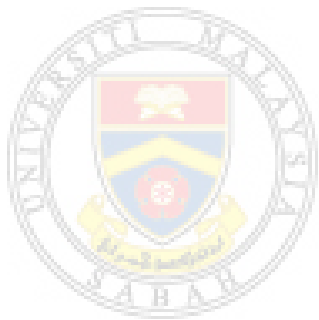


FISHING ACTIVITIES AND EFFECTS OF  
SEASONAL MONSOON TOWARDS SHRIMP  
AND FISH LANDING IN PROPOSED TUN  
MUSTAPHA PARK, KUDAT, SABAH



JESSIE BELIKU

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UMS  
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THESIS SUBMITTED IN FULFILLMENT  
FOR THE DEGREE OF MASTER OF SCIENCE

MARINE BORNEO RESEARCH INSTITUTE  
UNIVERSITI MALAYSIA SABAH  
2014

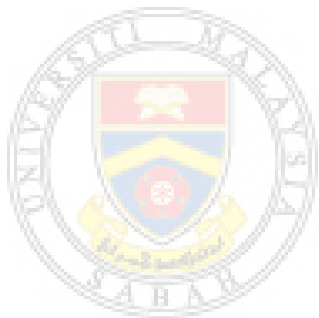
## DECLARATION

I hereby declare that the material in this thesis is my own except for quotations, excerpts, equations, summaries and references, which have been duly acknowledged.

03 April 2014

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CERTIFICATION

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MATRIC NO. : PO2007-8367  
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MONSOON TOWARDS SHRIMP AND FISH LANDING IN  
PROPOSED TUN MUSTAPHA PARK, KUDAT, SABAH  
DEGREE : MASTERS OF SCIENCE (MARINE SCIENCE)  
VIVA DATE : 02 SEPTEMBER 2013

DECLARED BY



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Signature

---

## ACKNOWLEDGEMENTS

Firstly, I would like to thank God almighty for making all this possible. Thank you Lord for all your blessings and protection.

I am grateful to my supervisor, Dr. Ejria Saleh, for her never ending guidance, support and patience, her valuable time and effort, encouragement and energy in making this a success. Her passion and patience is truly a virtue to look up to. I would be glad to emulate your patience and virtues in life.

My love and appreciation goes out to my family and friends who have been by my side through thick and thin. Thank you for believing in me when all odds were against me and giving me faith and strength to constantly move forward. This journey would be impossible to endure without all of you.

I would also like to take this opportunity to convey my appreciation to all the members of Borneo Marine Research Institute for providing materials, advice and support in order for me to finish this study. I would also like to convey my gratitude to all the people that have aid me on site and off site, namely WWF, UMS staff in Banggi, the locals and also the fishermen for sharing invaluable advice and knowledge. Without a doubt, without the help of all the parties involved, this study would not have been successful.

Finally, I would like to express my deepest appreciation and sincere gratitude for all those involved directly or indirectly in the course of making this study smooth sailing. Thank you.

