

STUDY ON THE DISTRIBUTION AND ABUNDANCE OF MANGROVE CRABS FROM MON COASTAL AREA

Nyunt Sandar Aung*

Abstract

The present study was conducted in six mangrove areas of Mon State (Bilukyun (Sabelar), Setse, Tarokpi, Kalegawk, Kaudut and Zeephyuthaung) from June 2012 to April 2017. During the study period, a total of 24 species of brachyuran crabs under 4 families (Portunidae, Grapsidae, Ocypodidae and Dorippidae) were recorded. Among the recorded species, *Scylla serrata*, *Scylla olivacea*, *Sesarma andersorii*, *S. bidens*, *S. intermedium*, *Varuna littera*, *Gelasimus acutus*, *G. annulipes*, *G. dessumieri*, *G. marionis var nitidus*, *Uca chlorophthalmus*, *Uca hesperiae*, and *Uca tetragonon* were observed at almost all the study areas. Almost all species were collected from Kalegawk and Kaudut mangrove areas representing 24 species and followed by Zeephyuthaung representing 17 species. *Scylla serrata*, *S. olivacea* and *Metaplax elegans* were the most abundance and also collected in every month in all stations. *Dorippe dorsipes* and *Ocypoda sp.* were only observed in Kalegawk and Kaudut mangrove areas. Seasonally, the highest species diversity of crabs was observed in hot months and the highest number of individuals of crab species was observed in the wet season.

Keywords: Abundance, brachyuran crabs, Dorippidae, Grapsidae, mangrove areas, Portunidae, Ocypodidae.

Introduction

Myanmar has extensive mangrove forests along the Rakhine, Ayeyarwaddy and Tanintharyi Coasts. The regions provide many mangroves and coastal habitats, and also serve as the breeding sites and the development of shrimps, prawns, crabs and fish culture. Mon Coast is situated at the southern part of Myanmar and have the long coastline more than thousand kilometers. It is famous for its inland and offshore. Crabs are one of the most commercial function in Mon coastal areas.

Mangroves are unique inter-tidal ecosystem of tropic and subtropics which support genetically diverse group of aquatic and terrestrial organisms. They provide the most important sources of fisheries and livelihoods of people living in the coastal zone. The products come from marine fisheries, freshwater and aquaculture of shrimp, crabs and fishes from marine, brackish and freshwater. Mangrove ecosystems are also known to be the areas of high biodiversity since which provide home for many marine and fresh water species. Crabs are one of the important species in the mangrove ecosystem.

Brachyuran crabs are the most predominant and abundant species in many mangrove forests. Some of the crabs are resident species where some others are visiting species within the mangrove areas. The crabs depend directly on mangrove areas for survival by feeding on leaves and litter. The complex structure of prop roots, pneumatophores and main trunks provides living spaces for numerous organisms and cover from the predation of large populations of small fishes, nektonic and benthic crustaceans, annelids, mollusks and invertebrates. Occurrence of crab species are related to habitat condition, community types, and nature of substrate. *Sesarma biden* and *Sesarma intermedium* prefer to live in the mangrove areas of *Avecinnia - Excoecaria* forest types. *Scylla serrata* species prefer to live in muddy substrate in deep forest. The groups of *Uca* and *Gelasimus* species seem to have preference for high tide regions of the mangrove forest.

At present, an attempt has been made on the study of distribution and abundance of mangrove crabs along the Mon Coasts including Bilukyun, Tarokpi, Setse, Kaudut, Kalegawk and

* Dr, Associate professor, Department of Marine Science, Mawlamyine University

Zeephyuthaung. The aim of the present study is to know the distribution and abundance of mangrove crabs within the study areas.

Materials and Methods

The study of distribution and abundance of crabs was carried out along the mangrove areas of Mon coast from June 2012 to April 2017. Monthly field trips were conducted on six designated places where mangrove crabs are landed including Bilukyun (Sabelar) (Lat. 16° 14'N, Long. 97°32' E), Setse (Lat. 15° 54'N, Long. 97°35' E), Tarokpi (Lat. 15° 55'N, Long. 97°34' E), Kaudut (Lat. 16° 29'N, Long. 97°23' E), Kalegawk (Lat. 15° 31'N, Long. 97°51' E) and Zeephyuthaung (Lat. 15° 11'N, Long. 97°47' E). The locations of study areas were shown in Fig.1. The specimens were collected mainly by hand and locally made traps during day time in almost all the habitats within the mangrove and surrounding areas. The colorations, localities and date of collection of the crabs were noted immediately after they have been caught. All specimens were first preliminarily examined on the day of collection and then preserved in 10% formalin for further examination. Species identification was largely based on the F.A.O species identification sheets and some identification guide books. Diagnostic characters of the specimen followed after De Man (1888), Alcock (1896,1900), Chhapgar (1956), Sakai (1965), Barends (1967), Crane (1975), Motoh (1980), Carpenter and Niem (1998), Keenan (1998), Peter (2008) and Naser (2011) and some previous workers. Local name of the studied species was informed by the local fishermen.



Figure 1 Map showing the samples collected areas: Bilukyun (Sabelar); Setse; Tarokpi; Kaudut; Kalegawk and Zeephyuthaung

Results

A total of 24 species, 15 genera, 4 families belonging to order Decapoda under the class crustacea and the Phylum Arthropoda was recorded during the study period comprising 3 species of Portunidae, 12 species of Grapsidae, 8 species of Ocypodidae and 1 species of Dorippidae. The classified list of mangrove crab species was presented in Fig.2 and Table 1. The distribution and abundance of mangrove crabs was observed monthly at the six stations, namely, Bilukyun (Sabelar), Setse, Tarokpi, Kaudut,

Kalegauk and Zeephyuthaung within the study period. Kalegauk and Kaudut mangrove areas were represented as the most diverse crab species representing 24 species and followed by Zeephyuthaung representing 17 species. Among the recorded species, *Dorippe dorsipes* and *Ocypoda sp.* were only observed in Kalegauk and Kaudut mangrove areas. The distribution of the crab species among the study areas were presented in Table 2.

