International Journal of Ecology and Environmental Sciences 44 (2):165-169, 2018
ISSN: 2320-5199 (Online)

Short Communication

Crustacean Diversity of the Gulf of Kachchh, Gujarat, India

Heena Parmar[1]*, Yashpal Anand[2], Jigar Joshi[3], Sandeep Munjapara[4], R.D. Kamboj[5] and Harshad Salvi[6]

GEER Foundation, Indroda Nature Park, Gandhinagar, 382007, Gujarat, India
Email IDs:[1] heena.parmar.hp9@gmail.com; [2] yashaanand@gmail.com; [3] jigarjoshi4mylife@gmail.com; [4] sandeepmunjapara@gmail.com; [5] dir-geer@gujarat.gov.in; [6] harshadsalvi@gmail.com
* Corresponding Author

ABSTRACT

This communication based on a survey of the Gulf of Kachchh reports the occurrence of 39 species of crustaceans belonging to 4 orders and 18 families. They included one endemic species, *Metapenaeus kutchensis*. Three species *viz., Etisus laevimanus, Portunus (Portunus) pelagicus* and *Petrolisthes boscii* were most common and abundant while *Lepas (Anatifa) testudinata*, *Atergatisfloridus* and *Panuliruspolyphagus* were very rare. The study adds one species *Charybdis helleri* to the previously known list of crustacean diversity from the area.

Key Words: Arthropods; Ecosystem; Coral Reef; Biodiversity; Crabs; Abundance

Arthropods are one of the major and the most diverse group of animals in which Subphylum Crustacea is a large group in marine ecosystems (Martin and Davis 2001). Crustaceans which include prawns, lobsters, crabs, etc., exhibit the fourth largest diversity among animal groups on planet (Martin and Davis 2001) - estimated to be about 50,000 to 67,000 species world-wide but still ten times of these remain undiscovered (Deshmukh 2012). In India, about 2934 species have been recorded which include 139 species of Stomatopods, 26 species of Lobsters, 162 species of hermit crabs, 705 species of Brachyuran crabs, 84 species of shrimps and prawns, 159 species of Caridea, 540 species of Copepods, 104 species of Cirripeds, and 120 species of Ostracods (Venkataraman 2005). So far, 157 species of crustaceans have been recorded from Gujarat coast of which 148 species are recorded from the Gulf of Kachchh (Singh et. al. 2004, Dev Roy 2013, Parasharya and Padte 2013, Beleem et al. 2014, Trivedi et al. 2015, Trivedi and Vachhrajani 2015).

We surveyed the Gulf of Kachchh (GoK) having diverse habitats *viz*., mangrove forests, coral reef, seagrass, mud flats etc. We surveyed 38 sites of GoK (as mentioned in Table 2) including coastal area and islandsin two ways: opportunistic observation/whole area search and Line transect method (English et al. 1997).The data were collected at low tide at amplitude ≤1.3m in visible daytime. A total of 100 transects were laid at different locations and the number of transects on a location varied from one to five depending on the extent of intertidal area as well as biodiversity status (Figure 1). The identification was confirmed from the photographs, drawings, character description and comparison with the illustrative keys (Sethuramalingam and Khan 1991). For further confirmation of species, all the details of the specimens were compared with the information available on Marine Species Identification Portal website (www.speciesidentification.org) and National Institute of Oceanography web site on Marine FaunaI information (Jeyabaskaran and Wafar 2002). The classification of crustaceans was adopted from WoRMS website (www.marinespecies.org). Diversity indices such as Shannon index, Simpson, Dominance and Evenness were also determined by using PAST (PAleontological STatistical) software ver 3.1. Density of a species was calculated by dividing number of individuals with area of transects. Diversity indices such as Shannon index, Simpson, Dominance, Relative density and Evenness were also determined.

