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Research Article

Distribution of Marine Crabs from the Marine National Park, Gulf of Kachchh

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Abstract: Crabs are known to flourish in various turbid environments around the world. The Gulf of Kachchh (GOK) is one of the world's richest Marine National Park (MNP); southern part of GOK has 42 islands which provide shelter for coral reef, mangroves and associated faunas. Present study brings out 22 species of marine crabs, high diversity of marine crabs were reported at Narara reef and low diversity was at Sachana coast from GOK, MNP. Literature reveals that 80 species of marine crabs have been recorded from the Gujrat.
Keywords: Crabs, Check list, Marine National Park, Gulf of Kachchh

INTRODUCTION

Marine crabs are distributed globally in different depths and different habitat in the marine environment. They are found with higher diversity in reef environments and are also widespread on shallow shores and intertidal regions. It is economically important and has high proteins and minerals. The chitin and chitosan extract from the crabs and it's used for medicines and chemical applications. The skeletons are used as food for livestock's and poultries. Crabs are one of the ecologically important faunal communities in the marine ecosystem. The crabs play a significant role in detritus formation, recycling of nutrients and overall dynamics of ecosystems.

Gujarat is a maritime state endowed with 1650 km long coastline (Over 21% of the Indian coastline of 7500 km), which makes it strategically serving as natural gateway to India. The coastline of Gujarat has two indentations, the Gulf of Kachchh and Gulf of Khambhat covering about 60% of the state coastline. The Gulf of Kachchh is one of the world richest marine biospheres, occupies an area of 7350 sq km and 42 islands which possess a very interesting heterogeneous group of fauna and flora. Total 49 species under 25 genera, 10 family hard corals [1-2] , 23 soft corals under 9 families [3], 246 species of Molluscs, 76 sponges, 14 species of Echinoderms, 491 species of fishes [4] , 27 prawns, 4 shrimps, one lobster and 21 crabs reported from Marine National Park, Gulf of Kachch [5]. The present study describes the abundance of the crabs from Marine National Park Gulf of Kachchh.

MATERIALS AND METHODS

The present study carried out during 2012 to 2014 in eight different study sites (Sachana coast, Pirotan Island, Sikka coast, Narara reef, Kalubhar Island, Goose reef, Laku Point, Mithapur coast). Hand picking method was used for sampling from inter-tidal and sub-tidal regions and also we used formalin and digging for the collection of burrowed samples during low-tide time [6]. All the collected samples were deposited in the National Zoological Collection of the Zoological Survey of India. Common systematic keys used for collected sample identification [7-12].

Biodiversity indices like species richness, evenness and Shannon-Wiener diversity index were compared between shipwrecks. Margalef's species richness method was used for calculating species richness.

d = (S-1)/long (N),
S = number of species present
N = number of individuals.

Shannon – Wiener diversity index was calculated using the formula

$H' = - \sum p_i \log (p_i)$

p_i = relative abundances of each species

Species evenness was calculated using Pielou's Evenness Index

J = H/Log (S),

H = the Shannon – Wiener diversity index

RESULTS AND DISCUSTION

In the present study, author reported percentage of genera cover and total number of species identified on each islands presented in Table 1. Total, 22 species of crabs under 22 genera belonging to 11 families, under the order Decapoda in the class Malacostraca from Marine National Park, Gulf of Kachchh (plate 1, 2, 3). The Maximum crab species reported from Narara reef (18), followed by Pirotan Island (13), Laku point (12), Sikka coast and Kalubhar Island (8), Goose reef and Mithapur reef (7), and Sachana coast (3). The island-wise species diversity indices analysis shows that the Shannon Wienners diversity index (H') ranged from 0.84 to 2.48, with the highest in the Narara reef. The Pielou's evenness ranged from 0.76 in Sachana coast to 0.91 in Goose reef and Margalal's Species richness maximum in Narara reef (3.33), minimum in Sachana coast (0.65).

The analysis of data clearly showed that the Gulf of Kachchh support in terms of diversity, abundance and distribution. The major reason is that ecologically GOK has combination of coral reef, sea-grass bed, seaweed cover, sandy and muddy bottoms, which might be the attraction for more species of crabs. Since most of the crabs are very closely associated with coral reef ecosystem either for food, shelter or reproduction.

In the present survey period, total 22 species of crabs were recorded from Marine national Park, GOK, Gujarat. This study reveals that the Gulf of Kachchh is poorer in species in comparison to the previous reports from Gujarat coast. Trivedi et al. [13] reported 19 species belonging 15 genera and 8 families from Gulf of Kachchh. Dev Roy [14] reported 66 species under 45 genera of crabs from Gujarat, west coast of India. Detailed check list of marine crabs in Gujarat coast presented in Table 3.