Jessie Beliku  
03 April 2014



## ABSTRACT

The northern part of Sabah has been proposed as Tun Mustapha Park (TMP) since 2003. Establishment of the park essentially required information on the marine resources and fisheries activities within the area. Therefore, the objectives of this study are to access fishing activities and their impacts on endangered species, to identify potential fishing area and to determine the influence of seasonal monsoon on fishing operation. The study was carried out through the analysis of data from the Annual Fisheries Statistics (Kudat District) of the Department of Fisheries Sabah and meteorological data (wind and rainfall data) from Department of Meteorology Malaysia from 2000 to 2010, and a combination of survey interviews and observing trips on fishing boats. Survey interviews were conducted from October 2007 to October 2008 (one year) and were interviewed 79 fishers operating with gill nets; 95 and 41 fishers working on board shrimp trawl net and fish trawl net boats. Based on the information gathered from the gill net users via interview, onboard observations on 116 gill net fishing field trips were carried out between October 2008 and March 2009 (during Northeast Monsoon) near the main town of Banggi, Karakit and coastal villages. A decrease in landing for a 10 year period was recorded for both shrimp and fish trawler while the landing for gillnets has increased. The shrimp landing in Kudat were higher during the Northeast monsoon (average of 603.2 tonnes) than during the Southwest monsoon (average of 249.6 tonnes) while the landings for fish trawlers and gillnets are less affected by the monsoon seasons. Results indicated that gillnets operated within the waters of the islands of TMP while the shrimp and fish trawlers operated from Kudat and trawl in TMP waters. The important fishing ground for all three gears depended on the distance of the fishing ground from the port and the abundance of catch in that area, this was concluded as most of the important fishing ground are located near the ports and has mangroves, seagrass beds or corals nearby. The fishing grounds are overlapping between the three fishing gears and all gears have effects on turtle which is known as one of endangered marine species in Malaysia. Accidental turtle catch is relatively higher in gill nets (66.1%) compared to shrimp (25.9%) and fish (8%) trawl net boats. The information gathered from this study supports the establishment of the proposed TMP, that is, planning and future management plan of the park.

## ABSTRAK

### FISHING ACTIVITIES AND EFFECT OF SEASONAL MONSOON TOWARDS SHRIMP AND FISH LANDING IN PROPOSED TUN MUSTAPHA PARK, KUDAT, SABAH

Sejak tahun 2003, bahagian Utara Sabah telah dicadangkan sebagai Taman Tun Mustapha (TMM). Maklumat-maklumat berkenaan dengan sumber-sumber marin dan aktiviti-aktiviti perikanan yang dijalankan di kawasan ini diperlukan dalam penubuhan taman ini. Oleh itu, objektif kajian ini adalah bagi mengetahui aktiviti-aktiviti perikanan dan kesannya kepada spesis-spesis terancam, mengenalpasti kawasan-kawasan penangkapan ikan dan mengenalpasti kesan musim monsun terhadap operasi perikanan. Kajian ini dijalankan melalui analisa data daripada Perangkaan Tahunan Perikanan (Daerah Kudat), Jabatan Perikanan Sabah dan data meteorologi (data angin dan hujan) dari tahun 2000 ke 2010 dan kombinasi pemantauan temuramah dan pemerhatian atas bot nelayan. Pemantauan temuramah dijalankan dari bulan Oktober 2007 hingga bulan Oktober 2008 (satu tahun). Seramai 79 nelayan pukat tenggelam, 95 nelayan pukat tunda udang dan 41 nelayan pukat tunda telah ditemuramah. Berdasarkan keputusan temuramah, sebanyak 116 pemerhatian atas bot nelayan pukat tenggelam dijalankan antara bulan Oktober 2008 hingga bulan Mac 2009 (Monsun Timur Laut) di kawasan perairan pekan utama Pulau Banggi, iaitu, Karakit dan juga perairan kampung-kampung persisiran pantai. Keputusan menunjukkan penurunan bagi pendaratan pukat tunda udang dan ikan tetapi peningkatan pendaratan direkodkan bagi pendaratan pukat tenggelam. Pendaratan udang di Kudat didapati lebih tinggi pada monsun Timur Laut (purata 603.2 ton) berbanding dengan monsun Barat daya (purata 249.6 ton); pendaratan ikan bagi pukat tunda ikan dan pukat tenggelam kurang dipengaruhi oleh musim monsun. Keputusan menunjukkan bahawa nelayan pukat tenggelam beroperasi di sekitar kawasan pulau-pulau TMM manakala kapal-kapal pukat tunda beroperasi dari Kudat dan menunda di kawasan perairan TMM. Kawasan penangkapan ikan yang penting bagi ketiga-tiga alat penangkapan ini bergantung kepada jarak kawasan penangkapan ikan dari kawasan pendaratan ikan dan juga banyaknya ikan atau udang yang terdapat di kawasan tersebut. Ini dapat disimpulkan kerana kawasan-kawasan penangkapan ikan atau udang yang telah dikenalpasti berada pada jarak yang dekat dengan kawasan pendaratan dan juga mempunyai kawasan bakau, rumput laut dan terumbu karang di kawasan yang berdekatan. Kawasan penangkapan ikan ketiga-tiga peralatan perikanan adalah bertindih dan memberi kesan kepada penyu yang telah dikenalpasti sebagai haiwan terancam di Malaysia. Penangkapan penyu secara tidak sengaja adalah lebih tinggi bagi perikanan pukat tenggelam (66.1%) berbanding dengan pukat jerut udang (25.9%) dan pukat jerut ikan (8%). Maklumat yang didapati dalam kajian ini penting dalam menyokong penubuhan cadangan Taman Marin Tun Mustapha dari segi perancangan dan pengurusan taman kelak.

