Species Diversity and Spatial Distribution of Macroinvertebrates on the Intertidal Zone of Rajamangala Beach, Trang Province, Thailand

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ABSTRACT

The study on species diversity and spatial distribution of macroinvertebrates on the intertidal zone of Rajamangala beach, Trang province, Thailand aims to investigate species, numbers and spatial distribution changes of polychaetes, mollusks and crabs along the 2 km beach. Four sampling stations from an adjacent of the estuary to the end at the beach, which is nearby a hill, were examined. Each station was divided into four lines: highest tide, 100 m, 200 m and 300 m in distance from the high tide line. Quadrate sampling method was applied for sample collection in monsoon and dry seasons with three replicates in a season. The results showed that 23 polychaete, 23 mollusk and 19 crab species were found. The highest polychaete diversity was recorded at the lowest tide line. At 200 m and 300 m from the highest tide line had highest mollusk species diversity whereas at 100 m from the highest tide line had highest crab species. *Lumbrineris punctata* McIntosh, 1885 and *Scoloplos* spp. were dominated polychaete species of the 200 m and 300 m whereas *Glycera* spp. were frequently found at the 100 m from the highest tide line. For mollusk species, high densities of *Nassarius* spp., *Pilucina* sp. and *Donax incarnatus* Gmelin, 1791 were found. Crab species of the beach were in Infraorder Brachyura (15 species) and Anomura (four species). The most abundant species was *Dotilla myctiroides* (Milne-Edwards, 1852) followed by *Scopimera proxima* Kemp, 1919. The species diversity of all sampling stations had similar distribution, but from the highest tide line to the lowest tide line had a different pattern of macroinvertebrate species distribution.

1. INTRODUCTION

Trang province, magnificent coastal as its long coastline stretches along the Andaman Sea. In addition, the province has two major rivers flowing through it, the Trang River and the Palian River. The coast in the province has particular oceanographic characteristics. Rajamangala beach located in Rajamangala University Srivijaya, Trang campus. It is a 2 km long sandy to the sandy/muddy beach. Mangrove areas, tidal flat, rocky coast also occurs along this beach. Because of the complex habitats and lack of information about macroinvertebrate community of the beach, the study on benthic macroinvertebrate is needed to provide some basic data. The community pattern can be used for comparisons for any critical disorder that may occur within the area. Benthic macroinvertebrates have limited mobility that restrics their ability to avoid adverse conditions, so they are commonly used as environmental indicators. It becomes important to understand how the beach ecosystems will response to unprecedented environmental changes. Exposed sandy beaches are physically dynamic habitats, inhabited by specialized biotic assemblages (Defeo and McLachlan, 2005). Most beach species are found in no other environment, their unique adaptations for life in these dynamic systems such as mobility, burrowing ability, protective exoskeletons, rhythmic behavior (Defeo et al., 2009).

Changes in organism abundance of difference zones may naturally exist along gradients of the beach. Moreover, the intertidal ecology is dynamic and the distribution of the organisms is likely influenced by the specific swash characteristics of the incoming and outgoing tide (Brown and McLachlan, 1990). The analysis of a macrofauna pattern showed declining along a gradient of environmental stress (Solis-Weiss et al., 2004). Previous reports in

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freshwater and marine water benthic faunal habitat showed similar results. Aquatic insect larvae distribution in freshwater correlated with physic-chemical parameters of the bottom sediment and water quality (Premwaranyu and Prommi, 2013; Prommi and Thani, 2014). Moreover in addition, benthic macroinvertebrates related to sediment characteristics in the coastal zone (Kumar et al., 2004). Changes in the textual characteristics of the sediment and the higher level of organic carbon might be responsible for reducing the frequency of occurrence and abundance of the invertebrate fauna especially at stations located near effluent outfall to the stations located far away from the discharge point. Species richness and evenness of distribution have indicated that the disturbance of the environment resulting in changes of sensitive and tolerant benthic communities (Belan, 2003). The density of benthic macrofauna on the coastal seabed of the Andaman Sea ranged from 200 to 1,000 individuals/m2. The majority were polychaetes followed by crustaceans, echinoderms, mollusks and chordates (Chantananthawej and Bussarawit, 1987). Understanding about the macroinvertebrate distribution pattern is necessary to provide information on the beach environmental conditions as part of biological characteristic. This study was to fill the blank of information about the benthicfauna population structure. Therefore, primary objectives of the study were to reveal species diversity of macroinvertebrates on Rajamangala beach, Trang province, Thailand and to determine the spatial distribution of the organisms along the distance from the highest tide line to the approximate lowest tide line.

