Institute of Biodiversity and Environmental Conservation

Diversity and Diet of Babblers (Timaliidae and Pellorneidae): Possible Effects of Anthropogenic Disturbances and Environmental Characteristics at Pelagus, Sarawak (East Malaysia: Borneo)

Pang Sing Tyan

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Diversity and Diet of Babblers (Timaliidae and Pellorneidae): Possible Effects of Anthropogenic Disturbances and Environmental Characteristics at Pelagus, Sarawak (East Malaysia: Borneo)

Pang Sing Tyan

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

……

Signature

Name: Pang Sing Tyan

Matric No.: 14010019

Institute of Biodiversity and Environmental Conservation

Universiti Malaysia Sarawak

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ABSTRACT

Disturbed habitats tend to have impoverished bird communities compared to primary forests. This research focuses on the group known as babblers (Timaliidae and Pellorneidae) which are currently understudied in terms of how they persist in a multispecies community and what resource partitioning they utilise when in a continuous disturbed habitat. This study demonstrates a method to measure disturbance by quantifying the level of disturbance in selected sampling stations and was measured based on human and plant components. Based on the disturbance index, the disturbance was found to be varied in different forest types in Pelagus, Sarawak. In addition, the study also examined the babbler community and their potential prey in the areas with varying levels of disturbance; identifying which covariate(s) affect both babblers and prey the most. A total of 1,335 individuals of birds from 106 species were captured throughout this study. Amongst them were 328 babbler individuals, consisting of 16 different species representing from two families (Timaliidae and Pellorneidae). Chestnut-winged babbler was the most common species captured. Of the 17 orders of prey captured, Diptera was the most dominant order, followed by Hymenoptera and Coleoptera. Occupancy of babblers in Pelagus was found to be high (> 50%), despite netting probability being low (20%). Within the nine covariates measured with regards to occupancy and netting probability, eight had almost equal influence on babblers, except for the presence of domestic animals, such as dogs and cats, while canopy cover was the most influential covariate affecting prey abundance at all stations. Resource partitioning among babblers was also investigated by deploying double mist-nets with heights indicated by the ascending shelf (maximum height 3.6 m). The numbers of babblers netted was inversely proportionate to the shelf height of the mist-net, lower shelves (0–0.6 m) recorded the highest catches, implying that most babblers prefer to forage closer to the ground, despite the fact that a majority of

potential prey being caught on sticky traps at 1 m and above. Sampling was conducted four times a year, with an interval of two to three months in between. Results show that the collective babbler abundance was significantly greater between March and April of 2016 compared to the other months in the same year, but there was no seasonal marked on prey abundance. This suggests that foraging activity among babblers could be more active compared to other periods as the foraging time was shorten due to raining. Thus, higher number of babblers were captured. The composition of babbler diets was investigated by analysing sample obtained from 110 regurgitated sample, 58 faecal samples and 27 stomach content. Eleven intact prey items were found from the regurgitated samples, while faecal and stomach content had one each. The results showed that babbler in this study are diet-opportunist. and generalists. Their diets constitute of 11 prey groups. Caterpillars appeared to be the most preferred prey (Jacob's Index), while Coleopterans ranked fourth (behind Orthroptera and Araneida), despite being frequently found in the diet samples. Prey body size was not an important factor affecting babbler prey choice, as the regressions between babbler weight against prey body length had no relation. Instead, babblers may be tracking nutrient content. The preferred prey, caterpillars are rich in phosphorus, while Orthopterans have the highest crude protein content. As human-induced disturbance is inevitable, it is critical to understand how bird groups such as babblers and their prey tolerate different levels of disturbance at the community level, and ultimately mitigate the disturbances that may impact other wildlife.

