



Crustaceans Diversity along Mangroves of Sikka Coast, Gulf of Kachchh, Gujarat, India

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Abstract: The present study was conducted at two identical sites of the Sikka coast namely DCC (Digvijay Cement Company) jetty area and the GSFC (Gujarat State Fertilizer and Chemicals Limited) jetty area from October 2020 to March 2021. The observations were recorded at monthly intervals for the abundance of crustacean species. In total 13 crustacean species were identified of 13 genera and 11 families, including 9 brachyuran crabs, 2 shrimps, 1 porcelain crab and 1 barnacle. Nine genera, eight families, and nine species of brachyuran crabs were recorded. Shrimps encountered with two families, two genera, and two species. Presence of *Avicenna marina*, a common mangrove, is a good sign as it provides sites of attachment to the barnacle (*Amphibalanus Amphitrite*). The GSFC jetty area recorded the highest number of species during December and lowest was in October. In DCC area, the highest number of species were in March and the fewest number in October. *Metapograpsus thukuhar* and *Austruca iranica* (Uca crab) were the most common species of family Grapsidae and Ocypodidae, respectively.

Keywords: Mangrove, Crustaceans, Brachyuran crabs, Porcelain crab, Sikka coast, Jetty

The Gulf of Kachchh is veritably rich in floral and faunal diversity and comprises different types of communities and habitats with very unique coral reefs, mangroves, sandy shores, rocky shores and mudflats (Trivedi et al 2012). The mangroves are one of the most productive ecosystems distributed along the tropical coast and act as a buffer zone between the land and the ocean (Jatav et al 2022). The mangroves are salt-tolerant plants that arise within the intertidal zone of the tropical and subtropical estuarine regions (Morrissey et al 2010) and are very important to the ecosystem as they protect the coast from erosion and provide many resources for utilization in the forestry, fisheries, food, agriculture and pharmaceutical industries (Venkatesan et al 2010). As mangroves act as a nursery, a high juvenile abundance of many aquatic organisms is seen in mangrove forest as they get shelter, feed and protection (Murugan and Anandhi 2016). The global crustacean species diversity is estimated to be 1, 50,000 of which 40,000 species have been described, and among these, 2808 species of crustacean have been reported from the Indian coastal and marine habitats (Chandra et al 2016, Tandel et al 2022). From an ecological point of view, crabs are the most important faunal communities in the marine ecosystem (Raval 2020). They are filter feeders, sand cleaners, mud, plant, carrion

feeders, predators, commensalism and parasites. They feed on various marine animals such as squid, fish, turtles, and mammals (Josileen 2011). The coastal areas provide place for breeding, nesting, foraging and shelter for economically important organisms (Dev Roy and Sivaperuman 2012). Hence, most of the growing population in the world lives within easy reach of coastal areas. Lobsters, crabs, crayfish, shrimps, barnacles, etc. are very important in the food web as well as nutrient recycling and are most crucial in the human economy (Varada et al 2016). Apart from the food web, crustaceans are also an important unique source of nutrients like proteins, fats and minerals to aquatic life as well as to human beings (Nagelkerken et al 2008). The chitin and chitosan extracted from the crustaceans are used for medicines and chemical applications. The skeletons are used as food for livestock and poultries (Giri et al 2011). Crustaceans are one of the ecologically important faunal communities in the marine ecosystem. The crabs and shrimps play a significant role in detritus formation, recycling of nutrients and overall dynamics of ecosystems (Beleem et al 2014). Crustaceans had modified their body structures to fulfill their requirements of capturing food, habitat modification, camouflage with background and mechanism of offense and defense (Ponnada 2019). Crustaceans are a

good source of vitamins, minerals, protein, copper and phosphorus. In the mangrove ecosystem, the burrowing activity of crabs increases the porosity of the soil, which also increases the regeneration of mangrove seedlings (Khan et al 2005). Considering the importance of mangrove ecosystem as crucial component of crustacean diversity, the present study is carried out to identify the key aspects of the growth of crustaceans around the mangroves and relation of crustaceans with mangroves.

MATERIAL AND METHODS

Study area: The present study was carried out at two locations (site I (Digvijay Cement Company jetty area) and site II (Gujarat State Fertilizer and Chemicals Limited jetty area)) along the Sikka coast (situated at 22° 49' 17.7"N latitude and 69° 20' 33.8"E longitude) in the Gulf of Kachchh, India. Sikka coast is. The study confined for mangrove crustaceans and was carried from October 2020 to March 2021.

Sampling methods: Crustacean diversity was recorded at the selected two sites at different locations in the upper and lower levels of the mangrove swamp (Fig. 1, 2). The ebb tide durations were selected for the survey. Voucher specimens were collected for photographic and morphometric studies. The burrowing animals were dug out and caught with the help of forceps. The collected specimens were stored in plastic jars with labels and preserved in 70% ethyl alcohol. Samples were sorted and identified to the species level or to the closest taxa in the laboratory (Fisheries Research Station, JAU, Sikka). A variety of sources of information were used for identification, including the Marine Species Identification Portal website (www.speciesidentification.org), the FAO species identification guide for fishery purposes, the Manual on Taxonomy, and the identification of commercially important Indian crustaceans based on morphometric and meristic traits.

