

CHAPTER 6

6. Distribution Of Prawns

6.1 Introduction

Many studies have been carried out to define the importance of mangroves as habitats for fish and prawns (Chong et al., 1990; Macnae, 1974; Robertson, 1991; Robertson and Duke, 1987). Chong et al. (1990) found several species of prawns are dependent on mangroves for habitat and food. Robertson (1991) studied the importance of mangroves as a nursery ground for juvenile prawns.

Robertson and Duke (1987) suggest mangroves are important for prawns because of their trees, roots, pneumatophores and fallen timber which provide protective habitats for juvenile prawns. Macnae (1974) and Turner (1977) suggested the correlation between offshore prawn catches and areal extent of mangroves can be the indicator of the dependence of juvenile prawns on mangroves.

Nevertheless, the importance of mangroves to prawn fisheries cannot be disputed (Rebecca and Sasekumar, 1989). Martosubroto and Naamin (1977) found that shrimp production increases with the area of mangrove forests in Indonesia. In tropical Australia, the juveniles of two commercially important penaeid prawn species, *Penaeus merguensis* and *Metapenaeus ensis* were both significantly more abundant in

mangrove habitats compared to other nearshore habitats (Robertson and Duke, 1987). Further confirmation of prawn-mangrove association was shown by Vance *et al.* (1985) who found that immature banana prawn, *Penaeus merguensis* were restricted to parts of estuaries with mangrove fringes in the Gulf of Carpentaria.

The distribution of prawns in terms of total wet weight, biomass, number of specimens and species composition were studied in monthly collections at three sites in a mangrove creek. Diversity and similarity of prawn species between sites were also examined.

6.2 Results and Discussion

6.2.1 Abundance

6.2.1.1 Total Wet Weight of Prawns

The total wet weights of all samples were taken for monthly observations. Site I recorded the highest total wet weight of 796.3g in September 1993 (sampling period Sept. 1992 to Sept. 1993). Site II recorded the highest catch in weight in October 1992. The highest total wet weight of 1695.4g was recorded in Site III in December 1992 (Table 5.0).

Table 5.0 : The total number of specimens, species, wet weight and biomass of prawns captured in bagnets at three sites (I, II and III) in Sungai Sementa Kecil, Selangor.

Month/Date	Site	Total number of specimens	Total number of species	Total wet weight (g)	Biomass (g/m ²)
1992					
Sept, 2	I	63	2	131.0	4.0
	II	75	3	140.3	3.6
Sept, 29	I	219	4	413.4	12.5
	II	77	4	147.6	3.8
Oct, 28	I	316	3	489.2	14.8
	II	213	3	471.2	12.0
Nov, 25	I	187	4	215.0	6.5
	III	1300	4	1658.2	64.3
Dec, 28	I	149	3	337.1	10.2
	III	674	4	1695.4	65.7
Month/Date	Site	Number of specimens	Number of species	Total wet weight (g)	Biomass (g/m ²)
1993					
Jan, 21	I	67	4	116.0	3.5
	III	489	4	388.6	15.1
Feb, 22	I	65	5	117.2	3.6
	III	249	4	388.5	15.1
Apr, 5	I	113	3	267.8	8.1
	III	817	5	1184.3	45.9
Apr, 22	I	115	5	242.8	7.4
	III	330	6	273.6	10.6
May, 21	I	94	4	216.5	6.6
	III	46	4	116.9	4.5
June, 26	I	151	4	418.8	12.7
	III	117	4	258.7	10.0
July, 26	I	58	4	133.2	4.0
	III	146	5	301.1	11.7
Aug, 21	I	199	5	570.8	17.3
	III	97	3	247.3	9.6
Sept, 18	I	420	6	796.3	24.1
	III	539	4	837.9	32.5
Average	I	158	4	318.9	9.7
	II	122	3	253.0	6.5
	III	437	4	668.2	25.9

The lowest catches for Sites I and II were recorded in January 1993 and 2 September 1992^{respectively}. Whereas for Site III the lowest catch was in May 1993 with 116.9g sample. The monthly average of the total wet weight for the three sites varied considerably (Table 5.0).

6.2.1.2 Prawns Biomass

Results of catches at Sites I and III indicated that the highest biomass occurred in September with 24.1g/m² and 32.5g/m² respectively. Site II recorded the highest biomass of 33.5g/m² in September 1993 and the lowest biomass of 3.6g/m² in 2 September 1992. The lowest biomasses for Sites I and III were recorded in January and May with values of 3.5g/m² and 4.5g/m² respectively (Table 5.0).