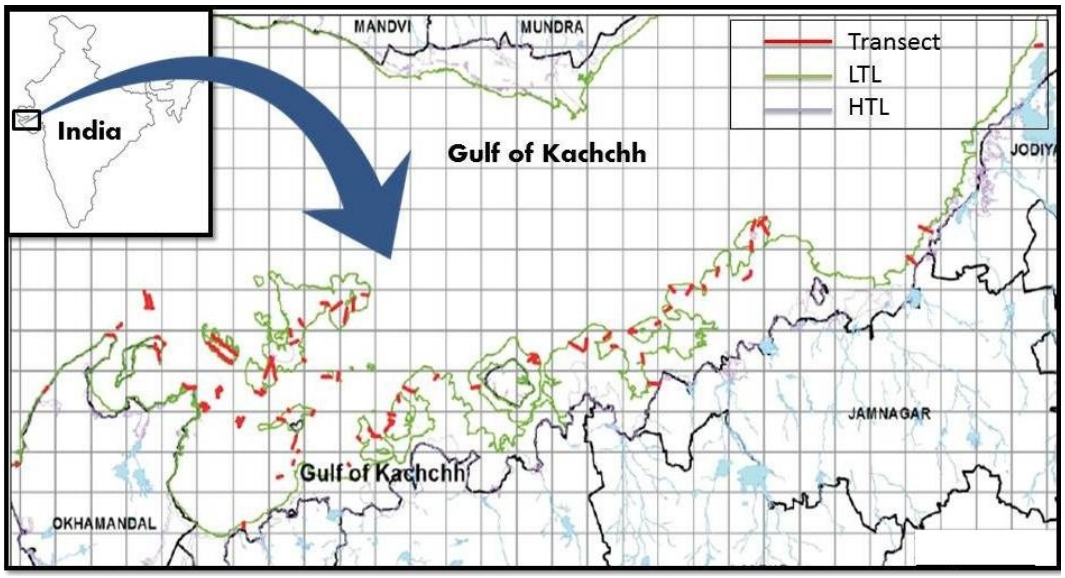

Figure 1. Study area –The Gulf of Kachchh

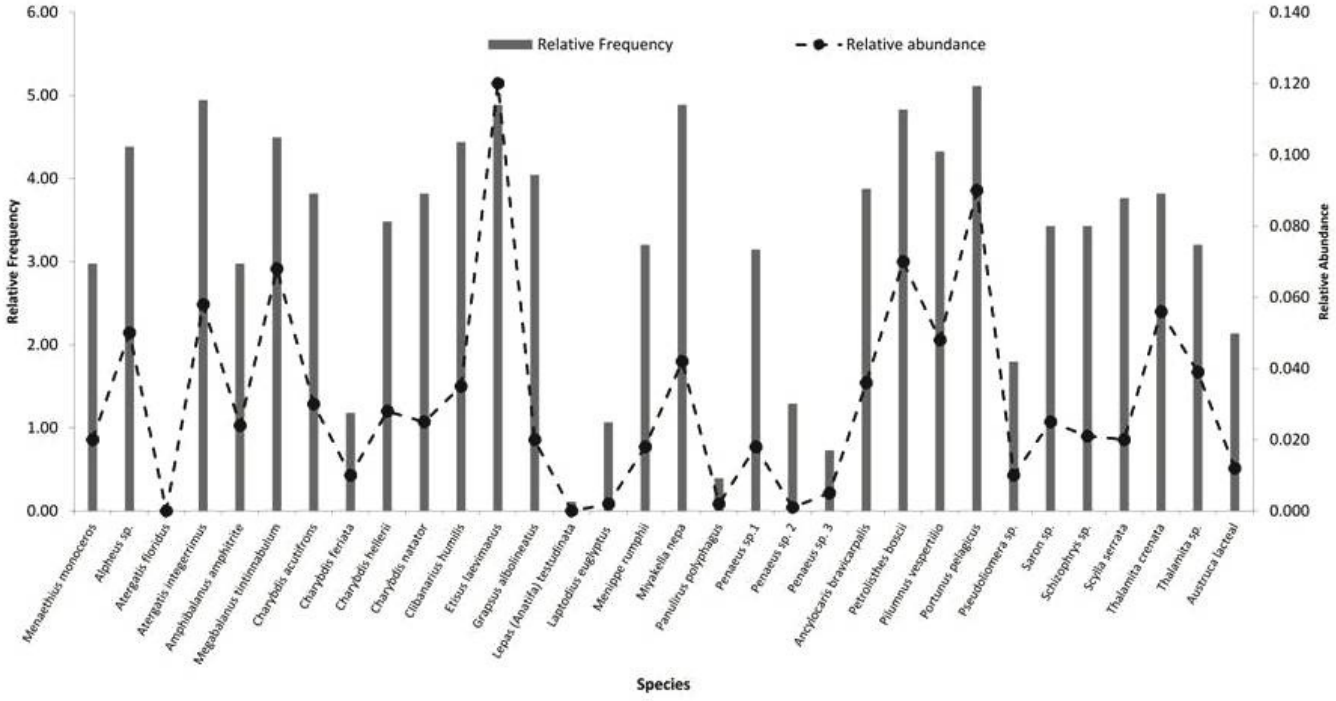

Figure 2. Relative abundance and frequency of various species recorded in the study area