Table 1 The Classified list of Brachyuran Crabs from the study areas of Mon Coast.

Phylum	Class	Order	Family	Genus	No.	Species	
Arthropoda	Crustacea	Decapoda	Portunidae	<i>Scylla</i>	1	<i>Scylla serrata</i>	
					2	<i>S. olivacea</i>	
					3	<i>Charybdis riversandersoni</i>	
			Grapsidae	<i>Metopograpsus</i>	4	<i>Metopograpsus messor</i>	
					5	<i>Grapsus tenuicrustatus</i>	
					6	<i>Pachygrapsus minutus</i>	
					7	<i>P. planifons</i>	
					8	<i>Pseudograpsus intermedia</i>	
					9	<i>Varuna littera</i>	
					10	<i>Metasesarma obesum</i>	
					11	<i>Sesarma andersorii</i>	
					12	<i>S. bidens</i>	
					13	<i>S.intermedium</i>	
					14	<i>Parasesarma plicatum</i>	
			15	<i>Metaplax elegans</i>			
			Dorippidae	<i>Dorippe</i>	16	<i>Dorippe dorsipes</i>	
			Ocypodidae	<i>Ocypoda</i>	17	<i>Ocypoda sp.</i>	
					<i>Gelesimus</i>	18	<i>Gelasimus annulipes</i>
						19	<i>G. niarionis var nitidus</i>
						20	<i>G. acutus</i>
					21	<i>G. dessumieri</i>	
					<i>Uca</i>	22	<i>Uca chlorophthalmus</i>
						23	<i>U. hesperiae</i>
			24	<i>U.tetragonon</i>			

Table 2 Distribution of branchyuran crabs among study areas of Mon coast.

No.	Species	Bilukyun	Setse	Tarokpi	Kalegauk	Kaudut	Zeephyuthaung
1	<i>Scylla serrata</i>	+	+	+	+	+	+
2	<i>S. olivacea</i>	+	+	+	+	+	+
3	<i>Charybdis riversandersoni</i>	-	-	-	+	+	+
4	<i>Metopograpsus messor</i>	-	+	+	+	+	+
5	<i>Grapsus tenuicrustatus</i>	-	-	+	+	+	+
6	<i>Pachygrapsus minutus</i>	-	-	-	+	+	-
7	<i>P. planifons</i>	-	-	-	+	+	-
8	<i>Pseudograpsus intermedia</i>	-	-	-	+	+	-
9	<i>Varuna littera</i>	+	+	+	+	+	+
10	<i>Metasesarma obesum</i>	-	-	-	+	+	-
11	<i>Sesarma andersorii</i>	+	+	+	+	+	+
12	<i>S. bidens</i>	+	+	+	+	+	+
13	<i>S. intermedium</i>	+	+	+	+	+	+
14	<i>Parasesarma plicatum</i>	-	-	-	+	+	-
15	<i>Metaplax elegans</i>	+	+	+	+	+	+
16	<i>Dorippe dorsipes</i>	-	-	-	+	+	-
17	<i>Ocypoda sp.</i>	-	-	-	+	+	-
18	<i>Gelasimus annulipes</i>	+	+	+	+	+	+
19	<i>G. niarionis var nitidus</i>	+	+	+	+	+	+
20	<i>G. acutus</i>	+	+	+	+	+	+
21	<i>G. dessumieri</i>	+	+	+	+	+	+
22	<i>Uca chlorophthalmus</i>	+	+	+	+	+	+
23	<i>U. hesperiae</i>	+	+	+	+	+	+
24	<i>U. tetragonon</i>	+	+	+	+	+	+
Total		14	15	16	24	24	17

Abbreviation; + present; - absent



Figure 2 Brachyuran crabs: a) *Scylla serrata*; b) *S. olivacea*; c) *Charibdis riversandersoni*; d) *Metopograpsus messor*; e) *Grapsus tenuicrustatus*; f) *Pachygrapsus minutus*; g) *P. planifons*; h) *Pseudograpsus intermedius*; i) *Varuna litterata*; j) *Metasesarma obesum*; k) *Sesarma andersorii*; l) *S. bidens*; m) *S. intermedium*; n) *Parasesarma plicatum*; o) *Metaplox elegans*; p) *Dorippe dorsipes*; q) *Ocypoda* sp.; r) *G. annulipes*; s) *G. marionis* var *nitidus*; t) *G. acutus*; u) *Gelasimus dussumieri*; v) *Uca chlorophthalmus*; w) *Uca hesperiae*; x) *Uca tetragonon*.

Monthly occurrence of crab species in the study areas

Scylla serrata, *S. olivacea* and *Metaplex elegans* were collected in every month in all stations. Monthly occurrence of mangrove crabs was presented in Fig. 3.

In Bilukyun (Sabelar), *Scylla serrata*, *S. olivacea*, *Sesarma bidens*, *S. andersorii* and *Metaplex elegans* were the most common species where as others species were frequently observed. The highest species number of crabs was found in February. The least number was found in December.

In Setse, *Scylla serrata*, *S. olivacea*, *Sesarma bidens*, *S. andersorii*, *S. intermedium*, *Varuna littera* and *Metaplex elegans* species were collected in every month within the study period. *Uca* and *Gelesimus* species were recorded as the most abundance. The highest species number of crabs was found in April but smallest number in November.