Keywords: Disturbance, Pelagus, Sarawak, Borneo, bird, trophic ecology, babbler, arthropod

***Pemakanan dan Kepelbagaian Babbler* (*Timaliidae dan Pellorneidae*): *Kesan Kemungkinan Gangguan Antropogenik dan Ciri-ciri Alam Sekitar di Pelagus, Sarawak* (*Malaysia Timur: Borneo*)**

ABSTRAK

Dalam mengekalkan hidupan komuniti burung, habitat yang terganggu tidak setanding dengan hutan primer. Kajian ini memfokus pada kumpulan burung babbler mengenai kaedah mereka bertahan dalam komuniti pelbagai spesies dan pembahagian sumber (tempat dan makanan) dalam habitat yang terganggu secara berterusan. Kajian ini menunjukkan kaedah mengukur gangguan dengan mengira tahap gangguan di stesen pensampelan terpilih yang menggunakan komponen manusia dan tumbuhan. Menurut indek ganguan, ia menunjukkan gangguan berbeza di jenis hutan berlainan di Pelagus, Sarawak. Kajian ini juga mengkaji komuniti babbler dan potensi mangsa mereka di kawasan yang mempunyai tahap gangguan yang berbeza; mengenal pasti kovariat yang terbanyak pengaruh terhadap mangsa dan pemangsa. Sejumlah 1335 individu burung daripada 106 spesies telah ditangkap sepanjang kajian ini. Babbler terdiri daripada 328 ekor, 16 spesies dan dua famili (Timaliidae dan Pellorneidae). Chestnut-winged babbler, merupakan spesies yang paling banyak ditangkap. Daripada 17 kumpulan mangsa tangkapan, Diptera paling dominasi, diikuti Hymenoptera dan Coleoptera. Kemungkinan babbler yang menghuni di Pelagus tinggi (melebihi 50%) walaupun kebarangkalian penangkapan rendah (kurang daripada 20%). Lapan kovariat mempunyai pengaruh yang hampir sama pada kebarangkalian penghunian dan penangkapan babbler, kecuali dalam kehadiran haiwan domestik seperti anjing dan kucing manakala penutup kanopi hutan adalah kovariat yang paling mempengaruhi potensi mangsa di semua stesen. Pembahagian sumber di kalangan babbler juga dikaji menggunakan jaring berganda dengan ketinggian maksimum 3.6 m. Bilangan babbler yang tertangkap pada jaring dengan ketinggian 0–0.6 m adalah tertinggi,

menunjukkan bahawa babbler mencari makanan berdekatan tanah walaupun kebanyakan mangsa ditangkap pada perangkap pelekat pada aras 1 m dan ke atas. Pensampelan dilakukan empat kali setahun berselang dua – tiga bulan. Hasil menunjukkan bahawa kelimpahan kolektif babbler adalah lebih tinggi pada Mac dan April 2016 berbanding dengan tiga tempoh lain tetapi tiada corak temporal yang ketara untuk kelimpahan mangsa. Aktiviti pencarian makanan mungkin lebih aktif dikalangan babbler. Ini kerana waktu pencarian makanan dipendekkan disebabkan hujan. Justeru, lebih banyak babbler terperangkap. Komposisi diet makanan babbler disiasat dengan menganalisis 110 sampel muntah, 58 sampel tahi dan 27 kandungan perut. Sebelas penemuan mangsa yang belum dihadam didapati dari sampel muntah, manakala setiap satu dari tahi dan kandunagn perut. Hasil kajian menunjukkan bahawa babbler adalah pemakan umum and berkesempatan. Diet pemakanan babbler terdiri daripada 11 kumpulan mangsa. Ulat bulu adalah mangsa paling digemari menurut Indeks Jacob manakala Coleoptera menduduki tempat keempat walaupun paling kerap dijumpai dalam sampel diet. Analisis juga menunjukkan bahawa saiz badan mangsa bukanlah faktor mempengaruhi pilihan pemangsa babbler kerana regresi antara berat badan babbler terhadap bahagian badan mangsa diukur mempunyai korelasi yang tidak ketara. Sebaliknya, pemilihan mungkin berdasarkan kandungan zat. Ulat bulu kaya dengan fosforus, manakala Orthoptera mempunyai kandungan protein yang tinggi. Oleh kerana gangguan yang disebabkan oleh manusia tidak dapat dielakkan, pemahaman kumpulan babbler dan mangsa mereka mengatasi tahap gangguan yang berbeza di peringkat komuniti dan akhirnya mengurangkan gangguan yang mungkin memberi kesan kepada hidupan liar yang lain adalah penting..