## TABLE OF CONTENTS

	Page
TITLE	i
DECLARATION	ii
CERTIFICATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
ABSTRAK	vi
LIST OF CONTENTS	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
LIST OF ABBREVIATIONS	xvii
LIST OF APPENDICES	xviii
CHAPTER 1: INTRODUCTION	
1.1 The Proposed Tun Mustapha Park and Fisheries Activities	1
1.2 Significance of Study	3
1.3 Objectives of Study	4
CHAPTER 2: LITERATURE REVIEW	
2.1 Establishment of Proposed TMP	5
2.2 Fisheries	7
2.3 Fisheries in Malaysia	8
2.3.1 Fish Production in Malaysia	9
2.3.2 Fishing Zones in Malaysia	10
2.3.3 Marine Capture Fisheries in Malaysia	11
a. Fishermen	12



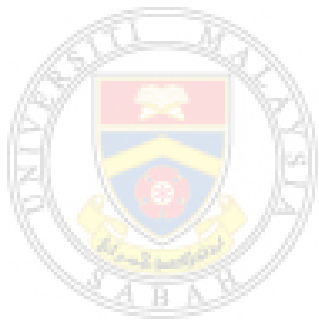
	b. Fishing Vessels	12
	c. Fishing Gear	13
2.4	Fisheries in Sabah	13
	2.4.1 Sabah Fishing Zones	15
	a. West Coast Fishing Zone	16
	b. Sandakan/ East Coast Fishing Zone	16
	c. Tawau Fishing Zone	16
	2.4.2 Destructive Fishing in Sabah	18
2.5	Fisheries in the Islands of Proposed TMP	18
	2.5.1 Socio Economy of Residents of the Island of Proposed TMP	20
2.6	Monsoon Seasons in Sabah	20
	a. Northeast Monsoon (Winter Monsoon)	21
	b. Southwest Monsoon (Summer Monsoon)	21
	2.6.1 Effects of Monsoonal Seasons to the Fisheries Industry	21
2.7	Issues Related to Fisheries in Proposed TMP	22
	2.7.1 Incidental Mortality of Charismatic and Migratory Species	22
	a. Marine Mammals	22
	b. Sea Turtles	23
CHAPTER 3: METHODOLOGY		
3.1	Study Area	27
3.2	Research Design	29
	3.2.1 Shrimp Trawler, Fish Trawler and Gillnet Data	29
	3.2.2 Shrimp Trawler, Fish Trawler and Gillnet Landing	29
	3.2.3 Seasonal Monsoon and landing	31