In Tarokpi, *Scylla serrata*, *S. olivacea*, *S. andersorii*, *Sesarma bidens*, *S. intermedian* and *Metaplex elegans* species were collected in every month within the study period. *Uca* and *Gelesimus* species were recorded as the most abundance species in observation. Other species are frequently observed. The highest species diversity of crabs was found in March and the lowest in April.

In Kalegauk, *Scylla serrata*, *S. olivacea*, *Sesarma bidens*, *S. intermedian*, *S. andersorii*, *Metaplex elegans* and *Gelasimus acutus* species were collected in every month within the study period. *Uca* and *Gelesimus* species were recorded as the most abundance species in observation. Other species are frequently observed. Among the collected species *Pachygrapsus planifons*, *P. minutes*, *Metopograpsus thukuhar*, *M. messor*, *Parasesarma plicatum*, *Dorippe dorsipes* and *Ocypoda sp.* were rarely observed. The highest species diversity of crabs was found in June and least amount in August.

In Kaudut, *Scylla serrata*, *S. olivacea*, *Sesarma bidens*, *S. andersorii*, *S. intermedium*, *Varuna littera*, *Metaplex elegans* species were collected in every month within the study period. *Uca* and *Gelesimus* species were recorded as the most abundance species. Other species are frequently observed. Among the collected species, *Pachygrapsus planifons*, *Grapsus tenuicrustatus*, *Metopograpsus messor*, *Pseudograpsus intermedia*, *Parasesarma plicatum*, *Metasesarma obesum*, *Dorippe dorsipes* and *Ocypoda sp.* were rarely observed. The highest species of crabs was found in May and July. In the month of August, they were found in very few numbers.

In Zeephyuthaung *Scylla serrata*, *S. olivacea*, *Varuna littera* and *Metaplex elegans* species were collected in every month within the study period. *Uca* and *Gelesimus* species were recorded as the most abundance species. The predominated month of crab occurrence was in March, in contrast the least accounted number had been recorded in February.

Seasonal occurrence of crabs in study areas

Number of individual crabs with related to species were collected monthly and compared to determine their abundance seasonally at each study sites. (Fig. 4, Fig.5 and Table.3) The study revealed that the dominant numbers of crab species had been collected from Kalegauk and Kaudut. In Kalegauk equal number of crab species was observed in all three seasons (summer, wet and winter). In Kaudut, species dominance occurred in summer and equal numbers of crab species had been recorded in wet and winter. And also, dominant number of crabs had been found during summer months in Setse, Tarokpi and Zeephyuthaung, but in Bilukyun, equal numbers of crab species could be collected during summer and wet months.

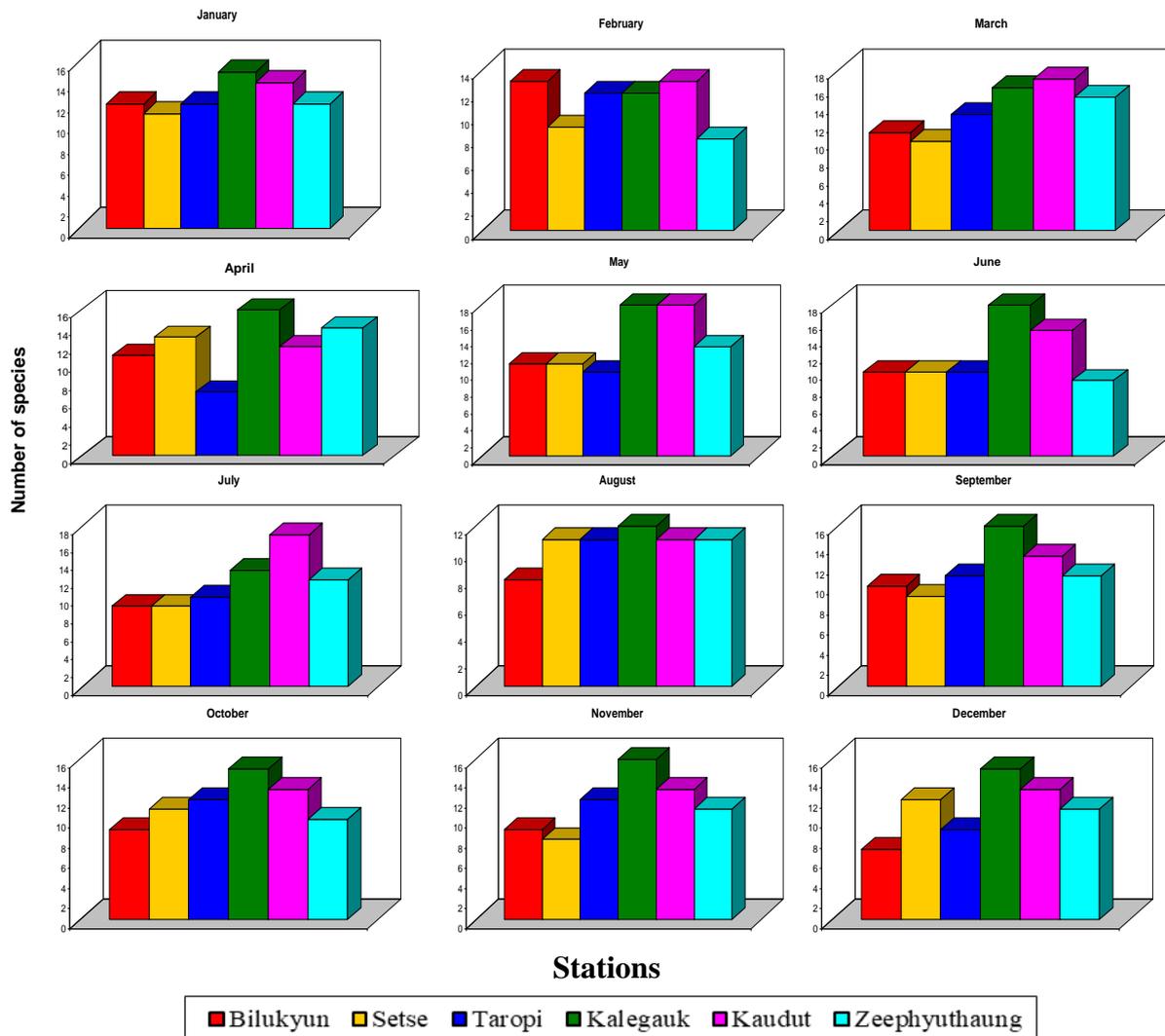


Figure 3 Monthly occurrence of crab species in the study areas of Mon Coast.