Kata kunci: *Gangguan, Pelagus, Sarawak, Borneo, babbler, burung, ekologi trofik*

TABLE OF CONTENTS

		Page
DECLARATION		i
ACKNOWLEDGEMENT		iii
ABSTRACT		v
ABSTRAK		vii
TABLE OF CONTENTS		ix
LIST OF TABLES		xvi
LIST OF FIGURES		xix
LIST OF ABBREVIATIONS		xxi
CHAPTER 1:	**GENERAL INTRODUCTION**	1
1.1	Habitat Disturbance	1
1.1.1	Logging	3
1.1.2	Shifting Cultivation	5
1.2	Animal Responses to Habitat Disturbances	7
1.3	Research Questions, Objectives and Hypotheses	18
1.4	Arrangement of Thesis	19
CHAPTER 2:	**QUANTIFYING ANTHROPOGENIC DISTURBANCE VARIATIONS**	21
2.1	Introduction	23

2.1.1 Anthropogenic Disturbance 23

2.1.2 Assessment of Anthropogenic Disturbance 24

2.1.3 Research Question, Objectives and Hypotheses 30

2.2 Materials and Methods 34

2.2.1 Study Sites 34

2.2.2 Assessment of Human Disturbance Level 36

2.2.2.1 Human Component 36

2.2.2.2 Plant Component 37

2.2.3 Statistical Analysis 38

2.2.3.1 Level of Disturbances 38

2.3 Results 47

2.3.1 Human Component 47

2.3.2 Plant Component 42

2.4 Discussion 49

2.5 Conclusion 52

CHAPTER 3: THE DISTRIBUTION AND OCCUPANCY OF BABBLERS IN DISTRUBED FORESTS IN PELAGUS 53

3.1 Introduction 53

3.1.1 Babblers Diversity in Degraded and Undegraded Forest 55

3.1.2 Babbler Response to Human Induced Disturbance 57

3.1.3 Foraging Pattern of Babblers 58

3.1.4 Spatial Distribution of Birds 59

3.1.5 Temporal Distribution of Birds 62

3.1.6 Research Questions, Objectives and Hypotheses 64

3.2 Materials and Methods 65

3.2.1 Study Sites 65

3.2.2 Field Sampling 65

3.2.2.1 Assessing Understorey Space Utilisation by Babblers 66

3.2.2.2 Assessing Temporal Effect 67

3.2.3 Statistical Analysis 67

3.2.3.1 Species Accumulation Curve 67

3.2.3.2 Proportion of Babblers' Species 68

3.2.3.3 Occupancy and Netting Probabilities 68

3.2.3.4 Disturbance Effect 69

3.2.3.5 Diversity Indices 69

3.2.3.6 Spatial Partitioning 70

3.2.3.7 Temporal Effect 70

3.3 Results 71

3.3.1 Avifauna Assemblages 71

3.3.1.1 Diversity of Avifauna at Pelagus 71

3.3.1.2 Feeding Guild 71

3.3.2 Babbler Community 72

3.3.3 Spatial Distribution (Horizontal and Vertical) 77

3.3.3.1 Horizontal Distribution 77

3.3.3.2 Vertical Distribution 85

3.3.4 Temporal Pattern 88

3.4 Discussion 91

3.4.1 Responses of Babbler to Disturbance 91

3.4.2 Occupancy (psi) and Netting Probability (p) of Babblers in Pelagus 92

3.4.3 Spatial and Temporal Distribution of Babblers in Pelagus 93

3.5 Conclusion 95

CHAPTER 4: PREY DISTRIBUTION OF UNDERSTOREY BABBLERS IN PELAGUS, KAPIT 97

4.1 Introduction 97

4.1.1 Potential Prey 97

4.1.1.1 Arthropods 97

4.1.1.2 Non-arthropods Items 98

4.1.2 Responses of Arthropods to Environmental Changes 99

4.1.3 Research Problems, Objectives and Hypotheses 100

4.2 Materials and Methods 102

4.2.1 Sampling Methods 106

4.2.1.1 Pitfall Trap 106

4.2.1.2 Sticky Trap 106

4.2.1.3 Modified Berlese Funnel 107

4.2.2 Statistical Analysis 108

4.2.2.1 Influences of Environmental Covariates on Prey Counts 108

4.2.2.2 Spatial Distribution 109

4.2.2.3 Temporal Distribution of Potential Prey 109

4.3 Results 110

4.3.1 Overall Result 110

4.3.2 Influences of Environmental Covariates on Prey Counts 111