A comparison of mean biomass for the three sites indicates that Site II had the lowest value while Site III had the highest value (Table 5.0).

6.2.1.3 Number Of Species and Specimens

In this study three families of prawns comprising nine species were found (Table 5.0). The number of species collected in Sites I, II and III were nine, four and seven

respectively (Table 5.0).

The total number of specimens collected for each species were counted on every sampling occasion. Site I recorded the highest number of specimens (420) on 18 Sept. 1993. Site II collected the highest number of specimens (219) on 29 Sept. 1992. Site III recorded the highest number of specimens (1300) on 25 Nov. 1992. This site collected the lowest number of specimens in May with only 46 specimens. This was the lowest number of specimens recorded among the three sites during the course of this study.

6.2.2 Total Wet Weight Of Catches In Bagnet Against Tidal Heights

The total wet weight of catches were below 500g at Site I when the tide levels ranged from 4.5m to 5.0m. The weight of catches increased with tide levels from 5.1m to 5.8m. Site II recorded the highest weight of 471.2g at the tidal height of 5.1 meters. However for Site III, the total wet weights were always high compared to Site I (Fig. 5.0).

The correlation between wet weights and tide levels was calculated for Site I and III. Only Site I had a positive

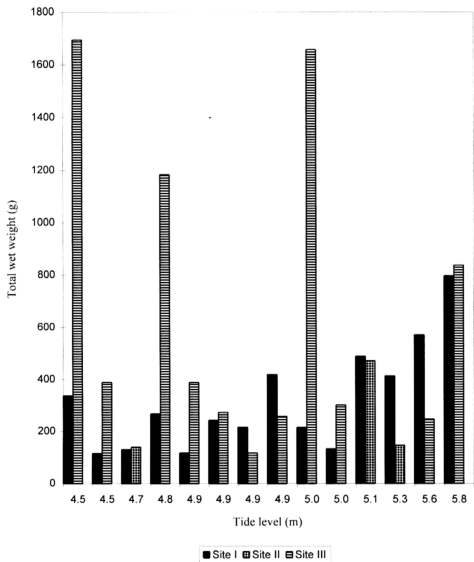


Figure 5.0 : The total wet weight of prawns captured at Sites I, II and III after inundation by tides of different heights.

Table 5.1 : The correlation coefficient (r) between wet weight of prawns against maximum tide level at two sites (I and III) in Sungai Sementa Kecil.

Site	Sample size (n)	r
I	14	0.7973
III	11	-0.1796

correlation , whereas Site III showed a negative correlation (Table 5.1), which is not significant.

6.2.3 Abundance Of Prawn Families

Three groups of crustaceans were common in the bagnet catches, i.e. Penaeidae, Palaemonidae and Sergestidae. Site I was dominated by Penaeidae. Penaeidae made up 100% of the catch in 2 September 1992, whereas in December it made up 81.2%. Palaemonidae and Sergestidae contributed only small percentages of the total catch. Site II was also dominated by the family of Penaeidae with monthly percentages of not less than 90% (Table 5.2).

Penaeidae was again dominant in the catches in Site III, except in the month of April 1993 when the Sergestidae constituted 52% of the catch (Table 5.2).

6.2.4 Species Composition

The Penaeidae were represented by seven species in the bagnet catches. *Penaeus merguensis* was the dominant species, followed by *Metapenaeus brevicornis* based on the number of specimens. Palaemonidae was represented by

Table 5.2 : Percentages of penaeid prawns and sergestid shrimps captured in three creeks (I, II and III) in Sungai Sementa Kecil, Selangor.

Family	Penaeidae		Palaemonidae		Sergestidae	
Month/Date/1992	Site I	Site II	Site I	Site II	Site I	Site II
Sept,2	100	92		8		
Sept,29	94.5	94.8	5.5	5.2		
Oct,28	95.6	98.1	0.6	1.9	3.8	
Month/Date/1993	Site I	Site III	Site I	Site III	Site I	Site III
Nov,25	92.5	98.8	7.5	1.2		
Dec,28	81.2	88	18.8	3.9		8.2
Jan,21	92.5	98.2	7.5	1.8		
Feb,22	87.7	92	12.3	8		
Apr,5	92	98.2	8	1		0.9
Apr,22	95.7	52.4	4.3	0.3		47.3
May,21	87.2	91.3	12.8	8.7		
June,26	90.7	98.3	9.3	1.7		
July,26	91.4	89.7	8.6	4.1		6.2
Aug,21	95.5	100	4.5			
Sept,18	98.8	99.6	1.2	0.4		

Macrobrachium sp. and Sergestidae by *Acetes* sp. (Table 5.3).