3.2.4	Shrimp Trawler, Fish Trawler and Gillnet Interviews	32
3.2.5	Onboard Observation for Gillnets	33
3.2.6	Issues Related to the Fisheries in Proposed TMP	34
3.3	Limitation of Study	34
CHAPTER 4: RESULTS		
4.1	Shrimp Trawler	36
4.1.1	Registered Shrimp Trawler in Kudat	36
4.1.2	Yearly Shrimp Landing by Shrimp Trawlers in Kudat	36
4.1.3	Shrimp Landing According to DoFS Fishing Blocks	37
4.1.4	Seasonal Monsoon Effect on Shrimp Landing	38
4.1.5	Wind Speed Effects on Shrimp Landing	39
4.1.6	Wind Direction Effects on Shrimp Landing	40
4.1.7	Relationship between Wind Speed and Wind Direction	41
4.1.8	Relationship between Rainfall and wind direction in degree	42
4.1.9	Rainfall Effects on Shrimp Landing	43
4.1.10	Interview Results for Shrimp Trawlers	44
	a. Operational Information for Shrimp Trawlers	45
	b. Fishing Ground of Shrimp Trawlers	46
4.2	Fish Trawlers	47
4.2.1	Registered Fish Trawlers in Kudat	47
4.2.2	Yearly Fish Landing in Kudat	48
4.2.3	Seasonal Monsoon Effect on Fish Landing for Fish Trawlers	49
4.2.4	Wind Speed Effect on Fish Landing for Fish Trawler	50
4.2.5	Wind Direction Effects on Fish Landing for Fish Trawler	50
4.2.6	Rainfall Effects on Fish Landing for Fish Trawler	51

4.2.7	Interview Results for Fish Trawler	52
	a. Operational Information fro Fish Trawlers	52
	b. Fishing Ground of Fish Trawlers	54
4.3	Gillnets	55
4.3.1	Location of Gillnet Fishermen in the Islands of Proposed TMP	55
4.3.2	Yearly Fish Landing by Gillnets in Kudat	56
4.3.3	Seasonal Monsoon Effect on Fish Landing for Gillnets	57
4.3.4	Wind Speed Effects on Fish Landing for Gillnets	58
4.3.5	Wind Direction Effects on Fish Landing for Gillnets	59
4.3.6	Rainfall Effects on Fish Landing for Gillnets	60
4.3.7	Interview Results for Gillnets	61
	a. Estimation of Gillnet Fishermen in the Islands of Proposed TMP	61
	b. Operational Information for Gillnets	62
	c. Fishing Ground of Gillnets	64
	d. Onboard Observation	65
4.4	Issues Related to Fisheries in Proposed TMP	67
4.4.1	Fishing Licenses	67
4.4.2	Conflict of Fishing Ground	68
4.4.3	Charismatic and Migratory Species	69
	a. Turtle Bycatch in Proposed TMP	69
	b. Areas wiuth High Turtle Sighting and High Turtle Bycatch in Proposed TMP	70
CHAPTER 5: DISCUSSION		
5.1	Shrimp Trawler	72

5.1.1	Shrimp Landing in Kudat	72
5.1.2	Shrimp Landing According to Fishing Blocks in Kudat	72
5.1.3	Effects of Seasonal Monsoon Towards Shrimp Landing by Shrimp Trawlers in Kudat	74
5.1.4	Fishing Grounds of Shrimp Trawlers in Kudat	75
5.2	Fish Trawler	76
5.2.1	Fish Landing by Fish Trawlers	76
5.2.2	Effects of Sesonal Monsoon Towards Fish Landing by Fish Trawlers	77
5.2.3	Operational Information on Fish Trawlers	78
5.2.4	Fishing Grounds of Fish Trawlers	78
5.3	Gillnet	79
5.3.1	Location of Gillnet Fishermen in the Islands of Proposed TMP	79
5.3.2	Fish Landing by Gillnets	79
5.3.3	Effects of Seasonal Monsoon Towards Fish Landing by Gillnets	80
5.3.4	Estimated Gillnet Fishermen in the Islands of Proposed TMP	80
5.3.5	Operational Information of Gillnets in the islands of TMP	81
5.3.6	Fishing Ground of Gillnets in the Island of Proposed TMP	81
5.3.7	Onboard Observation	82
5.4	Conflict of Fishing Ground	83
5.5	Sea Turtle Bycatch	84
CHAPTER 6: CONCLUSION		86
APPENDIX A		90