We recorded a total of 39 species of crustaceans belonging to 4 orders and 18 families, from the Gulf of Kachchh (Table 1). Some of the taxa could be identified at genus level only. The organisms included 28 crabs, 1 lobster, 3 shrimps, 3 barnacles, 3 prawns and 1 squilla.

Maximum richness of species was found in Goose and Lakhusa but the relative density was highest at Asaba-Gagva where species richness was low. The lowest density was observed in Narara, Vudakuda reef and Bhaidar. *Metapenaeus kutchensis*, a crustacean

endemic to Gujarat (George et al. 1963) was also recorded from Poshitra reef and in by-catch of fishermen when trawled in water near Paga, Mangunda and Pashu. *Etisus laevi-manus*, *Portunus (Portunus) pelagicus* and *Petrolisthes boscii* were the most common and abundant species. *Alpheus* sp., *Miyakella nepa, Thalamita* sp. etc. were moderately abundant and *Lepas (Anatifa) testudinata, Atergatis floridus* and *Panulirus polyphagus* were rarely observed during the study period. According to diversity index, Mithapur shows slight dominance of one or two species. It was observed that in most sites the Shannon index increases with the increase in evenness and species richness, but in Samiani Island the species richness was low but evenness was high resulting in a low Shannon diversity index (Table 2).

Data on relative frequency and relative abundance (Figure 2) show that they are positively correlated. This indicates that some species are widely distributed with high abundance while others are restricted to particular location with low abundance.

Figure 3. *Charybdis hellerii* (A. Milne-Edwards, 1867)

A review of the previous studies (Singh et al. 2004, Dev Roy 2013, Parasharya and Padte 2013, Beleem et al. 2014, Trivedi et al. 2015) showed that *Charybdis hellerii,* recorded earlier from the Saurashtra coast of Gujarat (Trivedi et al. 2015) was a new record from the Gulf of Kachchh (Figure 3).

Table 1. Crustacean Diversity recorded in the Gulf of Kachch, Gujarat

Family	Scientific Name
Barnacles	
Balanidae	*Amphibalanus amphitrite (*Darwin, 1854)
Balanidae	*Megabalanus tintinnabulum* (Linnaeus, 1758)
Lepadidae	*Lepas (Anatifa) testudinata* (Aurivillius, 1892)
Crabs	
Diogenidae	*Clibanarius humilis* (Dana, 1851)
Epialtidae	*Menaethius monoceros* (Latreille, 1825)
Eriphiidae	*Eriphia smithii* MacLeay, 1838
Grapsidae	*Grapsusalbo lineatus* (Latreille, in Milbert, 1812)
Majidae	*Schizophrys* sp.
Menippidae	*Menippe rumphii* (Fabricius, 1798)
Ocypodidae	*Austruca lacteal* De Haan, 1835
Palaemonidae	*Ancylocaris brevicarpalis* Schenkel, 1902
Pilumnidae	*Pilumnus vespertilio* (Fabricius, 1793)
Porcellanidae	*Petrolisthes lamarckii* (Leach, 1820)
Porcellanidae	*Petrolisthes boscii* (Audouin, 1826
Portunidae	*Charybdis (Goniosupradens) acutifrons* (de Man, 1879)
Portunidae	*Charybdis (Charybdis) feriata* (Linnaeus, 1758)
Portunidae	*Charybdis (Charybdis) hellerii* (A. Milne-Edwards, 1867)
Portunidae	*Charybdis (Charybdis) natator* (Herbst, 1794)
Portunidae	*Portunus (Portunus) pelagicus* (Linnaeus, 1758)
Portunidae	*Scylla serrata* (Forskal, 1775)
Portunidae	*Thalamita crenata* Ruppell, 1830
Portunidae	*Thalamita* sp.
Xanthidae	*Atergatis floridus* (Linnaeus, 1767)
Xanthidae	*Atergatis integerrimus* (Lamarck, 1818)
Xanthidae	*Atergatis roseus* (Riippell, 1830)
Xanthidae	*Etisuslaevimanus* (Randall, 1840)
Xanthidae	*Laptodius affinis* (De Haan, 1835)
Xanthidae	*Laptodius exaratus* (H. Milne Edwards, 1835)
Xanthidae	*Leptodius euglyptus*
Xanthidae	*Pseudoliomera* sp.
Lobster	
Palinuridae	*Panulirus polyphagus* (Herbst, 1793)
Shrimp and Prawns	
Alpheidae	*Alpheus* sp.
Hippolytidae	*Saron* sp.
Hymenosomatidae	*Elamena cristatipes* Gravely, 1927
Penaeidae	*Penaeus* sp.1
Penaeidae	*Penaeus* sp.2
Penaeidae	*Penaeus* sp.3
Penaeidae	*Metapenaeus kutchensis* (P.C. George, M.J. George & Rao, 1963)
Stomatopods	
Squillidae	*Miyakella nepa* (Latreille, in Latreille, Le Peletier, Serville & Guérin, 1828)