RESULTS AND DISCUSSION

In total of 13 species of crustaceans were recorded during the study which belong to 11 families and 13 genera. The recorded faunal assemblage includes 9 brachyuran crabs, 2 shrimps, 1 porcelain crab and 1 barnacle species. Brachyuran crabs recorded belong to seven families, nine genera and nine species were recorded (Table 1). The mangrove plant *Avicenna marina* acts as a host for barnacle *Amphibalanus amphitrite*. The trunk as well as roots acts as attachment surface. The barnacles are act as a fauling organism and might impede gas exchange ability of mangrove. The GSFC jetty area recorded the highest number of species of crustacean during December, and

lowest in October. At the DCC area, the highest number of species were seen in March and lowest in October. During the study period, *Metapograpsus thukuhar* and *Austruca irania* (Uca crab) were the most common species belonging to the family grapsidae and ocypodidae, respectively. The species composition showed that 77% of the species belonged to crabs, 15% shrimp and the rest 8% were barnacles (Figure 3). The diversity and comparison of the two sites showed that 48% of the species occurred DCC jetty area while 52% in the GSFC jetty area (Figure 4). Families such as grapsidae and portunidae contains 2 species while families like pilumnidae, oziidae, sesarimidae, macrophthalimidae, ocypodidae and porcellanidae contains single species during study (Fig. 5). Shrimps belonged to families Alpheidae (1 species) and Penaeidae (1 species) and barnacles to family balanidae (1 species). List of crustaceans recorded along mangroves of Sikka coast, Gulf of Kachchh, Gujarat, India (Table 1).

Brachyuran crabs and other benthic animals like shrimp and fish can thrive exceptionally in mangroves. But compared to open mudflat habitats, the diversity was lower. Sesarimidae, grapsidae, and ocypodidae were only a few of the families that make up the majority of the brachyuran crab diversity found in mangroves. Ten species of brachyuran



Fig. 1. Map of Gujarat, Gulf of Kachchh

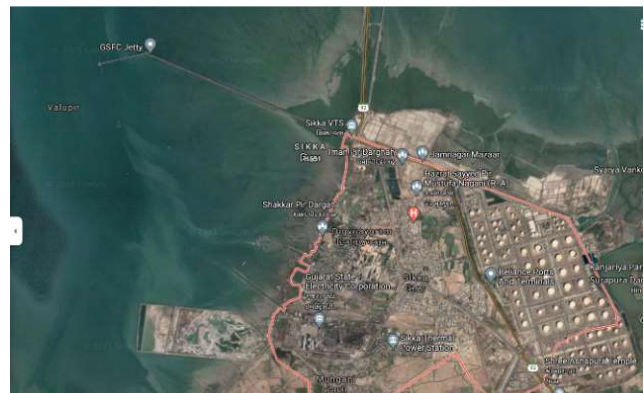


Fig. 2. Map of Sikka coast

Table 1. Check list of crustaceans along mangrove of Sikka coast, Gulf of Kachchh, Gujarat, India

Species	DCC jetty area	GSFC jetty area
Grapsidae		
<i>Metapograpsus thukuhar</i> (Macleay 1838)	+	+
<i>Thalamita crenata</i> (Ruppell 1830)	+	+
Portanidae		
<i>Scylla serrata</i> (Forsk. 1775)	+	+
<i>Eurycarcinus orientalis</i> (A. Milne-Edwards 1867)	+	+
Pilumnidae		
<i>Heteropanope glabra</i> (Stimpson 1858)	+	+
Oziidae		
<i>Epixanthus frontalis</i> (H. Milne Edwards 1834)	+	+
Sesamidae		
<i>Parasesarma persicum</i> (Naderloo & Schubart 2010)	+	+
Macrophthalmidae		
<i>Macrophthalmus depressus</i> (Ruppell 1830)	+	+
Ocypodidae		
<i>Austruca iranica</i> (Pretzmann 1971)	+	+
Porcellanidae		
<i>Petrolisthes rufescens</i> (Heller 1861)	+	-
Alpheidae		
<i>Alpheus inopinatus</i> (Holthuis and Gottlieb 1958)	-	+
Penaeidae		
<i>Fenneropenaeus indicus</i> (H. Milne-Edwards 1837)	-	+
Balanidae		
<i>Amphibalanus amphitrite</i> (Darwin 1854)	+	+