2. METHODOLOGY

2.1 Sampling area

The study was performed on Rajamangala beach. It is a very shallow sandy beach where mangrove areas and Sikao canal are found on the northward end of the beach. At the southward, the rocky patches partially scatter on the beach and a small mountain is located there. Intertidal flat sediments of this area are muddy and the area is sheltered by the mountain. The central part is exposed area and its tidal flat are longer than the northward end. Macroinvertebrate samples were collected from four stations of the beach every 500 m with four lines in each station, including high tide line 0 m, 100 m, 200 m and 300 m in distance from the highest tide line. Bottom sediments of the highest tide line are mostly composed by sand and shell fragments. Sandy mud with high organic content presented toward the lowest tide line. GPS coordinates positions of the sampling stations are shown in Table 1. The beach location and the sampling stations are shown in Figure 1.

Table 1. GPS coordinate positions of sampling stations in Rajamangala beach, Trang province

Sampling area	Coordinate position of sampling areas (UTM-47P)			
	Station 1	Station 2	Station 3	Station 4
Line 1 (0 m)	0533900	0533912	0533914	0533760
	0831648	0831784	0832646	0831387
Line 2 (100 m)	0533709	0533745	0533779	0533713
	0831460	0831545	0831733	0831433
Line 3 (200 m)	0533714	0533750	0533781	0533690
	0831468	0831566	0831769	0831444
Line 3 (300 m)	0533713	0533750	0533810	0533658
	0831476	0831586	0831802	0831457

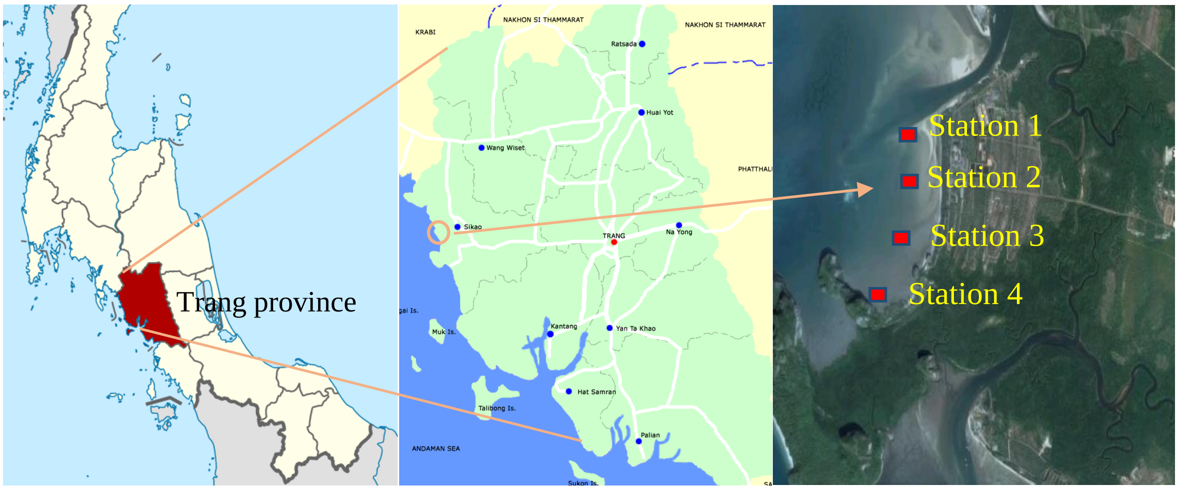

Figure 1. Study area (Modified from Google maps, 2016; Thailand maps, 2016)

2.2 Sampling method

The macroinvertebrate samples were collected in 2016 by quadrate sampling method which were done at the intertidal zone during low tide. They were sampled in monsoon season (midmay to mid mid-february) and in the dry season (mid- febryart to mid-may) with three replicates in a season. The sampling areas in each quadrate transect were 2.25 m^2 (nine quadrates in a sampling point).The soil in the quadrate areas were collected at 15 cm depth and they were sieved in the field using a 1000 µm mesh. The materials retained on the sieve were fixed in 4% buffer formalin and then preserved in 70% ethanol. The samples were brought back to a laboratory for sorting and taxonomic identification.