Total 80 species belonging 26 genera only reported from Gujarat coast, India. It is very less than other region of India. In west coast 226 species reported, east coast 461 species, Bay Islands 520 species [14]; Andaman and Nicobar Islands 220 species [15] after that 837 species reported from Andaman and Nicobar Islands by Ajmal Khan [9]. These studies revealed the marine crab diversity in rocky shores, muddy region and coral reef environment of Gulf of Kachchh, Gujarat. This preliminary study is a baseline data for future research studies on marine crab's diversity and distribution and species richness from this region.

Table-1: Percentage of species coverage of each island from Marine National Park, Gulf of Kachchh.

Scientific name	1	2	3	4	5	6	7	8
Family: Matutidae De Haan, 1833 *Ashtoret lunaris* (Forskal, 1775)	1.8	3.4	0.0	0.0	0.0	0.0	0.0	4.9
Family: Majidae Samouelle, 1819 *Schizophrys aspera* (H. Milne Edwards) 1834)	1.2	1.7	3.8	2.0	6.1	0.0	0.0	4.9
Family: Portunidae Rafinesque, 1815 *Charybdis orientalis* (Dana, 1852)	2.4	4.5	10.3	10.2	12.1	0.0	14.7	8.2
Thalamita prymna (Herbst, 1803)	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portunus pelagicus (Linnaeus, 1766)	15.2	25.7	7.7	22.4	0.0	40.9	26.5	0.0
Scylla serrata (Forskal, 1775)	7.3	7.3	0.0	16.3	0.0	0.0	0.0	0.0
Family: Xanthidae MacLeay, 1838 *Leptodius sanguineus* (H. Milne Edwards, 1834)	7.3	0.0	15.4	0.0	0.0	0.0	0.0	0.0
Atergatis integerrimus (Lamarck, 1801)	0.6	0.6	0.0	0.0	0.0	0.0	0.0	3.3
Etisus laevimanus (Randall, 1840)	4.2	3.4	19.2	0.0	25.8	0.0	8.8	8.2
Euxanthus exculptus (Herbst, 1790)	3.0	2.2	0.0	2.0	7.6	0.0	0.0	0.0
Menippe rumphii (Fabricius, 1798)	0.0	0.0	1.3	0.0	0.0	0.0	5.9	0.0
Platypodia cristata (A. Milne Edwards, 1865)	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Chlorodiella nigra (Forskal, 1775)	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0
Family: Pilumnidae Samouelle, 1819 *Pilumnus vespertilio* (Fabricius, 1793)	5.5	6.7	11.5	8.2	18.2	54.5	22.1	31.1
Family: Goneplacidae MacLeay, 1838 *Goneplex rhomboides* (Linnaeus, 1758)	0.6	0.0	1.3	0.0	0.0	0.0	0.0	0.0
Family: Ocypodidae Rafinesque, 1815 *Uca lactea annulipes* (H. Milne Edward, 1837)	23.0	22.3	0.0	0.0	0.0	0.0	0.0	0.0

Macrophthalmus pectinipes (Guerin, 1839)	0.6	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Family: Grapsidae MacLeay, 1838 *Metopograpsus messor* (Forskål, 1775)	4.8	9.5	7.7	0.0	0.0	0.0	0.0	0.0
Grapsus albolineatus (Lamarck, 1818)	1.2	0.0	14.1	0.0	0.0	0.0	0.0	0.0
Family: Porcellanidae Haworth, 1825 *Petrolisthes lamarckii* (Leach, 1820)	7.3	5.0	6.4	0.0	0.0	0.0	1.5	24.6
Family: Diogenidae *Clibanarius zebra* (Dana, 1852)	7.3	7.8	0.0	36.7	25.8	0.0	20.6	14.8
Family: Parthinopidae MacLeay, 1838 *Parthenope echinatus* (Herbst, 1790)	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0

1 – Narara reef, 2 – Pirotan Island, 3 - Laku point, 4 – Sikka coast, 5 – Goose reef, 6 – Sachana coast, 7 – Mithapur reef, 8 – Kalubhar Island

Table-2: Diversity Indices of Crabs in Gulf of Kachchh, Marine National Park, Gujarat

Indices	1	2	3	4	5	6	7	8
No of Species	18	13	12	8	7	3	7	8
No of individual	165	179	78	49	66	22	68	61
Shannon - Wienners Diversity (H')	2.48	2.18	2.22	1.67	1.77	0.84	1.74	1.8
Pielou's Evenness	0.86	0.85	0.89	0.81	0.91	0.76	0.89	0.87
Margalal's species Richness	3.33	2.31	2.52	1.79	1.43	0.65	1.42	1.7