The abundance of *Penaeus merguensis* at Site I through the study period did not showed any pattern. The highest number of specimens were collected in September 1993, whereas the lowest number was in February. Not more than 300 specimens were found at any of the monthly samples in Site II. The highest number of specimens of this species was found in Site III in November 1992 (Fig. 5.1).

The number of *Metapenaeus brevicornis* at Site I showed a linear pattern for the first three sampling occasions. Thereafter the distribution did not show any obvious pattern. Site I had a large number of this species in September 1993. Site II had a different pattern with the highest collection occurring on 29 Sept. 1992. More than 100 specimens of this species was collected in Site III in April 1993 (Fig. 5.1).

Macrobrachium sp. was found at every sampling occasion at Site II with the highest collected in 2 Sept. 1992. This species did not occur at Site III in August. A few specimens were always collected at each site (Fig. 5.2). Several other prawns such as *Penaeus penicillatus*, *Metapenaeus lysianassa*, *Metapenaeopsis barbata* and *Metapenaeopsis*

Table 5.3 : The occurrence of prawns and shrimps collected using bagnet placed across creeks at three sites (I, II and III) in Sungai Sementa Kecil based on the number of specimens.

Families/Species	Site	1992					1993									
		Sep,2	Sep,29	Oct,28	Nov,25	Dec,28	Jan,21	Feb,22	Apr,5	Apr,22	May,21	Jun,26	Jul,26	Aug,21	Sep,18	
Palaeomonidae																
<i>Macrobrachium</i>	I	0	+	+	+	+	+	+	+	+	+	+	+	+	+	
sp.	II	+	+	+	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	+	+	+	+	+	+	+	+	+	0	+	
Penaeidae																
<i>Metapenaeopsis barbata</i>	I	0	0	0	0	0	0	+	0	0	0	0	0	0	0	
	II	0	0	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	0	0	0	0	0	0	0	0	0	0	0	
<i>Metapenaeopsis lamellata</i>	I	0	0	0	0	0	0	0	0	0	0	0	0	+	+	
	II	0	0	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	0	0	0	0	0	0	0	0	0	0	0	
<i>Metapenaeus affinis</i>	I	0	0	0	+	0	+	0	0	+	0	0	0	0	+	
	II	0	0	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	+	0	0	0	0	+	0	0	0	0	+	
<i>Metapenaeus brevicornis</i>	I	+	+	+	+	+	+	+	+	+	+	+	+	+	+++	
	II	+	+	+	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	+	+	+	+	+++	+	+	+	+	+	+	
<i>Metapenaeus lymanassa</i>	I	0	+	0	0	0	0	0	0	0	0	0	0	0	0	
	II	0	0	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	0	0	+	+	0	0	0	0	0	0	0	
<i>Ponaeus merguensis</i>	I	+	+++	+++	+++	++	++	+	++	++	++	+++	+	+++	+++	
	II	++	+	+++	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	+++	+++	+++	+++	+++	+	+++	+++	++	+++	+++	
<i>Penaeus penicillatus</i>	I	0	0	0	0	0	0	+	0	+	+	+	+	+	+	
	II	0	+	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	0	0	0	0	+	+	+	+	+	+	0	
Sergestidae																
<i>Acetes</i>	I	0	0	+	0	0	0	0	0	0	0	0	0	0	0	
sp.	II	0	0	0	-	-	-	-	-	-	-	-	-	-	-	
	III	-	-	-	0	++	0	0	+	+++	0	0	+	0	0	

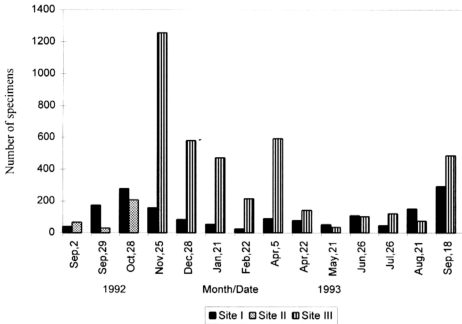
* + - numbers less than 49.