Table 2. Summary of diversity index

Locations	No. of species	Evenness	Simpson	Shannon	Dominance
Ajad	22	0.62	0.94	0.06	2.90
Arambhada	17	0.83	0.86	0.14	2.36
Asaba- Gagva	16	0.77	0.89	0.11	2.52
Balachadi	20	0.80	0.92	0.08	2.77
Beyt Dwarka	22	0.66	0.91	0.09	2.67
Bhaidar	24	0.77	0.94	0.07	2.92
Bhaisbid	18	0.86	0.93	0.07	2.74
Boria	13	0.81	0.89	0.11	2.36
Chandri	24	0.67	0.92	0.08	2.77
Chank	25	0.61	0.91	0.09	2.73
Chhad	15	0.77	0.89	0.11	2.44
Chogula	11	0.57	0.77	0.23	1.84
Dantiyokado	16	0.88	0.92	0.08	2.64
Dedeka-Mundeka	23	0.78	0.09	0.07	2.89
Dhani	20	0.86	0.94	0.06	2.85
Gandhiyakado	21	0.75	0.92	0.08	2.76
Goose	27	0.72	0.94	0.07	2.97
Janvarnokado	13	0.84	0.89	0.11	2.39
Kalubhar	25	0.77	0.94	0.06	2.96
Kalyanpur	17	0.62	0.86	0.14	2.36
Khara -Mithachusna	24	0.46	0.85	0.15	2.41
Khimarakhat	13	0.84	0.89	0.11	2.39
Lakhusa	27	0.68	0.93	0.07	2.91
Mangunda	21	0.64	0.90	0.10	2.61
Mithapur	8	0.46	0.56	0.44	1.30
Narara	20	0.80	0.93	0.08	2.77
Noru	23	0.77	0.93	0.07	2.88
Noru Bhaidar	16	0.66	0.88	0.12	2.36
Okha reef	9	0.80	0.84	0.16	1.98
Paga	25	0.77	0.94	0.06	2.96
Pashu	13	0.84	0.90	0.10	2.40
Pirotan	25	0.73	0.93	0.07	2.89
Sachana	17	0.85	0.92	0.08	2.67
Samiani	4	0.98	0.74	0.26	1.37
Shanniani	19	0.64	0.89	0.11	2.51
Shivrajpur	17	0.89	0.93	0.07	2.72
Sikka	20	0.80	0.93	0.08	2.77
VudaKuda reef	12	0.72	0.85	0.15	2.16

ACKNOWLEDGMENTS

We are highly grateful to the Gujarat Ecological Commission – State Project Management Unit (GEC-SPMU), Society of Integrated Coastal Management-National Project Management Unit (SICOM-NPMU), Ministry of Environment, Forest & Climate Change (MoEF& CC), Government of India, and the World Bank for providing financial support under the Integrated Coastal Zone Management Project for conducting this research. We also thank the Department of Forests, Government of Gujarat and Marine National Park & Sanctuary for the permission to carry out this survey. We acknowledge Gujarat Ecological Education and Research Foundation to provide platform, basic requirement, and support for the study.

Authors' contributions: The manuscript was prepared by Heena Parmar, Harshad Salvi and R.D. Kamboj. HP contributed to statistical analysis also. SM contributed in conceptualization, development and implementation of study design and field methodologies, field data collection and analysis. Yashpal Anand and Jigar Joshi carried out the survey field visits, analysis and identification of species.