1 – Narara reef, 2 – Pirotan Island, 3 - Laku point, 4 – Sikka coast, 5 – Goose reef, 6 – Sachana coast, 7 – Mithapur reef, 8 – Kalubhar Island

Table-3:checklist of crabs in the water of Gujarat coast

S.No	**List of the species**	***Trivedi et al., 2012 [13]***	***Dev Roy 2013 [14]***	***Present study***
1.	**Phylum:** Arthropoda **Subphylum:** Crustacea **Class:** Malacostraca **Subclass:** Eumalacostraca **Superorder:** Eucarida **Order:** Decapoda **Infraorder:** Brachyura **Family:** Calappidae *Calappa lophos* (Herbst, 1782)	–	+	–
2.	**Family:** Diogenidae *Clibanarius zebra* (Dana, 1852)	–	–	+
3.	**Family:** Dotillidae *Dotilla myctiroides* (H.Milne Edwards, 1852)	–	+	–
4.	**Family:** Dromiidae *Ascidiophilus caphyraeformis* (Richters, 1880)	–	+	–
5.	**Family:** Epialtidae *Acanthonyx limbatus* (A.Milne Edwards, 1862)	–	+	–
6.	*Doclea rissonii* (Leach, 1815)	–	+	–
7.	*Hyastenus planasius* (Adams and White, 1848)	–	+	–
8.	*Menaethius monoceros* (Latreille, 1825)	–	+	–
9.	*Eriphia smithi* (MacLeay, 1838)	–	+	–
10	*Menippe rumphii* (Fabricius, 1798)	+	–	+
11.	**Family:** Euryplacidae *Heteroplax dentate* (Stimpson, 1871)	–	+	–
12.	**Family:** Galenidae *Galene bispinosa* (Herbst, 1783)	–	+	–
13.	**Family**: Gecarcinidae *Cardisoma carnifex* (Herbst, 1796)	+	–	–
14.	**Family:** Goneplacidae	+	–	+

	Goneplex rhomboides (Linnaeus, 1758)			
15.	**Family:** Grapsidae *Grapsus albolineatus* (Latreille, in Milbert, 1812)	+	+	+
16.	*Grapsus grapsus* (Linnaeus, 1758)	_	+	_
17.	*Grapsus intermedius* (de Man, 1888)	+	_	_
18.	*Metopograpsus messor* (Forskål, 1775)	_	+	+
19.	*Neopisesarma tetragonum* (de Man, 1887)	+	_	_
20.	*Parasesarma plicatum* (Fabricius, 1798)	_	+	_
21.	*Parasesarma plictum* (De Haan, 1835)	+	_	_
22.	**Family:** Hymenosomatidae *Elamena sindensis* (Alcock, 1900)	–	+	–
23.	**Family:** Iphiculidae *Pariphiculus mariannae* (Herklots, 1852)	–	+	–
24.	**Family:** Leucosiidae *Arcania septemspinosa* (Fabricius, 1793)	–	+	–
25.	**Family**: Leucosiidae *Leucosia sima* (Alcock, 1896)	–	+	–
26.	**Family:** Majidae *Prismatopus aculeatus* (H.Milne Edwards, 1834)	–	+	–
27.	*Schizophrys aspera* (H. Milne Edwards, 1834)	_	+	+
28.	**Family:** Matutidae *Ashtoret lunaris* (Forskal, 1775)	–	–	+
29.	*Ashtoret miersi* (Henderson, 1887)	_	+	_
30.	*Matuta planipes* (Febricius, 1798)	_	+	_
31	**Family:** Ocypodidae *Macrophthalmus (Mareotis) crinitus* (Rathbun, 1913)	–	+	–
32..	*Macrophthalmus (Mareotis) pacificus* (Dana, 1851)	_	+	_
33.	*Macrophthalmus pectinipes* (Guerin, 1839)	+	_	+
34.	*Ocypode ceratopthelma* (Pallas, 1772)	+	+	_
35.	*Ocypode platytarsis* (H.Milne Edwards, 1852)	_	+	_
36.	*Ocypode rotundata* (Miers, 1882)	_	+	_
37.	*Uca dussumieri* (H. Milne Edwards, 1852)	+	+	_
38.	*Uca lactea annulipes* (H. Milne Edward, 1837)	+	+	+
39.	*Uca sindensis* (Alcock,1900)	_	+	_
40.	**Family:** Parthenopidae *Cryptopodia echinosa* (Chiong and Ng, 1998)	–	+	–
41.	*Parthenope echinatus* (Herbst, 1790)	_	_	+
42.	**Family:** Pilumnidae *Glabropilumnus laevis* (Dana, 1852)	–	+	–
43.	*Heteropilumnus angustifrons* (Alcock, 1900)	_	+	_
44.	*Heteropilumnus setosus* (A. Milne Edwards, 1873)	_	+	_
45.	*Pilumnus kempi* (Ded, 1987)	_	+	_
46.	*Pilumnus longicornis* (Hilgendorf,1878)	_	+	_
47.	*Pilumnus vespertilio* (Fabricius, 1793)	+	+	+
48.	**Family:** Pinnotheridae *Arcotheres placunae* (Hornell and Southwell, 1909)	–	+	–
49.	**Family:** Plagusiidae *Plagusia squamosa* (Herbst, 1790)	–	+	–
50.	**Family:** Porcellanidae *Petrolisthes lamarckii* (Leach, 1820)	–	–	+
51.	**Family:** Portunidae *Charybdis (Charybdis) acutifrons* (de Man, 1879)	+	–	–
52.	*Charybdis (Charybdis) annulata* (Fabricius, 1798)	_	+	_
53.	*Charybdis (Charybdis) callianassa* (Herbst, 1804)	_	+	_
54.	*Charybdis feriatus* (Linnaeus, 1758)	+	+	_
55.	*Charybdis (Charybdis) Goniohellenus hoplites* (Wood-Mason, 1877)	_	+	_
56.	*Charybdis (Charybdis) natator* (Herbst, 1804)	_	+	_
57.	*Charybdis (Charybdis) orientalis* (Dana, 1852)	_	+	+