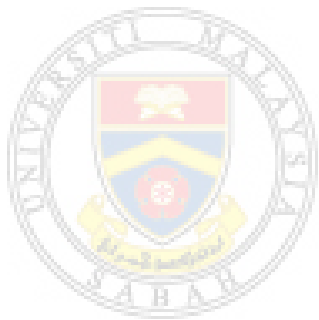
APPENDIX B	99
APPENDIX C	100
APPENDIX D	101
APPENDIX E	102
APPENDIX F	103
APPENDIX G	104



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## LIST OF TABLES

		Page
Table 4.1	Registered shrimp trawlers in Kudat	36
Table 4.2	Range of shrimp trawler information on boat, gear and operation	45
Table 4.3	Registered fish trawlers in Kudat	48
Table 4.4	Range of fish trawler information on boat, gear and operation	53
Table 4.5	Range of gillnet information on boat, gear and operation	63
Table 4.6	Turtle bycatch for shrimp trawlers, fish trawlers and gillnets	70



UMS  
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## LIST OF FIGURES

		Page
Figure 2.1	Map of Sabah showing the location of proposed Tun Mustapha Park in Northern Sabah	7
Figure 2.2	Malaysian fisheries management zones by distance from shore and fishing gear type	11
Figure 2.3	Commercial fishing zones and marine fishing districts of Sabah	17
Figure 3.1	Approximate boundary of proposed Tun Mustapha Park (A); interview location for shrimp and fish trawler/ Kudat Township (B); interview area for gillnet fishermen (C) and onboard observation area/ Southern waters of Banggi Island (D)	28
Figure 3.2	Fishing blocks within the waters of proposed TMP; waters of Marudu Bay (A); waters of Northern Jembongan Island (B); waters of Balambangan Island (C) and waters of Banggi Island and Manawali Island (D)	31
Figure 4.1	Yearly shrimp landing for shrimp trawler in Kudat of year 2000 – 2010	37
Figure 4.2	Average shrimp landing for shrimp trawlers in year 2000 – 2010 according to the fishing blocks in proposed TMP (see figure 3.2 for location of each fishing block)	38
Figure 4.3	Monthly average of shrimp landing for NEM and SWM monsoon between 2000 – 2010	39
Figure 4.4	Relationship of monthly average shrimp landing for shrimp trawlers and average monthly wind speed for NEM and SWM monsoon between 2000 - 2010	40
Figure 4.5	Relationship between monthly average shrimp landing and direction in degree for year 2000 – 2010	41
Figure 4.6	Relationship between monthly average wind speed and direction in degree for year 2000 – 2010	42

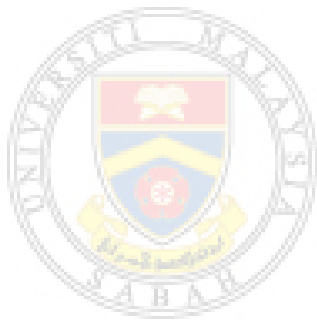
Figure 4.7	Relationship between monthly average rainfall and wind direction in degree for year 2000 – 2010	43
Figure 4.8	Relationship between monthly average shrimp landing and average monthly rainfall for year 2000 – 2010	44
Figure 4.9	Number of trips per month shrimp trawlers go out to sea (a); Duration of shrimp trawlers at sea (b)	46
Figure 4.10	Fishing ground of shrimp trawler; waters of Manawali Island and Mandi Darah Island (A), waters between Banggi Island and Balambangan Island (B), waters of Marudu Bay (C), waters off the Tip of Borneo (D)	47
Figure 4.11	Yearly fish landing for fish trawler from year 2000 - 2010	48
Figure 4.12	Monthly average of fish landing for fish trawlers at different seasonal monsoon between 2000 – 2010	49
Figure 4.13	Relationship of monthly average fish landing for fish trawlers and wind speed for NEM and SWM monsoon between 2000 – 2010	50
Figure 4.14	Relationship between monthly average fish landing for fish trawlers and direction in degree for year 2000 – 2010	51
Figure 4.15	Relationship between monthly average fish landing for fish trawlers and average monthly rainfall for year 2000 - 2010	52
Figure 4.16	Number of trips per month fish trawlers go out to sea (a); Duration of fish trawlers at sea (b)	53
Figure 4.17	Fishing ground of fish trawlers; Western waters of Balambangan Island (A), Southern waters of Balambangan Island (B), Northern waters of Kudat (C) and Eastern water of Banggi Island (D)	55
Figure 4.18	Approximate location of gillnetting villages in the islands of proposed TMP, mostly located on Banggi Island	56
Figure 4.19	Yearly fish landing for gillnets from year 2000 – 2010	57
Figure 4.20	Monthly average of fish landing for gillnets at different seasonal monsoon between 2000 - 2010	58