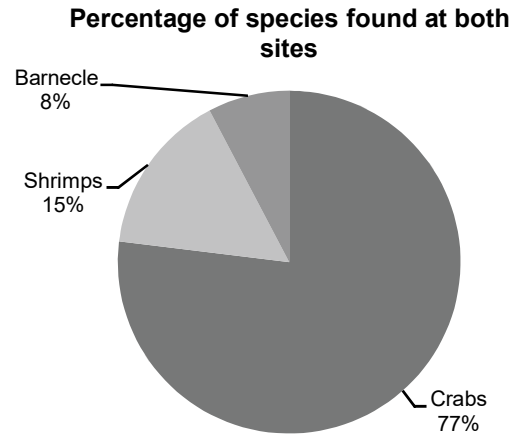


Fig. 3. Percentage of species of different groups found at both sites

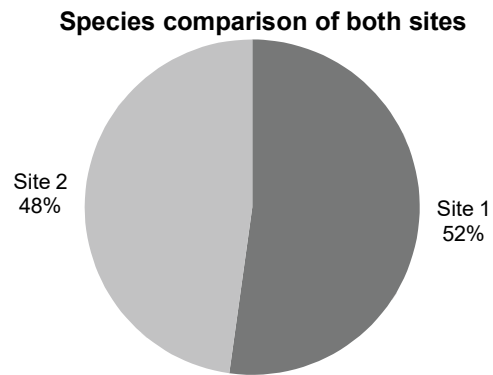


Fig. 4. Species comparison at both sites

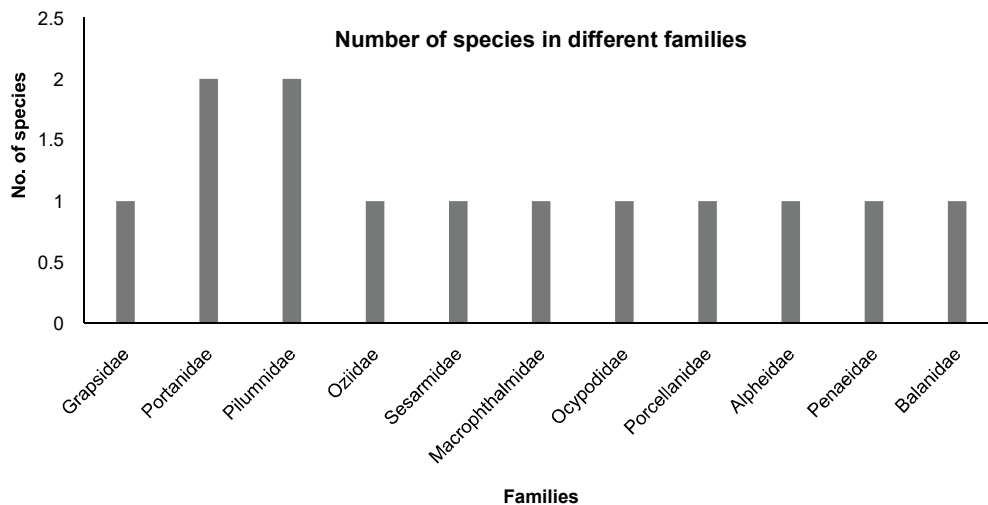


Fig. 5. Graph showing the number of species in different families

*Metapograpsus thukuhar**Thalamita crenata**Epixanthus frontalis**Scylla serrata**Eurycarinus orientalis**Parasesarma persicum**Macrothalamus depressus**Heteropanope glabra**Austruca iranica**Fenneropenaeus indicus**Alpheus inopinatus**Amphibalanus Amphitrite***Table 2.** Species of crustaceans collected from mangrove of Sikka coast, Gulf of Kachchh, Gujarat

crabs have been recorded in mangrove mudflats by Trivedi et al (2012). Mangrove mud flats were dominated by the families grapsidae and portunidae, each of which contributed three species. From every site surveyed, *U. lactea annilipes* and *P. plicatum* were recorded. Nine brachyuran crab species belonging to seven families were recorded in the current study. In the Pichavaram mangroves, Khan et al (2005) recorded 38 species of brachyuran crabs, of which 18 species belonged to the family grapsidae and 8 to the family ocypodidae. Grapsidae and ocypodidae are the two dominant families in the current study too.

CONCLUSION

Crustacean play very crucial rolet of mangrove

ecosystem as they make holes which facilitate aeration in deep mud and many aerobic bacteria as well as other fauna can be settle. Mangroves are recognized as an essential part of coastal ecosystems because of their high production and ability to support a range of animal species. Crustaceans are important for the preservation of mangrove ecosystems because they help to preserve nutrients for the growth of mangrove trees. A wide variety of crustaceans can observed in the diversified and dispersed mangrove ecosystem along the Sikka coast. The diversity and comparison showed that 48% of the species were reported in the Digvijay Cement Company area while 52% were in the Gujarat State Fertilizer and Chemical limited jetty area. *Metapograpsus thukuhar* and *Austruca iranica* (Uca crab) were the most common

species belonging to the family grapsidae and ocypodidae, respectively. In Sikka, mangrove areas are growing more and more intensely as a result of silt deposition in a few locations, but they are under severe stress in other locations due to anthropogenic activities like pollution and the allocation of the intertidal zone for industrial purposes like shipbuilding and repairs. Species wise both location have showing difference and species composition is also differ this might be due to difference in the mangrove density and mangrove height. Gsfc jetty site have very dence mangrove canopy compare to DCC jetty and gsfc jetty area is comparatively less polluted compared to other area. This research will help identify the crustacean diversity of mangrove areas along the Sikka coast of Gujarat. This research will also help us to identify the key aspects of the growth of crustaceans around the mangroves or the relation of crustaceans with mangroves.

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