58.	*Portunus pelagicus* (Linnaeus, 1766)	+	+	+
59.	*Portunus sanguinolentus* (Herbst, 1803)	_	+	_
60.	*Portunus tenuipes* (De Haan, 1835)	_	+	_
61	*Scylla serrata* (Forskal, 1775)	+	+	+
62.	*Thalamita poissonii* (Audouin and Savignyi, 1817)	_	+	_
63.	*Thalamita prymna* (Herbst, 1803)	_	+	+
64.	**Family:** Sesarmidae *Nanosesarma jousseaumei* (Nobili, 1906)	–	+	–
65.	*Nanosesarma minutum*(De Man, 1887)	_	+	_
66.	**Family:** Varunidae *Ptychognathus barbata* (A. Milne Edwards, 1873)	–	+	–
67.	**Family:** Xanthidae *Actaea calculosa* (A. Milne Edwards, 1869)	–	+	–
68.	*Actaea savignyi* (Milne Edwards, 1834)	_	+	_
69.	*Atergatis integerrimus* (Lamarck, 1801)	+	+	+
70.	*Atergatis roseus* (Ruppell, 1830)	_	+	_
71.	*Atergatis subdentatus*de (Haan, 1835)	+	_	_
72.	*Chlorodiella nigra* (Forskal, 1775)	_	_	+
73.	*Demania baccalipes*(Alcock, 1898)	_	+	_
74.	*Etisus laevimanus* (Randall, 1840)	_	+	+
75.	*Euxanthus exculptus* (Herbst, 1790)	_	+	+
76.	*Leptodius exaratus* (H. Milne Edwards, 1834)	_	+	_
77.	*Leptodius sanguineus* (H. Milne Edwards, 1834)	_	_	+
78.	*Macromedaeus quinquedentatus* (Krauss, 1843)	_	+	_
79.	*Medaeops granulosus* (Haswell, 1882)	_	+	_
80.	*Platypodia cristata* (A. Milne Edwards, 1865)	+	+	+
	Total number of Species	19	47	22

***Ashtoret lunaris* (Forskal, 1775)**

***Schizophrys aspera* (H. Milne Edwards, 1834)**

***Charybdis orientalis* Dana, 1852**

Thalamita prymna (Herbst, 1803)

***Portunus pelagicus* (Linnaeus, 1766)**

***Scylla serrata* (Forskal, 1775)**

***Leptodius sanguineus* (H. Milne Edwards, 1834)**

***Atergatis integerrimus* (Lamarck, 1801)**

Plate 1

***Etisus laevimanus* (Randall, 1840)**

Euxanthus exculptus(Herbst, 1790)

***Menippe rumphii* (Fabricius, 1798)**

***Platypodia cristata* (A. Milne Edwards, 1865)**

***Chlorodiella nigra* (Forskal, 1775)**

***Pilumnus vespertilio* (Fabricius, 1793)**

Goneplex rhomboides (Linnaeus, 1758)

Uca lactea annulipes H. Milne Edward, 1837

Plate 2

***Macrophthalmus pectinipes* (Guerin, 1839)**

***Metopograpsus messor* (Forskål, 1775)**

Grapsus albolineatus (Lamarck, 1818)

Petrolisthes lamarckii (Leach, 1820)

Clibanarius zebra (Dana, 1852)

Parthenope echinatus (Herbst, 1790)

Plate 3

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