In relation to the seasonally dominant individual species, totalling 928 individuals and 14 species, belonging to 6 genera, under 3 families were recorded in Bilukyun station. Among these, 228 individuals, 456 individuals and 244 individuals were observed from summer, wet and winter, respectively. A total of 6 genera were recorded in summer and wet but in winter only 5 genera were recorded. Among the recorded species, *Varuna littera* was most abundance in summer and wet seasons. In winter, *Sesarma bidens* was occurred as dominant species.

In Setse, a total of 944 individuals and 15 species, belonging to 7 genera under 3 families were recorded. Among these, 192 individuals, 476 individuals and 276 individuals were recorded in summer, wet and winter respectively. During the study period, *Varuna littera* and *Sesarma intermedium n* were dominant during the summer months, *Sesarma bidens* was most abundance in wet season. In summer season, *Varuna littera* and *Metopograpsus messor* were dominated. In Tarokpi, a total of 1164 individuals, 16 species, belonging to 7 genera, under 3 families were recorded. Among those, 232 individuals, 520 individuals and 304 individuals were collected summer, wet and winter, respectively. During the study period, *Varuna littera* and *Sesarma intermedium n* were dominant in the summer months. In wet and winter season, *Sesarma intermedium n* was found dominance.

In Kalegawk, a total of 1960 individuals and 24 species belonging to 15 genera, under 4 families were recorded. Among those, 412 individual, 976 individuals and 580 individuals were collected in

Species	Bilukyun			Setse			Tarokpi			Kalegauk			Kaudut			Zeephyuthaung		
	Hot	Wet	Cool	Hot	Wet	Cool	Hot	Wet	Cool	Hot	Wet	Cool	Hot	Wet	Cool	Hot	Wet	Cool
<i>Scylla alivacea</i>	8	12	8	4	12	8	4	12	12	8	16	4	8	16	12	8	12	12
<i>S. serrata</i>	8	4	4	12	12	8	12	20	8	8	20	12	12	20	8	12	12	8
<i>Charibdi riversandersoni</i>	0	0	0	0	0	0	0	0	0	20	28	12	4	16	8	12	12	8
<i>Metopograpsus messor</i>	0	0	0	20	20	32	24	48	36	12	40	32	12	48	36	0	0	0
<i>Grapsus tenuicrustatus</i>	0	0	0	0	0	0	0	0	0	16	36	28	20	32	12	0	0	0
<i>Pachygrapsus minutus</i>	0	0	0	0	0	0	0	0	0	12	44	32	8	60	32	0	0	0
<i>P. planifons</i>	0	0	0	0	0	0	0	0	0	16	64	28	16	112	0	0	0	0
<i>Pseudograpsus intermedia</i>	0	0	0	0	0	0	0	0	0	16	52	0	8	28	20	0	0	0
<i>Sesarma andersorii</i>	12	36	32	12	44	28	8	20	16	36	64	48	28	72	36	12	16	8
<i>S. bidens</i>	28	44	36	16	60	24	24	48	32	52	76	60	36	68	40	16	36	24
<i>S.intermedium</i>	12	32	24	24	44	28	28	60	40	32	48	44	16	40	24	20	32	28
<i>Parasesarma plicatum</i>	0	0	0	0	0	0	0	0	0	24	64	36	16	0	24	8	32	12
<i>Metasesarma obesum</i>	0	0	0	0	0	0	0	0	0	0	56	24	20	48	24	0	0	0
<i>Varuna littera</i>	44	72	0	24	44	32	28	60	36	44	84	36	24	52	28	32	44	36
<i>Dorippe dorsipes</i>	0	0	0	0	0	0	0	0	0	0	0	12	0	56	20	0	0	0
<i>Ocypoda sp.</i>	0	0	0	0	0	0	0	0	0	12	0	0	36	20	0	0	0	0
<i>Metaplex elegans</i>	20	28	16	12	32	24	16	44	24	20	44	28	24	48	36	12	36	20
<i>Gelasimus acutus</i>	12	32	20	16	36	24	8	40	24	12	44	20	12	36	20	8	24	16
<i>G. annulipes</i>	8	20	0	0	28	16	12	36	16	8	32	24	8	44	12	32	56	0
<i>G. dessumieri</i>	20	32	12	12	32	16	12	24	12	12	24	16	20	48	28	12	40	24
<i>G. niarionis var nitidus</i>	16	28	20	12	24	20	8	28	16	12	36	28	12	32	24	8	40	28
<i>Uca chlorophthalmus</i>	12	36	20	8	44	16	12	44	16	8	44	20	12	0	12	16	0	0
<i>Uca hesperiae</i>	12	44	32	8	0	0	12	36	16	12	24	12	16	32	24	12	0	24
<i>Uca tetragonon</i>	16	36	20	12	44	0	24	0	0	20	36	24	12	44	16	0	32	20
Total number of crabs	228	456	244	192	476	276	232	520	304	412	976	580	380	972	496	220	422	286
Total number of species	14	14	12	15	14	13	16	15	15	22	22	22	23	22	22	15	14	14
Total number of genera	6	6	5	7	7	7	8	7	7	13	13	13	14	14	14	7	7	7
Total number of families	3	3	3	3	3	3	3	3	3	3	3	4	3	4	4	3	3	3