Figure 4.21	Relationship of monthly average fish landing for gillnets and average monthly wind speed for NEM and SWM monsoon between 2000 – 2010	59
Figure 4.22	Relationship between monthly average fish landing for gillnets and direction in degree for year 2000 – 2010	60
Figure 4.23	Relationship between monthly average fish landing for gillnets and average monthly rainfall for year 2000 - 2010	61
Figure 4.24	Total number of fishermen and gillnetting fishermen in the islands of proposed TMP	62
Figure 4.25	Engine type for gillnet fishermen (a); Percentage of landing locations for gillnets (b); Fishing trips per month (c); Duration of fishing trips (d)	64
Figure 4.26	Fishing ground of gillnet fishermen; Northeastern waters of Balambangan Island (A); Eastern waters of Balambangan Island (B); Southern waters of Banggi Island (C) and Eastern waters of Banggi Island (D)	65
Figure 4.27	Location of fishing ground and sea bed condition for gillnets	67
Figure 4.28	Registered fishing licenses for trawlers and gillnets in DOFS, 2000 – 2010	68
Figure 4.29	Overlaying of Fishing ground for shrimp trawler, fish trawler and gillnets	69
Figure 4.30	Areas with high turtle sightings and high turtle bycatch	71

## LIST OF ABBREVIATIONS

DoFM	Department of Fisheries Malaysia
DoFS	Department of Fisheries Sabah
HP	Horse Power
Kg.	Kampung/ Village
m	meter
mm	milimeter
MRF	Marine Research Foundation
NEM	Northeast Monsoon
SWM	Southwest Monsoon
TMP	Tun Mustapha Park
USD	United States Dollar



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## LIST OF APPENDICES

		Page
Appendix A	Interview form for trawlers and gillnets	98
Appendix B	Interview form for Baseline Interviews	99
Appendix C	Form for Onboard Observation	100
Appendix D	Map of the waters of proposed Tun Mustapha Park and its mangrove coverage	101
Appendix E	Poster Presentation: UMS-KINKI Seminar 2012	102
Appendix F	Abstract of Oral Presentation: Seminar on Science and Technology 2012	103
Appendix G	Statistic Outputs	104



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# CHAPTER 1

## INTRODUCTION

### 1.1 The Proposed Tun Mustapha Park and Fisheries Activities

The proposed Tun Mustapha Park (TMP) is located at the North of Sabah, the park encompasses the waters of Kudat, Kota Marudu and Pitas and consist of Banggi Island along with neighbouring Balambangan Island, Manawali Island, Mandi Darah Island and amongst others (WWF, 2006; The Borneo Post, 2013). The waters of proposed TMP is unique as it is the meeting point of the South China Sea and Sulu Sea, the region is characterized by relatively shallow seas, strong tidal currents and turbid waters near the coast. The climate in this area is affected by the Northeast Monsoon (NEM) and Southwest Monsoon (SWM) (Teh et al., 2006).