The macroinvertebrate samples were studied under a stereo microscope (Olympus SZX7) and a compound microscope (Olympus BX50) with the DP27 camera and the Cellsens Dimension program to magnify details of the specimens based on the keys to marine invertebrates and previous identification reports (Allen, 2010; Environmental Monitoring and Support Laboratory Office of Research and Development, 1986; Fauchald, 1977; McLaughlin, 2002; Poutiers, 1998; Swennen et al., 2001). In order to confine the sample which can be used as indicator species, for this study, the macroinvertebrates classification is according to the size larger than 1 mm and less than 10 mm (Tagliapietra and Sigovina, 2010).

2.3 Data analyses

Macroinvertebrate community structures were analyzed using the calculation diversity indices, including Shannon-Wiener index (H) (Krebs, 1999), Species equitability or Evenness index (E) (Hill, 1973), Dominance species index (D) (Odum, 1971). Sorensen's similarity coefficient (Krebs, 1999) was used to compare a similarity of sampling stations and lines.

3. RESULT AND DISCUSSION

3.1 Taxonomic classification of macroinvertebrates

The 4 stations with 4 sampling lines from the adjacent of Sikao channel (Station 1) to the end at the beach (Station 4) were evaluated the biodiversity of macroinvertebrates. The result found that a total of 65 species of macroinvertebrates were collected from the 16 sampling points representing 3 phyla, 5 classes, 14 orders, and 36 families. Of these, phylum Mollusca had highest number. It is composed of 3 classes which were Gastropoda, Bivalvia and Scaphopoda. The class Gastropoda consisted of 5 orders, 9 families and 13 species whereas the class Bivalvia accounted for 1 orders, 6 families and 9 species. The class Scaphopoda had only a single species. Polychaeta had second highest number and it composed of 6 orders, 13 families and 23 species. Phylum Arthopoda was found only in class Malacostraca (subphylum Crustacea).The class was found only in the order Decapoda which consisted of infraorder Anomura (hermit crabs) and infraorder Brachyura (crabs). The infraorder Anomura had 4 species belonging to the family Diogenidae and the Brachyura had 15 species of 6 families. Taxonomic

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classification of macroinvertebrates collected from study areas is shown in Table 2.

Table 2. Taxonomic classification of macroinvertebrates found in Rajamangala beach

Taxa	Family	No.	Species
Phylum Annelida			
Class Polychaeta			
Order Spionida	Spionidae	1	*Dispio latilamella* Williams, 2007
		2	*Prionospio* (*prionospio*)
		3	*steenstrupi* Malmgren, 1867
	Magellonidae	4	*Scolelepis* (*scolelepis*) sp.
	Maldanidae	5	*Magelona sacculata* Hartman, 1961
	Cirratulidae	6	*Axiothella* sp.
		7	*Chaetozone* sp.
Capitellida	Capitellidae	8	*Notomastus latericeus* Sars, 1851
		9	*Notomastus* sp.
		10	*Capitella minima* Langerhans, 1881
Orbinida	Orbiniidae	11	*Scoloplos* (*scoloplos*) sp.
		12	*Scoloplos* (*Leodamas*) sp.
		13	*Leitoscoloplos* sp.
Phyllodocida	Glyceridae	14	*Glycera onomichiensis* Izuka, 1912
		15	*Glycera* sp.
	Goniadidae	16	*Goniadopsis incerta* Fauvel, 1932
	Eulepethidae	17	*Grubeulepis geayi* Fauvel, 1918
	Nereididae	18	*Tylonereis* sp.
Eunicida	Onuphidae	19	*Diopatra* sp.
	Lumbrineridae	20	*Lumbrineris punctata* McIntosh, 1885
		21	*Eranno* sp.
		22	*Scoletoma tenuis* Verrill, 1873
Opheliida	Opheliidae	23	*Ophelina* sp.
Phylum Mollusca			
Class Gastropoda			
Order Neogastropoda	Mitridae	1	*Subcancilla* sp.
	Turridae	2	*Ptychobela nodulosa* Gmelin, 1791
		3	*Turricula javana* Linnaeus, 1767
	Melongenidae	4	*Pugilna cochlidium* Linnaeus, 1758
	Nassaridae	5	*Nassarius pullus* Linnaeus, 1758
		6	*Nassarius livescens* Philippi, 1849
		7	*Nassarius stolatus* Gmelin, 1791
	Marginellidae	8	*Cryptospira ventricosa* G .Fischer, 1807
Neotaenioglossa	Turritellidae	9	*Turritella* sp.
Mesogastropoda	Naticidae	10	*Natica vitellus* Linnaeus, 1758
		11	*Polinices mammilla* Linnaeus, 1758
Heterostropha	Architectonicidae	12	*Architectonica perspectiva* Linnaeus, 1758
Archaeogastropoda	Trochidae	13	*Umbonium vestiarium* Linnaeus, 1758
Class Bivalvia			
Order Veneroida	Pharidae	14	*Cultellus scalprum* Gould, 1851
		15	*Siliqua fasciata* Spengler, 1794
	Donacidae	16	*Donax faba* Gmelin, 1791
		17	*Donax incarnatus* Gmelin, 1791