summer, wet and winter, respectively. According to genera, 13 genera were recorded in summer and winter periods but in wet season 14 genera were recorded. *Sesarma bidens* was the most abundant species in winter and summer season. The dominant species during the wet season was *Varuna littera*. In Kaudut, a total of 1848 individuals and 24 species belonging to 15 genera under 4 families were recorded. Among those, 380 individuals, 972 individuals and 496 individuals were recorded during summer, wet and winter, respectively. *Sesarma bidens* was the most abundant species in the winter and summer season. In the wet season, *Pachygrapsus planifons* was the most abundant species. In Zeephyuthaung, a total of 928 individuals and 15 species belonging to 7 genera under 3 families were recorded. Among those, 220 individuals, 422 individuals and 286 individuals were recorded summer, wet and winter, respectively. In summer, *Varuna littera* and *Gelasimus annulipes* were dominant and only *Gelasimus annulipes* was the most abundant species during the wet season and only *Varuna littera* was the most abundant in the winter months.

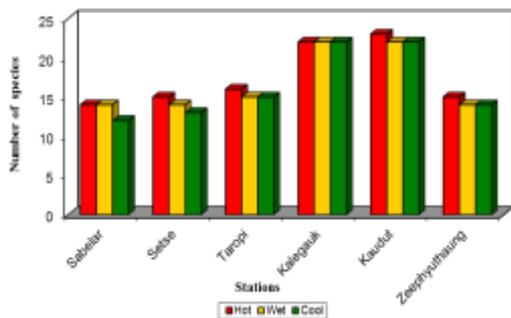


Figure 4 Stations wise seasonal occurrence of crab species.

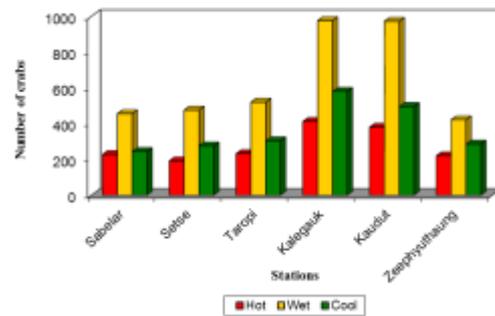


Figure 5 Stations wise seasonal occurrence of total crabs.

Discussion

During the study period, a total of 24 species, 15 genera under 4 families could be collected. Of all the collected species of crabs, 3 species such as *Scylla serrata*, *Scylla olivacea* and *Charybdis riverandersonii* were included under the family Portunidae, 12 species, *Metopograpsus messor*, *Grapsus tenuicrustatus*, *Pachygrapsus minutes*, *P. planifons*, *Pseudograpsus intermedia*, *Varuna littera*, *Metasesarma obesum*, *Sesarma andersorii*, *S. bidens*, *S. intermedium* and *Parasesarma plicatum*, *Metaplax elegans* were included in the family Grapsidae; and 8 species, *Ocypoda sp.*, *Gelasimus annulipes*, *G. niarionis var nitidus*, *G. acutus*, *G. dessumieri*, *Uca chlorophthalmus*, *Uca hesperiae* and *Uca tetragonon* were in the family Ocypodidae; and the only one species, *Dorippe dorsipes* was included in the family Dorippidae. Alcock (1896) mentioned that the common mud species of *S. serrata*, and *S. olivacea* had been recorded from Myanmar coastal waters. In the present study these two species were also recorded. Chhapgar (1956) recorded that one of the Potunid crab, *Charybdis annulata*, was collected by Myanmar coastal waters particular in the mangrove region and rocky shore. It was observed that Sesarmid crabs were the most abundance in the muddy substrate of mangrove regions apart from Potunid crabs. The genus *Charybdis* as mentioned by Alcock (1900) included six species namely *Charybdis orientalis*, *C. merguiensis*, *C. affanis*, *C. rosrom*, *C. ornata* and *C. hoplites*. According to Sandar Win (1997) three species were recorded from Mon State. Among the recorded crab species, the species *Charybdi. river andersori* was recorded from Zeephyuthaung, Kalegauk, Kaudut areas. According to Alcock (1896), the genus *Metopograpsus* included two species such as *M. messor* and *M. maculatus* which has been recorded from Myanmar Coastal Waters. Khin Khin Than (1986) has been studied one species, *M. latifrons* from Myanmar Coastal Waters and Khin Mar Wai (1995) recorded three species such as *M. messor*, *M. latifrons* and *M. maculatus* from Rakhine Coastal Area. Sandar Win (1997) recorded *M. messor* from Mon Coastal area. Only one species of genus

Metopograpsus, *M. messor* was recorded from Setse, Tarokpi, Kalegawk, Kaudut and Zeephyuthaung areas.

Another common mangrove Sesamid crabs is the genus *Grapsus*. Most of the *Grapsid* crabs are resident in the mangrove region and they have bright and distinct color. The genus *Grapsus* was recorded by Alock (1900) included one species *G. strigosus* which had been recorded from Myanmar coastal waters. Khin Khin Than (1986) and Thida Soe (2014) also recorded *G. strigosus* from Myanmar coastal waters and Chaungtha areas. According to Zin Moh Moh Tun (2014) included two species *G. albolineatus* and *G. tenuicrustatus* which had been recorded in Ye coastal areas. According to Zin Moh Moh Tun (2014) included two species *Grapsus albolineatus* and *G. tenuicrustatus* which had been recorded in Ye coastal areas. In the present study *Grapsus tenuicrustatus* was recorded from Tarokpi, Kalegawk, Kaudut and Zeephyuthaung study areas. The genus *Pachygrapsus* discovered by Alcock (1896) included one species *P. minutus* which has been recorded from Myanmar Coastal Waters. Bronchard (2011) discovered three species, *P. minutus*, *P. planiformis* and *P. plicatus* from Mayotte region. In the present study two species, *P. minutus* and *P. planiformis* are recorded from Kalegawk and Kaudut.