4.3.3 Vertical and Horizontal Distribution of Potential Prey in Pelagus 113

4.3.4 Temporal Distribution of Babbler Potential Prey in Pelagus 118

4.4 Discussion 120

4.5 Conclusion 124

CHAPTER 5: THE COMPOSITION BABBLER DIETS AND NUTRIENT CONTENTS OF POTENTIAL PREY 125

5.1 Introdcution 125

5.1.1 Composition of Insectivorous Bird Diets 125

5.1.2 Prey Composition in the Diets of Babblers 127

5.1.3 Relationships Between Bird Predators and Arthropod Prey 129

5.1.4 Methods Used to Study Avifaunal Diets 130

5.1.5 Nutrient Content of Potential Prey Items 134

5.1.6 Research Questions and Objectives 138

5.2 Materials and Methods 139

5.2.1 Bird Diet Sampling 139

5.2.2 Examination Regurgitated, Stomach and Faecal Sample in Laboratory 140

5.2.3 Data Analysis 141

5.2.3.1 Babbler Prey Preferences and Selection 141

5.2.3.2 Relationship Between Body Size of Selected Prey and of Babbler 141

5.2.3.3 Accumulation Curve of Captured Prey 141

5.2.4 Prey Sample Chosen for Analysis 142

5.2.5 Laboratory Analyses 142

5.2.5.1 Ash Determination 142

5.2.5.2 Phosphorus Determination 143

5.2.5.3 Crude Protein Determination 144

5.2.5.4 Gross Energy Values Determination 145

5.3 Result 146

5.3.1 Composition of Babbler Diets 146

5.3.2 Babbler Diet Breadth and Selection 150

5.3.3 Prey Preference 152

5.3.4 Relationships between Weight of Babbler and Size of Prey 153

5.3.5 Nutrient Contents of Potential Prey 156

5.4 Discussion 157

5.5 Conclusion 160

CHAPTER 6: GENERAL DISCUSSION 162

CHAPTER 7: CONCLUSION, LIMITATIONS AND RECOMMENDATIONS 167

7.1 Conclusion 167

7.2 Limitations 168

7.3 Recommendations 168

REFERENCES 170

APPENDICES 197

LIST OF TABLES

		Page
Table 1.1	Areas affected by natural disasters in ASEAN countries and the degraded forests of Borneo.	3
Table 1.2	List of studies focused on animal response to disturbances worldwide.	8
Table 1.3	List of the respective responses of birds to disturbances.	13
Table 2.1	List of previous studies on human-induced disturbances	25
Table 2.2	Description of forest types (adopted from Pang et al., 2017)	34
Table 2.3	Parameters comparison among stations at selected stations in the current study.	35
Table 2.4	Selected covariates used in environmental assessment of disturbance modelling and the ranking system adopted.	40
Table 2.5	Total encounter frequency of human and pets at stations. PNP is Pelagus National Park, PL is Ng. Pelagus, B is Ng. Benin, PR is Ng. Peraran.	43
Table 2.6	Proportions of pioneer and planted trees recorded within fix-sized quadrates at each sampling station, Pelagus.	43
Table 2.7	Count of pioneer and planted trees and proportion of count of total trees found in quadrate in each station.	44
Table 2.8	Disturbance ranking of all sampling stations based on different DBH categories and the proportion of pioneer and planted trees within the quadrats. R is disturbance ranking. P is proportion of pioneer and planted trees from Table 2.7.	44
Table 2.9	The depth of leaf litter at stations in Pelagus, Kapit.	47
Table 2.10	Disturbance index of each sampling station in Pelagus.	48
Table 3.1	Percentage of babblers captured from various habitats in Peninsular Malaysia and Sarawak.	56
Table 3.2	Definition of avian feeding guilds (Pang et al. 2017).	59