Table 2. Taxonomic classification of macroinvertebrates found in Rajamangala beach (cont.)

Taxa	Family	No.	Species
	Tellinidae	18	*Tellina emarginata* Sowerby, 1825
		19	*Tellina* sp.
	Lucinoidae	20	*Pillucina* sp.
	Veneridae	21	*Pitar* sp.
	Solenidae	22	*Solen strictus* Gould, 1861
Class Scaphopoda			
Order Dentaliida	Dentaliidae	23	*Dentalium* sp.
Phylum Arthropoda			
Subphylum Crustacea			
Class Malacostraca			
Order Decapoda			
Infraorder Brachyura	Ocypodidae	1	*Ocypode ceratophthalmus* Pallas, 1772
		2	*Ocypode macrocera* H .Milne Edwards, 1852
		3	*Scopimera proxima* Kemp, 1919
		4	*Paracleistoma* sp.
		5	*Macrophthalmus convexus* Stimpson, 1858
		6	*Macrophthalmus laevimanus* H .Milne Edwards, 1852
		7	*Dotilla myctiroides* H .Milne Edwards, 1852
		8	*Dotilla intermedia* de Man, 1888
	Portunidae	9	*Portunus sanuinolentus* Herbst, 1783
		10	*Portunus* sp.
	Leucosiidae	11	*Philyra* sp.1
		12	*Philyra* sp.2
	Calappidae	13	*Matuta victor* Fabricius, 1781
	Dromiidae	14	*Lauridromia indica* Gray, 1831
	Pilumnidae	15	*Heteropilumnus* sp.
Infraorder Anomura	Diogenidae	16	*Diogenes laevicarpus* Rahayu, 1996
		17	*Diogenes custos* Fabricius, 1798
		18	*Diogenes rectimanus* Meirs, 1884
		19	*Diogenes planimanus* Meirs, 1884

3.2 Diversity of macroinvertebrates in the study area

Macroinvertebrate communities of the coastal water of Rajamangala beach showed differences in species patterns and numbers along the distance from the highest tide line to the lowest tide line. A total of 5,207 macroinvertebrate individuals were collected in 16 sampling points. Number of the organisms was contributed by mollusks and polychaetes which were found 23 species in both groups. Other important macroinvertebrates for species contribution were decapods (19 species). Mollusks were numerically dominant, accounting for 2,732 individuals. Polychaetes and decapods followed, which were 1,688 and 787 individuals, respectively. Among them, the dominant species of polychaetes were *Glycera* spp., *Lumbrineris punctata* and *Scoloplos* spp. (Figure 2). The most abundance of mollusk species was *Pilucina* sp. followed by *Nassarius* spp. and *Donax incarnatus* (Figure 3). For decapods, the dominant species were two species including *Dotilla myctiroides* and *Scopimera proxima.* (Figure 4).

Glycera onomichiensis

Glycera sp.

Lumbrineris punctata

Scoloplos sp.