REFERENCES

Beleem, I.B.; YogeshKumar, J.S.; Satyanarayana, Ch.; Venkataraman, K. and Kamboj, R.D. 2014. Distribution of Marine Crabs from the Marine National Park, Gulf of Kachchh. Scholars Academic Journal of Biosciences 2(7): 419-427.

Deshmukh, V.D. 2012. Principles of Crustacean Taxonomy. Training Manual on CAFT Program on Development of Brood and Gene Banks for Aquaculture Production and Conservation: 52-61. Central Institute of Fisheries Education (CIFE), Mumbai.

Dev Roy, M.K. 2008. An annotated checklist of mangrove and coral reef-inhabiting Brachyuran crabs of India. Records of Zoological Survey of India, Occasional Paper 289: 1-212.

English, S.; Wilkinson, C. and Baker, V. 1997. Survey Manual for Tropical Marine Resources. Townsville, Australia, Australian Institute of Marine Science, Townsville Australia. 378 pages.

George, P.C.; George, M.J. and Rao, P.V. 1963. *Metapenaeus kuchensis* a penaeid prawn from the Gulf of Kachchh. Journal of Marine biological Association, 5(2): 284-288.

Gokul, A. and Venkataraman, K. 2010. Taxonomy and systematics of coral associated brachyuran crabs of Mannar Marine Biosphere Reserve. Records of Zoological Survey of India 110 (1 & 2): 61–76.

Jani, S.P. and Mishra, A.K. 2007. Management Plan Marine National Park and Sanctuary for the year of 2007-08 to 2016-17; Part-I & Part-II. Marine National Park. Government Press, Jamnagar.

Jeyabaskaran, R. and Khan, A.S. 2007. Diversity of Brachyuran crabs in Gulf of Mannar (Southeast coast of India). pages 68-82, In: Kannaiyan, S. and Venkataraman, K. (Editors) Biodiversity Conservation in Gulf of Mannar Biosphere Reserve. National Biodiversity Authority, Chennai.

Jeybaskaran, R.S. and Wafar, M. 2002. CD on Brachyuran Crabs of West Coast, India. National Institute of Oceanography, Dona, Paula, Goa, India.

Martin, J.W. and Davis, G.E. 2001. An Updated Classification of the Recent Crustacea. Natural History Museum of Los Angeles County Contributions in Science 39: 1-124.

Parasharya, D. and Padte, G. 2013. Status of scleractinian corals of Narara reef in the Gulf of Kachchh, western India. Jalplavit 4 (3): 49-59.

Sankarankutty, C. 1961. On some crabs (Decapod –brachyura) from the Laccadive Archipelago. Journal of Marine Biological Assessment of India 3 (1 & 2): 120-136.

Sankarankutty, C. 1962. On Decapod –Bbrachyura from the Andaman and Nicobar Islands, Journal of Marine Biological Assessment of India 4(1): 151-164.

Sethuramalingam, S. and Khan, A.S. 1991. Brachuran Crabs of Parangipettai Coast. CAS in Marine Biology, Annamalai University, Parangipettai, India. 93 pages.

Singh, H.S.; Pandey, C.N.; Yennawar, P.; Ansari, R.J.; Patel, B.H.; Tatu, K. and Raval, B.R. 2004. The Marine National Park and Sanctuary in the Gulf of Kachchh (A Comprehensive Study on Biodiversity and Management Issues). GEER Foundation, Gandhinagar, Gujarat.

Trivedi, D.J.; Trivedi, J.N.; Soni, G.M.; Purohit, B.D. and Vachhrajani, K.D. 2015. Crustacean fauna of Gujarat state of India: A Review. Electronic Journal of Environmental Science 8: 23-31.

Trivedi, J.N. and Vachhrajani, K.D. 2015. First record of brachyuran crab *Leptodius affinis* (De Haan, 1835) (Crustacea: Decapoda: Xanthidae) from the western coast of India, Marine Biodiversity Records 8, e2. https://doi.org/10.1017/S175526721400133X

Venkataraman, K. and Wafar, M. 2005. Coastal Biodiversity of India. Indian Journal of Marine Science 34 (1): 57-75.

WoRMS. 2015. Crustacea. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1066 on 2015-05-11.

www.speciesidentification.org

Received 8 December 2017
Accepted 10 March 2018