++ - numbers from 50 to 99.

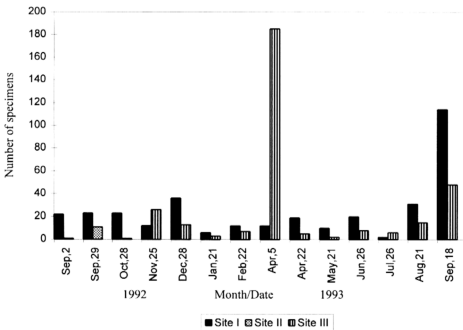
+++ - numbers above 100.

- : sampling was not done.

0 : no specimen was found.



(a)



(b)

Figure 5.1 : The number of prawn specimens (a) *Penaeus merguensis* and (b) *Metapenaeus brevicornis* captured in three study sites (I, II and III) in Sungai Sementa Kecil during 1992 and 1993.

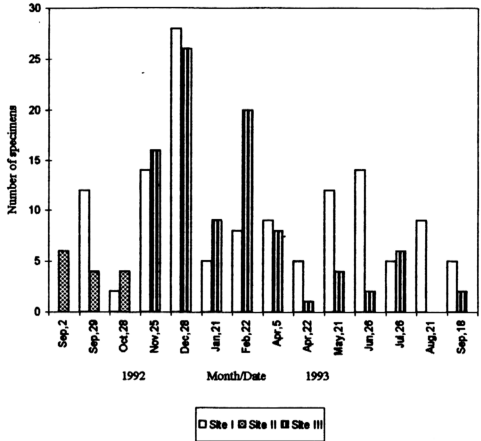


Figure 5.2 : Number of *Macrobrachium* sp. captured in three sites (I, II and III) in Sungai Sementa Kecil during 1992 and 1993.

lamellata occurred occasionally in the study sites (Table 5.3).

6.2.5 Species Richness (D), Diversity (H') and Evenness (J')

The comparison for species richness, diversity and evenness between Sites I and II were calculated from 2 Sept. until 28 Oct. 1992 (Table 5.4). Results show that Site I had the higher species richness, diversity and evenness compared to Site II.

The comparison of species richness, diversity and evenness between Sites I and III for samples from 25 Nov. until 18 Sept. 1993 indicates that Site I had a higher diversity of species. Eventhough the species richness was higher in Site I, the evenness values show that both sites had abundant species (Table 5.4).

6.2.6 Species Similarity (D)

Comparing the monthly similarity of species for Sites I and II (only three samples) using Schoener (D) index indicates that in October these two sites had higher similarity of species. Whereas for Site I and III (samples

from 25 Nov. 1992 until 18 Sept. 1993) the highest similarity of species occurred in August 1993.

The monthly averages of similarity of species between Sites I and II and between Sites I and III showed nearly similar values (Table 5.5). All species captured at Sites I and II and at Sites I and III showed almost the same prawn fauna (Table 5.6).

4 : The comparison of diversity, evenness and richness of prawn species captured in creeks between Sites I and II for the first three times of sampling and between Sites I and III for the rest of sampling during year 1992 and 1993.

	Site I	Site II	Site I	Site III
No. of samplings	3	3	11	11
H'	0.63	0.61	0.9	0.62
H max	1.61	1.39	1.95	1.95
Evenness	0.39	0.44	0.46	0.32
Species richness	1.44	1.17	1.87	1.63

5 : The comparison of similarity of prawn species captured in creeks between Sites I and II for the first three times of sampling and between Sites I and III for the rest of sampling during year 1992 and 1993.

Sites	Schoener Index
I and II	0.89
I and III	0.81

Table 5.5 : Comparison of the monthly similarity of prawn species between Sites I and II and between Sites I and III using the similarity index of Schoener (D) during 1992 and 1993.

Month/Date/1992		Sites I and II
Sept, 2		0.66
Sept, 29		0.83
Oct, 28		0.89
		Sites I and III
Nov, 25		0.88
Dec, 28		0.63
Month/Date/1993		Sites I and III
Jan, 21		0.85
Feb, 22		0.49
Apr, 5		0.84
Apr, 22		0.53
May, 21		0.78
June, 26		0.83
July, 26		0.92
Aug, 21		0.95
Sept, 18		0.79
Average	Sites I and II	0.79
	Sites I and III	0.77
S.D	Sites I and II	0.12
	Sites I and III	0.15