Figure 2. Dominant polychaete species in Rajamangala beach

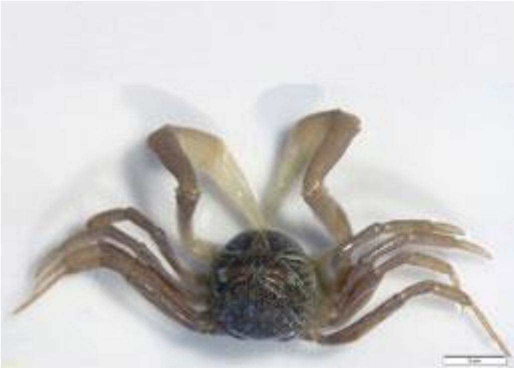
Pilucina sp.

Donax incarnatus

Nassarius stolatus

Nassarius livescens

Figure 3. Dominant mollusk species in Rajamangala beach



Dotilla myctiroides

Scopimera proxima

Figure 4. Dominant crab species in Rajamangala beach

The highest numbers of organisms were recorded at station 4 line 2 with 261 individuals, followed by station 1 line 2 and station 3 line 4 with 238 and 237 individuals, respectively. At station 1 line 1 showed the lowest number of macroinvertebrates with 8 individuals. For species numbers, the highest species presented at station 3 line 3 with 21 species, followed by station 4 line 2 and station 3 line 2 with 20 and 18 species, respectively. Station 1 line 1 and station 2 line 1 had the lowest species number with 4 species. The diversity indices of the macroinvertebrate groups showed wide variability in sampling stations and lines. Shannon-Wiener index of polychaetes ranged between 0.32-1.93, Evenness index ranged between 0.46-0.94 and Dominance index ranged between 0.18-0.82. For mollusks diversity indices, the Shannon-Wiener index ranged between 0.37-1.62, Evenness index ranged between 0.21-0.92 and Dominance index ranged between 0.08-0.94. Decapods showed lowest species diversity, which ranged between 0.06-1.40, Evenness index ranged between 0.06-0.99 and Dominance index ranged between 0.28-0.98. Shannon-Wiener index indicated that the highest species diversity was at station 3 line 4, whereas at station 3 line 3 showed the high species diversity of mollusks and decapods. The biological indices of 16 sampling points are shown in Table 3.

Table 3. Biological indices of 3 macroinvertebrate groups in 16 sampling points

Sampling point	Polychaete			Mollusk			Decapod		
	H	E	D	H	E	D	H	E	D
St1 L1	0.32	0.46	0.82	0.50	0.72	0.08	0.69	0.93	0.50
St1 L2	1.12	0.81	0.40	1.28	0.92	0.35	0.06	0.06	0.98
St1 L3	1.54	0.86	0.25	1.21	0.67	0.33	0.69	0.53	0.50
St1 L4	1.49	0.92	0.24	1.26	0.91	0.31	0.54	0.78	0.65
St2 L1	0.56	0.81	0.62	0.37	0.76	0.83	0.77	0.70	0.56
St2 L2	1.18	0.73	0.38	0.56	0.51	0.70	1.05	0.75	0.43
St2 L3	1.69	0.82	0.22	0.59	0.86	0.59	0.69	0.06	0.50
St2 L4	1.51	0.78	0.31	0.64	0.92	0.56	0.95	0.86	0.44
St3 L1	1.69	0.94	0.19	1.47	0.92	0.25	0.54	0.78	0.64
St3 L2	1.29	0.72	0.37	0.89	0.43	0.55	1.28	0.92	0.31
St3 L3	1.29	0.59	0.59	1.62	0.78	0.25	1.40	0.99	0.28
St3 L4	1.93	0.78	0.18	0.15	0.21	0.94	0.18	0.16	0.85
St4 L1	1.60	0.78	0.25	1.04	0.65	0.37	1.39	0.86	0.29
St4 L2	1.79	0.86	0.19	1.03	0.52	0.43	1.23	0.89	0.36
St4 L3	1.83	0.93	0.23	1.01	0.27	0.44	0.50	0.72	0.44
St4 L4	1.62	0.90	0.21	0.52	0.37	0.71	0.63	0.91	0.56

Note : St = station, L = line, H = Shannon-Wiener index, E = Evenness index, D = Dominant index

