean pH value in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	160
4.37	Analysis of variance for pH value with area, plot and peat layers as independent variables	161
4.38	Mean bulk density in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	163
4.39	Analysis of variance for bulk density with area, plot and peat layers as independent variables	165
4.40	Mean hydraulic conductivity in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	166
4.41	Analysis of variance for hydraulic conductivity with area, plot and peat layers as independent variables	168
4.42	Mean organic and ash contents in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	169
4.43	Analysis of variance for organic content with area, plot and peat layers as independent variables	172
4.44	Analysis of variance for ash content with area, plot and peat layers as independent variables	173
4.45	Condition of soil organic matter in combustion process (Hasking 1938 in De Bano et al. 1998)	173
4.46	Mean inorganic contents in different area, peat layers and plot in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	176

4.47	Analysis of variance for calcium content with area, plot and peat layers as independent variables	182
4.48	Analysis of variance for potassium content with area, plot and peat layers as independent variables	183
4.49	Analysis of variance for magnesium content with area, plot and peat layers as independent variables	183
4.50	Analysis of variance for sodium content with area, plot and peat layers as independent variables	184
4.51	Water level in burned area (BA) and unburned area II (UA II) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	186
4.52	Analysis of variance for water level with area and plot as independent variables	187

LIST OF FIGURES

Figure		Page
2.1	Daily forest fire frequency in Semarang, Central Java, Indonesia for period of 1982 – 1986 (Syaufina 1988)	19
2.2	Mean monthly rainfall, fire frequency and burned area in Semarang, central Java for period of 1982 – 1986 (Syaufina 1988)	23
2.3	Combustion pattern of peat fire (from Artsybashev 1983)	35
2.4	Monthly climatic condition and KBDI in Sumberkima Forest Resort, Bali-Indonesia in 1997	39
3.1	Sungai Karang Forest Reserve, Tanjong Karang, Selangor	46
3.2	Map of study area	47
3.3	Burned area (compartment 132) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	48
3.4	Unburned area (compartment 127) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	48
3.5	Climatic diagram of Tanjong Karang, Selangor	49
3.6	Monthly mean distribution of rainfall and rain days in Tanjong Karang, Selangor for period of 1968 - 1998	50
3.7	Yearly distribution rainfall in Tanjong Karang, Selangor for period of 1968 – 1998	51
3.8	Monthly mean distribution of maximum temperature, minimum temperature and relative humidity in Tanjong Karang, Selangor for period of 1968 - 1998	52
3.9	Monthly mean distribution of sunshine hours in Tanjong Karang, Selangor for period of 1983 - 1998	52
3.10	Monthly mean distribution of pan evaporation in Tanjong Karang, Selangor for period of 1982 - 1997	53
3.11	Soil profiles in burned (left) and unburned (right) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	55

4.1	(a) Yearly, (b). Monthly mean temperature variations for Tanjong Karang in 1968-1998	75
4.2	(a) Yearly, (b). Monthly mean relative humidity variations for Tanjong Karang in 1968-1998	76
4.3	(a) Yearly, (b). Monthly mean rainfall variations for Tanjong Karang in 1968-1998	77
4.4	(a) Yearly, (b). Monthly mean pan evaporation variations for Tanjong Karang in 1982-1997	78
4.5	(a) Yearly, (b). Monthly mean sunshine hour variations for Tanjong Karang in 1968-1998	79
4.6	Dendrogram for monthly rainfall using Centroid Method	81
4.7	Normalized mean rainfall during study period	82
4.8	Climatograph based on normal (1968-1998) temperature and precipitation at Tanjong Karang	87
4.9	Daily rainfall, maximum temperature and KBDI in various stages in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	90
4.10	Drought occurrences in Sungai Karang Forest Reserve, Tanjong Karang, Selangor, (a). in April 2000; (b). in October 2000	92
4.11	Mean moisture content variations and total weekly rainfall in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	95
4.12	Mean moisture content at various peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	97
4.13	Mean moisture content at various distances toward the canal in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	97
4.14	Mean pH value variations in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	100
4.15	Mean pH value at various peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	102

4.16	Mean pH value at various distances towards the canal in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	103
4.17	Mean bulk density variations in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	105
4.18	Mean bulk density at two peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	107
4.19	Mean hydraulic conductivity variations in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	109
4.20	Mean hydraulic conductivity at two peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	110
4.21	Mean organic and ash contents variations in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	114
4.22	(a). Mean organic, (b) Mean ash contents at various peat layers in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	116
4.23	Mean peat calcium content in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	119
4.24	Mean peat potassium content in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	119
4.25	Mean peat magnesium content in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	120
4.26	Mean peat sodium content in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	120
4.27	Mean peat inorganic content at various peat layer in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	121
4.28	Mean calcium content at various peat layer in various plots in unburned area I (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	122
4.29	Mean magnesium content in different season in various plots in unburned area I (UA I) in Sungai Karang Forest	124

Reserve, Tanjong Karang, Selangor

4.30	Water level in unburned area (UA I) and rainfall variations in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	127
4.31	Relationship between water level and KBDI in unburned area (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	135
4.32	Relationship between peat moisture content and KBDI in unburned area (UA I) in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	136
4.33	Peat heat content at various moisture content in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	138
4.34	Peat combustion rate at various silica addition and regression line	144
4.35	Regression models for combustion rate at various moisture content; (a) in mixed texture fuel; (b) in coarse texture fuel	147
4.36	Combustion rate at various silica addition; (a) in 0 – 14 cm depth in unburned area (UA I); (c) in 5 – 14 cm depth in burned area (BA)	149
4.37	Initial temperature of consecutive samples during combustion test	150
4.38	Temperature variations during combustion test	150
4.39	Model of temperature variations during combustion test	151
4.40	Monthly rainfall in 1998 in Tanjong Karang	152
4.41	Daily rainfall in March 1998 in Tanjong Karang	153
4.42	Monthly rainfall in 1999 in Tanjong Karang	154
4.43	Daily rainfall in July-August 1999 in Tanjong Karang	154
4.44	Mean moisture content in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	157
4.45	Mean moisture content at various peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	159

4.46	Mean pH value in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	161
4.47	Mean pH value at various peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	162
4.48	Mean bulk density in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	163
4.49	Mean bulk density at two different peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	164
4.50	Mean hydraulic conductivity in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	166
4.51	Mean hydraulic conductivity at two different peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	167
4.52	Mean organic content in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	170
4.53	Mean ash content in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	170
4.54	Mean organic content at various peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	171
4.55	Mean ash content at various peat layers in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	172
4.56	Mean organic content at various distances toward the canal in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	174
4.57	Mean ash content at various distances toward the canal in burned (BA) and unburned (UA II) areas in Sungai Karang Forest Reserve, Tanjong Karang, Selangor	175
4.58	Mean calcium content in burned (BA) and unburned (UA II)	176