The waters of proposed TMP is rich with marine resources and also home to a number of migratory and charismatic species such as sea turtles and marine mammals (WWF, 2006). The coasts of mainland Kudat, Kota Marudu and Pitas are lined with mangroves which serves as a nursery for shrimps and fishes. This condition ensures that the waters in these areas are rich with marine resources. The bigger islands within the waters of proposed TMP, namely Balambangan Island and Banggi Island are also lined with mangroves and has coral reef and sea grass cover which in all serves as a habitat for the marine life in these waters.

The commercial fishing areas of Sabah is divided into three main zones, namely, the West Coast, East Coast and Tawau Zones, the zoning of these fishing areas are determined by the Department of Fisheries Sabah (DoFS). The waters of proposed TMP falls within the East Coast fishing zone which extends from the waters of Kudat District to the waters in Tambisan which is within the Sandakan District (Busing, 2001; Manjaji-Matsumoto and Jumin, 2011).

The fishing rights of the fishermen in Sabah are controlled by issuance of fishing licenses. Thus, fishermen registered in Kudat could fish from the waters of

East Coast Fishing Zone. The waters of proposed TMP serves as the fishing ground for thousands of fishermen who make a living through commercial and artisanal fishing. The commercial and traditional fishermen depend on the rich resources of these waters for their livelihood (Busing, 2001; Manjaji-Matsumoto and Jumin, 2011).

The commercial fisheries of Kudat include purse seines and trawlers. However, for this study, only trawlers are investigated. Through personal observation, the trawlers registered in Kudat can be divided into two, shrimp trawlers and fish trawlers, the different type of trawlers can be distinguished by its size. The shrimp trawlers are normally smaller in size while the fish trawlers are bigger. Both shrimp and fish trawlers trawl within the waters of TMP and land their catch in the landing ports of Kudat which is located within the Kudat Township.

Through personal observation and interviews with local communities, the main artisanal fisheries operating within the islands of proposed TMP are gillnets and hook and line. The fishermen in the islands of proposed TMP favour hook and line due to its low cost and the increase of the demand of live fish. Hook and line fishermen would focus on reef fishes and sell their catch to the fish culture in the islands of proposed TMP. The gillnet fishermen fish in near shore areas or waters close to their fishing villages and land their catch in their villages or the fish landing ports nearest to their village. For this study, the artisanal fishing gear assessed is gillnets as it has higher impact on the environment, mainly in contributing towards turtle bycatch.

The gillnet fishermen are located in the coastal areas of proposed TMP, however, the study would emphasize gillnet fishermen in the islands of TMP as baseline information on these fishermen are scarce due to the islands' remote nature. More, heavy reliance on the marine resource of proposed TMP would be greater among the artisanal fishermen on the islands of TMP as they are located far from the mainland and thus changing their source of income would be difficult.

The waters of proposed TMP has been heavily exploited as the waters are shared by both commercial and artisanal fisheries. Commercial fisheries are

improving their catch through investment on technologies such as usage of fish finders while the fishermen in the islands of proposed TMP have resort to using destructive fishing methods such as fish bombing and also cyanide fishing (Poh, 2009; Sham et al., 2010). The increase in efficiency of commercial fisheries would deplete the fish stock even more while destructive fishing would destroy the habitat of the fishes. The management of the current situation in the waters of proposed TMP is highly needed to ensure measures are carried out to aid in rebuilding the fish stock and ensuring that future generations would still be able to enjoy these resources.

## 1.2 Significance of Study

Baseline information on fishing activities within the waters surrounding the islands of Banggi, Balambangan, Mandi Darah, Manawali and the waters off Kudat and Pitas are scarce as comprehensive studies have not been conducted or are unpublished, this includes information on the landings trends and effects of seasonal monsoon towards the landings of shrimp trawlers, fish trawlers and gillnets in proposed TMP. The information on the gear specification and operational information is also not well documented. Thus, information gathered from this study would aid in better understanding the gears operating within the waters of proposed TMP. This study would also help identify the landing trend for each gear and identify the monsoon season or month with high or low landings. These baseline informations would be useful for the formation of the management plan of proposed TMP.