3.3 Spatial distribution of macroinvertebrates in the study areas

Community structure variation occurred among sampling stations. There were a large amount of variations between station 1 and station 4 in species numbers and macroinvertebrate groups. In the adjacent of estuary zone, decapods showed high numbers and obvious difference within station, whereas at open beach zone dominated by polychaetes and mollusks. The structure within the community in the high-beach zone at line 1 was variable compared to line 2, line 3 and line 4. Polychaete and mollusk densities were lowest at line 1 and increased at the other lines. The highest polychaete density presented at line 3, whereas mollusks and decapods showed high density at line 2. The macroinvertebrate groups on the beach varied among zones across the beach and similar patterns of zonation occurred along the entire beach. The macroinvertebrate abundances of each sampling station and line in Rajamangala beach are shown in Table 4.

Table 4. Macroinvertebrate abundances of each sampling station and line

Sampling area	Polychaete		Mollusk		Decapod	
	Species number	Density (ind/m^2)	Species number	Density (ind/m^2)	Species number	Density (ind/m^2)
Station						
Station 1	15	76	10	21	8	207
Station 2	18	151	10	55	8	96
Station 3	23	302	23	327	13	63
Station 4	23	154	21	455	18	56
Line						
Line 1 (0 m)	16	74	14	58	11	94
Line 2 (100 m)	20	106	15	372	17	265
Line 3 (200 m)	23	276	18	103	13	15
Line 4 (300 m)	23	227	22	325	8	48

Mollusks, polychaetes and decapods were common macroinvertebrates of the beach. For all of 16 station points, *Dotilla myctiroides*, *Scopimera proxima*, *Nassarius stolatus*, *Pillucina* sp, *Scoloplos* (*Leodamas*) sp., *Lumbrineris punctata*, *Scoloplos* sp. and *Glycera* sp. were most representative species. Curiously, crabs most represented at line 1 but polychaetes dominated at line 3. A gastropod (*Nassarius stolatus*) and a bivalve (*Pillucina* sp.) became frequently found at line 2. Moreover, *Pillucina* sp. also represented highest numbers at line 4 and *Glycera* sp. was the most polychaete found at this sampling line. Macroinvertebrate dominant species in 16 sampling points are shown in Table 5.

Table 5. Macroinvertebrate dominant species in 16 sampling points

Sampling point	Species	Number (individuals)
St1 L1	*Dotilla myctiroides* (crab)	15
St2 L1	*Scopimera proxima* (crab)	85
St3 L1	*Dotilla myctiroides* (crab)	41
St4 L1	*Dotilla myctiroides* (crab)	28
St1 L2	*Dotilla myctiroides* (crab)	238
St2 L2	*Nassarius stolatus* (gastropod)	17
St3 L2	*Pillucina* sp. (bivalve)	58

Table 5. Macroinvertebrate dominant species in 16 sampling points (cont.)

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Sampling point	Species	Number (individuals)
St4 L2	*Nassarius stolatus* (gastropod)	85
St1 L3	*Scoloplos* (*Leodamas*) sp. (polychaete)	10
St2 L3	*Lumbrineris punctata* (polychaete)	16
St3 L3	*Lumbrineris punctata* (polychaete)	64
St4 L3	*Scoloplos* sp. (polychaete)	31
St1 L4	*Dotilla myctiroides* (crab)	36
St2 L4	*Glycera* sp. (polychaete)	37
St3 L4	*Pillucina* sp. (bivalve)	116
St4 L4	*Pillucina* sp. (bivalve)	88

Note : St = station, L = line

Comparisons of species diversities between the stations revealed low similarity. The Sorensen's similarity coefficient of macroinvertebrate species in the sampling stations ranged from 0.18 to 0.50. The lowest coefficient was between station 1 and station 4, whereas the highest coefficient was between station 2 and station 3. The result indicated that from the adjacent of the estuary to open beach had different macroinvertebrate species. For these samples, nearby stations had higher similarity and showed lower similarity when distance is increasing. The coefficient of sampling lines showed lowest species similarity between line 1 and line 2 at 0.19. The low similarity value indicates that both sampling lines had different macroinvertebrate community patterns. Conversely, between line 2 and line 3 had highest species similarity at 0.66. Excluding between line 1 and line 2, the similarity of community patterns also showed higher similarity in closer line. Sorensen similarity coefficient of sampling stations and lines are shown in Table 6.