No species of the genus *Varuna* had been recorded from Myanmar coastal waters in the record of Alcock (1968). But the species *Varuna littera* had been recorded by Sandar win (1997) from Mon coastal area. Thida Soe (2014) recorded this species from Chaungtha and Zin Moh Moh Tun (2014) also recorded *Varuna littera* from and Ye coastal area. In the present study the species *Varuna littera* also recorded from all stations. The genus *Metasesarma* discovered by Alcock (1896) included one species *M. rousseauxii* which had been recorded from Myanmar Coastal Waters. Khin Mar Wai (1994) also found this species from Rakhine coast. Bronchard (2011) discovered *M. obesum* from Mayotte region. In the present study *M. obesum* was recorded from Kalegawk and Kaudut. The genus *Parasesarma* mentioned by Bronchard (2011) discovered *P. plicatum* from Mayotte region. In the present study *P. plicatum* was collected from Kalegawk and Kaudut. Alcock (1900) recorded six species of genus *Sesarma* such as *S. pictum*, *S. taeniolum*, *S. edwardsi*, *S. andersoni* and *S. pilatum* under the genus *Sesarma* from Myanmar coastal waters. In the present study, the three species *S. bidens*, *S. intermedian* and *S. andersori* were recorded from all stations. The genus *Metaplex* discovered by Thet Su Mar (2010) included three species *Metaplex dentipes*, *M. elegans* and *M. distinct* which had been recorded from Ayeyawady Delta. In the present study only one species *Metaplex elegans* was recorded from Kalegawk and Kaudut. Alcock (1900) recorded five species of *Dorippe* including *D. dorsipes*, *D. astute*, *D. facchino*, *D. granulate* and *D. polota* from Myanmar coastal waters. In the present study, *D. dorsipes* was recorded from Kalegawk and Kaudut mangrove.

The genus *Ocypoda* recorded by Alcock (1900) included one species *O. cordimana* which had been recorded from Myanmar coastal waters. *O. certopthalma* had been recorded by Khin Khin Than (1986) and Khin Mar Wai (1995). *O. certopthalma*, *O. stimpson* and *O. roundata* were recorded by San San Lwin (1986) from Chaungtha area. Sandar Win (1997) recorded three species such as *O. certopthalma*, *O. cordimanus*, *O. roundata* and *O. stimpsoni* were recorded from Mon coastal area. Thida Soe (2014) also discovered three species: *O. certopthalma*, *O. cordimanus*, *O. stimpson* from Chaungtha coastal areas. Moreover, Zin Moh Moh Tun (2014) also recorded *O. certopthalma* from Ye coastal areas. In the present study *Ocypoda* sp. was recorded from Kalegawk and Kaudut. The genus *Gelasimus* included.

Alcock (1896) recorded three species namely, *G. annulipes*, *G. acutus* and *G. dussumieri* and Chhappgar (1956) recorded one species of *G. marionis var nitidus*. The genus *Gelasimus*, Khin Khin Than (1986) recorded four species such as *G. lacteal*, *G. annulipes*, *G. marionisnitidus* and *G. marionis* from Myanmar coastal waters. In the present study, the above mentioned four species were collected from all stations.

The genus *Uca* mentioned by Bronchard (2011) also included six species, *U. annulipes*, *U. inversa*, *U. hesperiae*, *U. tetragonon*, *U. chlorophthalmus* and *U. urvillie* were collected from Mayotte region. Thida Soe (2014) also discovered three species *G. annulipes*, *G. tetragonan* and *G. marionis* from Chaungtha coastal areas. In the present study *U. chlorophthalmus*, *U. hesperiae* and *U. tetragonon* were collected from all stations. According to the distribution and occurrence of collected species, it was recorded that 14 species under 3 families from Bilukyun (Sabelar); 15 species under 3 families from Setse; 16 species under 3 families from Tarokpi; 24 species under 4 families from Kalegauk and Kaudut and 17 species under 3 families from Zeephyuthaung.

Khin Khin Than (1986) observed 66 species 10 families (Calappidae, Leucosidae, Maiidae, Parthenopidae, Portunidae, Xanthidae, Pinnotheridae, Grapsidae and Ocypodidae) from Myanmar coastal waters. Sanda Win (1997) recorded 29 species under 7 families (Calappidae, Parthenopidae, Portunidae, Xanthidae, Ocypodidae, Grapsidae and Potomonidae) from Setse coastal areas. Thet Su Mar (2010) observed 27 species 3 families (Portunidae, Grapsidae and Ocypodidae) from the Pyindaye reserved forest, Ayeyarwaddy Delta. Myint Myint Aye (2013) recorded 24 species under 7 families (Dorippidae, Calappidae, Portunidae, Xanthidae, Geocarcinidae, Ocypodidae and Grapsidae) from U-TO creek Chaungtha coastal area. Thida Soe (2014) recorded 65 species 14 families (Dromiidae, Dorippidae, Leucosidae, Calappidae, Majidae, Pisidae, Parthenopidae, Portunidae, Xanthidae, Galenidae, Goneplacidae, Ocypodidae, Grapsidae and Porcellanidae) from Chaungtha coastal areas. And also, Zin Moh Moh Tun (2014) recorded 34 species 9 families of brachyuran crabs (Portunidae, Xanthidae, Calappidae, Ocypodidae, Xenophthalmidae, Dotillidae, Parthenopidae, Ozidae and Grapsidae) from Ye coastal area. In the present study, 24 species of brachyuran crabs under 4 families (Portunidae, Grapsidae, Ocypodidae and Dorippidae) were recorded.