There is a lack of fisheries profile on the island of Banggi and its neighbouring islands as Banggi Island is considered a sub-district under the Department of Fisheries, Kudat. The Kudat Office of the Department of Fisheries is located on mainland Kudat, thus, due to budget constraints, monitoring and information gathering on the fishermen in Banggi Island and its surround islands are not adequate. In that, more information is needed from studies in order to understand the fisheries profile of Banggi Island and its surrounding Islands. Information on the number of fishermen in Banggi Island and their gears are still lacking, there is also no information on the location of villages in Banggi Island.

Thus, this study would look into mapping the location of fishing villages and to identify the number of gillnet fishermen in these waters.

A need in information regarding the fishing areas for the fishing gears operating within the islands in TMP is needed as zoning of the fishing areas for the proposed TMP are still in way. Information on the fishing ground would aid in the construction of the management plan of TMP and reducing conflicts between fishermen of different gears.

The waters of TMP has been recognised as the central source from which the rest of the Indo-Pacific recruited much of its fauna, threatened, charismatic and migratory species such as turtles (WWF, 2006). The waters of TMP have also been identified as an important route for turtle migration. More, there are records of turtle eggs in the islands of TMP (Hin, 2010). This indicates the importance of the waters of TMP for turtles. Thus, it is important to understand the impacts of the fishing pressure from fishing gears operating in TMP towards turtles.

### 1.3 Objectives of Study

The scope and overall objective of this study is to obtain baseline information on the fisheries activities of shrimp trawlers, fish trawlers and gillnets of proposed TMP. In order to achieve the overall objective, the following specific objective are targeted:

1. To obtain baseline information on the landing trend for shrimp trawlers, fish trawlers and gillnets operating within the waters of proposed TMP at different seasonal monsoon.
2. To determine the distribution of gillnet fishermen operating within the waters of proposed TMP and obtain baseline information on the number of gillnet fishermen in the waters of proposed TMP.
3. To identify gear characteristics and fishing grounds for shrimp trawlers, fish trawlers and gillnets in the water of TMP.
4. To identify impacts of shrimp trawlers, fish trawlers and gillnets on turtle population in proposed TMP.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Establishment of Proposed TMP

In 2001, Sabah Parks proposed the establishment of TMP in north Sabah, including Banggi Island, with the aim of alleviating overexploitation of the region's fisheries and conserving the rich biodiversity found within its coastal environment (Teh et al., 2005). The Sabah State Government, through a State Cabinet decision, approved the proposal to gazette the northern part of Sabah as a Marine Protected Area (MPA) in 2003. (Teh et al., 2005; Komilus et al., 2012, Lajiun, 2013) (Figure 2.1). The objectives of the establishment of the proposed TMP are to protect and enhance biodiversity of terrestrial and marine environment of the area, to exploit the marine and terrestrial resources of the area in an ecologically sustainable manner and to alleviate the socio-economic conditions of the local people, particularly the hard-core poor of the area, through ecologically sustainable economic development (Lajiun, 2013).

Sabah Parks was mandated to coordinate the development of a management plan that was required for the subsequent gazetting of the Park, in collaboration with relevant government agencies and other stakeholders including academics, local communities and NGOs. Once fully gazette, TMP will be the largest marine park in Malaysia and second largest marine protected area in South-East Asia with 1.02 million hectares and managed in line with the concept of multi-stakeholder collaborative management (Lajiun, 2013; The Borneo Post, 2013). The concept for the park is to be multiple use, managed area which includes areas for strict protection, tourism, artisanal fishing and commercial fishing among others.

The proposed TMP is a globally significant conservation area. The waters of TMP is one of the priority conservation areas (PCAs) of the Sulu Sulawesi Marine Ecoregion (SSME) and is located within the Coral Triangle, the centre of the world's marine diversity. This complex bioregion supports the highest levels of