Table 6. Sorensen similarity coefficient of sampling stations and lines

Sampling area	Station 2	Station 3	Station 4
Station 1	0.40	0.29	0.18
Station 2		0.50	0.32
Station 3			0.42
	Line 2 (100 m)	**Line 3 (200 m)**	**Line 4 (300 m)**
Line 1 (0 m)	0.19	0.30	0.25
Line 2 (100 m)		0.66	0.33
Line 3 (200 m)			0.46

The polychaetes, mollusks and crustaceans frequently occurred in Andaman shore. The macrofauna community of coastal water in Ayeyarwady continental shelf of Myanmar dominated by polychaetes and it showed similar communities as Krabi, Trang and Satun sandy beaches. For this study, the most abundance of the beach was mollusks but other Andaman beaches dominated by polychaetes (Ansari et al., 2011; Aungtonya et al., 2002; Jitpukdee et al., 2015). Sediment granulometry is influential factor and it negatively related to polychaete abundance. Sand percentage is typical for benthic assemblages (Frojan et al., 2006). Larger particles are less favorable for the fauna species, permitting rapid water drainage from the sediment, while smaller particles are more auspicious, as they hold water in the interstices. Sandy beach fauna may be very selective for sediment grain size (Neves and Bemvenuti, 2006). The Sorensen's similarity coefficient confirmed that community of macroinvertebrates differed among zones from line 1 to line 4. Stratification of the sampling lines was based on groups of the organisms. The macroinvertebrate communities changed from high zone (line 1) of the beach through the mid zone (line 2 and line 3) to the swash zone (line 4). The results from this study showed stratifying the lines to the spatial variation. The beach was divided into high-zone, mid-zone, and swash zone on the basis of the distribution of mollusks, polychaetes and decapods. Further, the results indicated that the adjacent of the estuary (station 1) had a unique pattern that it differed from the beginning of the beach zone. Open beach sampling stations have a large and gentle beach face. In contrast, station 1 that is characterized by narrow beach face had greater decapod communities. The beach that receives significant inputs of algae, seagrass and nutrient support rich of crustaceans (Defeo et al., 2009). Estuarine beaches can provide suitable habitats for the organisms in spite of its short and more heterogeneous environment compared to ocean counterparts (Rosa and Borzone, 2008). Previous studies reported that sandy beach could be divided based upon the distribution of crustacean and ghost crabs that were commonly found on the supralittoral zone areas and polychaetes dominated the mid-shore zone (Jaramillo et al., 1993; Raffaelli et al., 1991). Moreover, sub-terrestrial fringe characterized by the presence of crabs from the genera *Ocypode* (tropical and subtropical regions). The beach physical features defined a zonation scheme and, in addition, sandy beach macrofauna zonation pattern assumes the form of three distinct and universal zones based upon the distribution of characteristic taxa. In terms of the fauna distribution, the sandy beach can be divided into supralittoral, littoral and sublittoral zones (Janssen and Mulder, 2005). Supralittoral zones provide a favourable habitat for invertebrates on the stable reflective beach which showed in station 2, station 3 and station 4 (Defeo et al., 2009). Faunal patterns change on the zones. Dominant species varied significantly in density along different beach sediment characteristics. Crustaceans dominated in shallow water that is more sandy whereas polychaetes were most presented in muddy sand. Densities of mollusks tended to increase from line 2 to line 4. Of these, the gastropods had high density at line 2 but bivalves most presented in the lower beach at line 4. These results of the beach zonation may be a basic stratification of the sandy beach that is useful in further study.

4. CONCLUSIONS

Polychaeta, Mollusca and Crustacea were common macroinvertebrate phyla of Rajamangala beach. The spatial distribution of the beach displayed a pattern. The different groups of the organisms distributed and dominated in distance from the highest tide to the lowest tide lines and in distinctive areas. The high tide beach was dominated by decapods (true crabs) while at middle tide beach was the area where mollusks (bivalves and gastropods) were exceeding numbers. The polychaete abundance was high in the low tide beach zone. Moreover, the distribution pattern of decapods contrasted with polychaetes and mollusks by the sampling stations. At near the estuary, the number of decapods was high and decreased to the sampling station at the end of the beach, whereas polychaete and mollusk numbers increased in opposite direction.

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