Among the study area, Kalegauk and Kaudut mangrove region were recorded as the most diverse species areas and are followed by Zeephyuthaung. Accordance to the crab families' occurrence, the family Ocypodidae were represented as the most abundance group in Bilukyun (Sabelar), Setse and Zeephyuthaung. Whereas the family Grapsidae dominated in Kaudut and Kalegauk and the family Grapsidae and Ocypodidae were found abundantly in Tarokpi. As record the monthly occurrence of mangrove crabs among study areas in Mon, the most common species in Bilukyun (Sabelar) area were *Scylla serata*, *S. olivacea*, *Sesarma bidens*, *Sesarma andersorii* and *Metaplax elegans*. The predominant period of those species was February. The common species found in Setse area were *Scylla serata*, *Scylla olivacea*, *Sesarma bidens*, *Sesarma andersorii*, *Varuna littera* and *Metaplax elegans*. All those species were found throughout the year and the highest occurrence of them was in April. The common species found in Tarokpi were *Scylla serata*, *S. olivacea*, *Sesarma bidens*, *Sesarma andersorii* and *Metaplax elegans*. The highest abundance period was in March. In Kalegauk, *Scylla serata*, *S. olivacea*, *Sesarma bidens*, *Sesarma andersorii*, *Metaplax elegans* and *Gelasimus acutus* were common species and the highest abundance period of these species was noticed in June. In Kaudut, *Scylla serata*, *Scylla olivacea*, *Sesarma bidens*, *Sesarma andersorii*, *Varuna littera* and *Metaplax elegans* were common species and peaked in May. The common species found in Zeephyuthaung were *Scylla serrata*, *S. olivacea*, *Varuna littera* and *Metaplax elegans*. The highest abundant period was in March. This result showed that two species under genus *Scylla* had been observed in all study areas and it may be said that these two species have a wide range in distribution.

In the observation of seasonal occurrence of collected species in Mon study areas, the crab species abundantly occurred during wet months. In Bilukyun area, the dominant species during summer and wet months was *Varuna littera* and dominant species in winter months was *Sesarma bidens*. In Setse, the dominant periods of crabs were found during wet season and the dominant species of this period was *Sesarma bidens*. *Sesarma intermedium* dominated during summer time, and *Metopograpsus messor* in winter months. *Varuna littera* was found in abundance both during

summer and winter months. In Tarokpi, the most dominant period of crab species was noticed in wet months. The dominant species observed in summer months were *Varuna littera* and *Sesarma intermedium* which were found throughout the wet and winter months. For the remaining three study areas in Mon, the period dominated by crab species had also been noticed during wet months and the most common species in that season were *Varuna littera* in Kalegawk, *Pachygrapsus planifrons* in Kaudut, *Gelasimus annulipes* in Zeephyuthaung. According to these results, it may be considered that wet season was regarded as the most abundant periods of crab species. Recording to seasonal occurrence of crabs, Thet Su Mar (2010) observed 8 genera (*Scylla*, *Episesarma*, *Sesarma*, *Metaplax*, *Metopograpsus*, *Clistocoeloma*, *Varuna*, *Ilyoplex* and *Gelasimus*) in the hot, wet and cool season respectively from the Pyindaye reserved forest, Ayeyarwaddy Delta.

In the present study, especially in Bilukyun (Sabelar) station, 6 genera (*Scylla*, *Sesarma*, *Varuna*, *Metaplax*, *Gelesimus* and *Uca*) were recorded in hot and wet season and 5 genera (*Scylla*, *Sesarma*, *Metaplax*, *Gelesimus* and *Uca*) were recorded in the cool season. In Setes station, 7 genera (*Scylla*, *Grapsus*, *Sesarma*, *Varuna*, *Metaplax*, *Gelesimus* and *Uca*) were observed in dry, wet and cool seasons. In Tarokpi station, 8 genera (*Scylla*, *Metopograpsus*, *Grapsus*, *Sesarma*, *Varuna*, *Metaplax*, *Gelesimus* and *Uca*) in hot season and 7 genera (*Scylla*, *Metopograpsus*, *Sesarma*, *Varuna*, *Metaplax*, *Gelesimus* and *Uca*) were recorded in wet and cool seasons. In Kalegawk station, during hot, 13 genera (*Scylla*, *Charybdis*, *Metopograpsus*, *Grapsus*, *Pachygrapsus*, *Pseudograpsus*, *Varuna*, *Sesarma*, *Parasesanna*, *Metaplax*, *Ocypoda*, *Gelesimus*, *Uca*) were recorded and also (*Scylla*, *Charybdis*, *Metopograpsus*, *Grapsus*, *Pachygrapsus*, *Varuna*, *Metasesarma*, *Sesarma*, *Parasesanna*, *Metaplax*, *Dorippe*, *Gelesimus*, *Uca*) were recorded in wet and cool seasons. In Kaudut station, during hot season (*Scylla*, *Charybdis*, *Metopograpsus*, *Grapsus*, *Pachygrapsus*, *Pseudograpsus*, *Varuna*, *Metasesarma*, *Sesarma*, *Parasesanna*, *Metaplax*, *Ocypoda*, *Gelesimus*, *Uca*); in wet season (*Scylla*, *Charybdis*, *Metopograpsus*, *Grapsus*, *Pachygrapsus*, *Pseudograpsus*, *Varuna*, *Metasesarma*, *Sesarma*, *Metaplax*, *Dorippe*, *Ocypoda*, *Gelesimus*, *Uca*); in cool season (*Scylla*, *Charybdis*, *Metopograpsus*, *Grapsus*, *Pachygrapsus*, *Pseudograpsus*, *Varuna*, *Metasesarma*, *Sesarma*, *Parasesanna*, *Metaplax*, *Dorippe*, *Gelesimus*, *Uca*) were recorded. In Zeephyuthaung station, 7 genera (*Scylla*, *Charybdis*, *Varuna*, *Sesarma*, *Metaplax*, *Gelesimus*, *Uca*) were recorded in hot, wet and cool seasons.