Table 3.3	Total number of species and individuals from avian assemblages in accordance to the feeding guilds recorded from Pelagus, Kapit.	72
Table 3.4	List of babblers recorded from stations in Pelagus, Kapit.	74
Table 3.5	Distribution of species belonging to families of Timaliidae and Pellorneidae at stations visited in Pelagus, Kapit.	78
Table 3.6	List of recaptured babblers, individual and capture timeline.	79
Table 3.7	AICc values for each babbler species in this study corresponding to the covariates.	81
Table 3.8	Most parsimonious model(s) to predict occupancy and netting probability of 16 babblers recorded in Pelagus. psi (~.) means occupancy depends on, p (~.) means the probability of netting depends on.	83
Table 3.9	Frequency of the target babber species caught at respective shelf.	86
Table 3.10	Significance level from Kruskal-Wallis test on the bird abundance among four samplings conducted in different months in Pelagus, Kapit.	90
Table 4.1	Methods used in collecting arthropods.	103
Table 4.2	GLM results showing the influence of the covariates on arthropod abundance.	112
Table 4.3	List of potential prey captured using three different methods in Pelagus, Kapit.	114
Table 4.4	Distributions of captured arthropods at stations in Pelagus, Kapit.	117
Table 4.5	Pooled results on potential prey captured by three different methods used between December 2015 – November 2016 in Pelagus.	119
Table 5.1	Techniques used to study the diet of birds.	132
Table 5.2	The nutritive values of arthropods (The superscripts represent source of references.	136
Table 5.3	Preparation of standard range containing 1, 2, 3 and 4 ppm phosphorus	144

Table 5.4	List of babbler species and ordinal categories of prey recovered from regurgitated (R) and faecal (F) samples and stomach content (S). The prey were identified from intact individuals (I) or body parts (P).	147
Table 5.5	Level of preferences (Jacob's Index) of types (ordinal categories) found in babblers captured in Pelagus, Kapit.	153
Table 5.6	Ash, crude protein, gross energy and phosphorus content of prey item (ordinal categories). NA indicates analysis not done due to insufficient sample.	156
Table 6.1	Distribution of prey collected from diet sample in relation to babbler diversity from different stations	166

LIST OF FIGURES

		Page
Figure 1.1	Total production of logs in relation to forest area in Malaysia from 1949 to 2012 (Department of Statistics Malaysia, 2014).	4
Figure 2.1	The sampling stations in Pelagus, Kapit.	33
Figure 2.2	The canopy covers of each sampling station.	45
Figure 3.1	Rank abundance curve (Whittaker plot) of captured babblers in Pelagus, Kapit.	73
Figure 3.2	Species accumulative curve of all 106 captured species and of babbler captured from all stations. Solid line indicates all bird species captured and dotted line is the babblers, recorded in the current study. Bars indicate the standard deviations.	75
Figure 3.3	Species accumulation curve of babbler against sampling days in this study. Bars indiciate the standard deviations.	76
Figure 3.4	Occupancy (Ψ / psi) and netting probability (p) of each babbler species recorded in Pelagus, Kapit.	76
Figure 3.5	The grouping of babblers corresponding to space utilisation in the forested areas, Pelagus, Kapit.	88
Figure 3.6	Accumulation of rainfall (mm) over the sampling days of Kapit. Source: Department of Meteorology Malaysia, Sarawak branch. The horizontal line indicates the average values of rainfall during the sampling period.	89
Figure 3.7	Rarefaction curves represent the relationship between number of babbler individuals (x-axis) and the number of babbler species (y-axis) during visits.	90
Figure 4.1	Methods used to capture potential prey in Pelagus, Kapit. The pitfall trap used to catch the ground dweller (A). The cover of a sticky trap (B). The modified Berlese Funnel before it was covered by an aluminium foil (C).	108
Figure 4.2	Counts of prey groups sampled during study periods.	111
Figure 4.3	The correlation between prey count and canopy cover at each sampled station in Pelagus, Kapit	112
Figure 4.4	Cluster analysis on prey abundance in relation to the methods used for capturing them at Pelagus, Kapit. Δ represents prey	115

groups that caught by sticky traps, + represents those by pitfall traps and *o* represents those collected in leaf litter.

Figure 4.5 The abundance of prey captured in Pelagus in relation to the rainfall (mm) in four sampling periods. 119

Figure 4.6 Rarefaction curves represent the relationship between potential prey count for babblers (accumulated individual numbers on x-axis) and the number of prey groups (y-axis) at Pelagus, Kapit. 120

Figure 5.1 Prey consumed by babblers in Pelagus, Kapit. 148

Figure 5.2 Ordinal prey group constitutions collected from babblers at Pelagus, Kapit. 149

Figure 5.3 Accumulation curve of ordinal prey items found from babblers caught in Pelagus, Kapit. 150

Figure 5.4 Diet breath of babblers captured in Pelagus, Kapit throughout the study period. 152

Figure 5.5 Relationships between weights of babblers (g) and the length of selected prey body parts (mm). Babbler vs elytra (wing cover of Coleoptera), r^2 value is -0.004092 (A). Babbler vs forum (hind legs of Orthoptera), r^2 value is 0.7448 (B). Babbler vs heads (Hymenoptera), r^2 value is -0.02178 (C). 155

Figure 6.1 Linear regression of prey and babblers (in log number) against canopy covers (%). 164

LIST OF ABBREVIATIONS

APT	Antimony potassium tatrate
AM	Apomorphine
Ara	Arachnida
B	Benin
BCB	Black-capped Babbler *Pellorneum capistratum*
BRB	Chestnut-rumped Babbler *Stachyris maculata*
BSTB	Bold-striped Tit-babbler *Macronous bornensis bornensis*
BTB	Black-throated Babbler *Stachyris nigricollis*
CAN	Canopy
Cat	Caterpilar
CBSB	Chestnut-backed Scimitar Babbler *Pomatorhinus montanus*
cc	Cubic centimetre
cm	Centimetre
Col	Coleoptera
CWB	Chestnut-winged Babbler *Stachyris erythroptera*
DBH	Diameter breast height
Der	Dermaptera
Dic	Dictyoptera
Dip	Diptera
DIST	Distance
Eph	Ephemenoptera
ELE	Elevation
FB	Ferruginous Babbler *Trichastoma bicolor*
FBTB	Fluffy-backed Tit-babbler *Macronous ptilosus*

FT	Forest type
Gas	Gastropoda
GHB	Grey-headed Babbler *Stachyris poliocephala*
g	Gramme
HB	Horsfield's Babbler *Trichastoma sepiarium*
Hem	Hemiptera
Hym	Hymenoptera
ind.	Individual
Iso	Isoptera
Lep	Lepidoptera
LLD	Leaf litter depth
MAN	Human
MB	Moustached Babbler *Malacopteron magnirostre*
ml	Milimetre
Myr	Myriapoda
Ng.	Confluence
no.	Number
Odo	Odonata
Ort	Orthoptera
PET	Pet
Pha	Phasmida
PL	Pelagus
PNP	Pelagus National Park
ppm	Part per million
PR	Peraran
Rh	House