Conclusion

Among the recorded species, the genus *Scylla* particular *Scylla serrata* and *S. olivaceae* species are the most economically important species for both exports and local consumption. It is seemed to be suggested that the most abundantly occurrence of these crabs was between Decembers to March according to the monthly distribution data from the study areas within the study period. Among the study areas, Kalegawk and Kaudut mangrove region were represented as the highest diversity of crabs, however, Bilukyun (Sabelar) and Setse areas a smaller number of crab species were recorded.

Acknowledgements

Special thanks go to Rector and Pro-rectors of Mawlamyine University for encourage to do the research and complete the work. My deepest thanks are due to Dr. Soe Pa Pa Kyaw, Professor & Head of Marine Science Department, Mawlamyine University, for his kind guidance, constant encouragement and permitting me to continue and complete this work. Finally, I would like to thank my beloved family for their encouragement and providing various supports during this work.

References

- Alcock, A. (1896-1900). *Materials for a Carcinological Fauna of India*. Wheldon & Wesley Ltd. Stechert-hafner service agency, inc. codicote, herts. New York.
- Barnes, R. S. K. (1967). *Studies on the Australasian species of the genus Macrophthalmus and of other related genera (Crustacea: Brachyura)*. University of Queensland.
- Bouchard, J. M. (2011). Land, Mangrove and Freshwater Decapoda Crustaceans of Mayotte Region (Crustacean Decapoda). *National museum of natural history Smithsonian Institution Washington D.C, U.S.A.* no. xxx, pp. 1-96.
- Carpenter, K. E and Niem, V. H. (1998). *The living marine resources of the Western Central Pacific*. Food and agriculture organization of the United Nations Rome.
- Chhapparg, B. F. (1956). On the Marine Crabs (Decapoda: Brachyura) of Bombay State. *Journal Bombay Natural Hist. Society*. vol. 54. part I, no.2, pp. 399-439.
- Crane, J. (1975). *Fiddler crabs of the world Ocypodidae: Genus Uca*. Princeton University Press, Princeton, New Jersey.
- De Man. (1888). Report on the Podophthalmous Crustacean of the Myeik Archipelago. *Journal of the Linnaean Society*. vol. XXII, part 5, pp.1-305.
- Keenan, P. (1998). A revision of the genus *Scylla* De Haan, 1833 (Crustacea: Decapoda: Brachyura: Portunidae). *National University of Singapore*. vol. 46, no. 1, pp. 217-245.
- Khin Khin Than. (1986). *Taxonomy and distribution of Myanmar marine crabs (Decapoda; Brachyura)*. M.Sc. Thesis. Department of Zoology, University of Yangon. (Unpublished).
- Khin Mar Wai. (1995). *The taxonomic study of crabs in Gwa Area*. M.Sc. Thesis. Department of Zoology, University of Yangon. (Unpublished).
- Motoh, H. (1980). *Field guide for the edible crustacean of the Philippines Southeast Asia Fisheries Development Centre (SEAFDEC)*. Iloilo, Philippines.
- Myint Myint Aye. (2013). *Occurrence of crab species in mangrove area of U-To creek, Chaungtha, Patheingyi Township, Ayeyawady Region*. PhD Thesis. Department of Zoology, Yangon University, Yangon, Myanmar. (Unpublished).
- Naser, D. M. (2011). The Sesamid crab *Parasesarma pericum* Naderloo and Schubart, 2010 (Crustacea: Decapoda: Brachyura: Sesarmidae), New to the Iraqi Coastal Waters of Khor Al-Zubair and Shatt Al-Basrah Canal, Basrah, Iraq. *Department of marine biology, Marine Science Centre, University of Basrah, Basrah, Iraq*. vol.4, no. 3, pp.185-190.
- Peter, K. L. (2008). Systema Brachyurum: Part 1. An annotated checklist of extent Brachyuran crabs of the world. *The Raffles Bulletin of Zoology, National University of Singapore*, vol.17, pp.1-286.
- Sakai, T. (1965). *The crabs of Sagami Bay*. East West Center-Press Honolulu. Maruzen Co., Ltd., New York.
- San San Lwin. (1986). *A Taxonomic study of marine crabs of Chaungtha area*. M.Sc. Thesis. Department of Zoology, Yangon University, Yangon, Myanmar. (Unpublished).
- Sandar Win. (1997). *The Taxonomic study of some crabs in Mon State*. M.Sc. Thesis. Department of Zoology, Mawlamyine University, Mawlamyine, Myanmar. (Unpublished).
- Thet Su Mar. (2010). *Community structure of brachyuran crab species in mangrove area of Pyindaye Forest, Ayeyarwaddy Delta*. PhD Thesis. Department of Zoology, Yangon University, Yangon, Myanmar. (Unpublished).
- Thida Soe. (2014). *Diversity of crabs along Chaungtha coastal area with emphasis on habitat preference of Ocypoda ceratophthalma (Phallus, 1772)*. PhD Thesis. Department of Zoology, Yangon University, Yangon, Myanmar. (Unpublished).
- Zin Moh Moh Tun. (2014). *A study on the Branchyura crabs in Ye coastal areas, Mon State*. M.Sc Thesis, Department of Marine Science Mawlamyine University, Mawlamyine. (Unpublished)