



A SURVEY ON THE SPECIES COMPOSITION OF DECAPOD CRUSTACEANS IN DHARMADAM COAST, KANNUR DISTRICT, KERALA

Ms. Anusha, C. C¹. and Dr. J. Roopavathy^{2*}

¹M.Sc. Student, PG and Research Department of Zoology, Nirmala College for Women (Autonomous),
Coimbatore-18,

²Assistant Professor, PG and Research Department of Zoology, Nirmala College for Women (Autonomous),
Coimbatore-18, *E-mail: jroopavathy27@gmail.com

Abstract: The short-term study was made for a period of 3 months from November 2020 to January 2021 to assess the crustacean species composition of the Dharmadam coast, Kannur District of Kerala. Total of 20 species of crustaceans belonging to order Decapod has been identified, which belongs to 13 genera that spread over 7 family. Among the families identified, Penaeidae is the dominant one. There are 10 species of crabs belonging to 5 family and 6 genera have been recorded. Of the 5 families, Portunidae was the most dominant followed by Matutidae, Menippidae, Dotillidae and Grapsidae. There are about 3 species of hermit crabs were recorded at Dharmadam coast belonging to family Diogenidae. The present findings reveal that the commercial important decapod crustaceans especially shrimps and crabs population was predominant in the Dharmadam coast of Kerala when compared to non-edible crustaceans population.

Index Terms-Penaeidae, Matuidae, Menippidae, Dotillidae, Grapsidae, Dharmadam, Cosast

I. INTRODUCTION

The 560-km-long Kerala coast is characterised by long barriers with narrow beaches and steep cliffs. Dark green coconut trees and loaded white sand embrace the beauty of beaches of Kerala. In the northern parts of Kerala, particularly in Kannur (Dharmadam beach is in Kannur district of Kerala), the outcrops ascend beyond the shore from the periphery of the beaches [1].

Crustaceans are one of the oldest arthropod groups and represent one of the largest and most diverse groups of invertebrates on this planet. They are known from all habitats, terrestrial and aquatic; their maximum diversity is, however, noted in marine habitats. Although about 4258 species of crustaceans belonging to 22 orders are available in India with a considerable number of commercially important species, yet crustacean species are lacking conservation measures in India [2]. India is one of the major contributors

of marine crustaceans in the world market [3]. The crustacean forms has been major group in overall faunal diversity in India various fluctuating estimates made on the species diversity of crustaceans approximately 5000 species worldwide [4]. Decapod crustaceans are important members of tropical benthic communities. In addition to their prominent ecological roles, many of the larger and more abundant species represent important food resources [5].

Decapods are of great importance to the ecological processes of aquatic environments acting at the different levels of the trophic chain as herbivores, predators, decomposers and prey for other groups [6]. The shrimps and prawns have great economic value as they earn valuable foreign exchange. Penaeidae, is a family of marine crustacean in the suborder Dendrobranchiata, often referred to as penaeid shrimp or penaeid prawn with 48 recognized genera, 23 of them are known only from the fossil record. Commercial important species of shrimps in India which include *Penaeus indicus*, *Penaeus monodon*, *Penaeus semisulcatus*, *Penaeus merguensis*, *Penaeus canaliculatus*, *Metapenaeus dobsoni*, *Metapenaeus affinis*, *Metapenaeus monoceros*, *Metapenaeus brevicornis*, *Metapenaeus kutchensis*, *Parapenaeopsis stylifera*, *Parapenaeopsis sculptilis*, *Parapenaeopsis hardwickii*, *Solenocera indica*. [7].

Among the marine crustaceans found along the Indian coast, crab rank second after shrimp. Among the commercially important crabs, the genus *Scylla* rank first followed by *Portunus* sp. (*P.pelagicus* and *P.sanguinolentus*). Portunid crabs are one of the good fishery resources of Southeast Asian seas, which includes swimming crab, three spot crab (*P.sanguinolentus*) and blue swimming (*P.pelagicus*) are highly commercial value along with the mud crab. In Indian coast fifteen edible crabs are commonly available [8]. Some species such as the blue swimming crab, *Portunus pelagicus* and the mud crab, *Scylla* sp., are well-known in international markets. At a local level, they are a source of income for local fishing communities living in coastal areas. From an ecological point of view, they play an important role as predators, prey, and/or detritus feeders in the complex food web of coastal and marine ecosystems, especially in mangrove forests, seagrass beds and coral reefs. At the same time, they are prey for other marine animals such as squids, fish, turtles and mammals [9]. In India, best potentials are seen in the coasts of Tamil Nadu, Kerala, and Karnataka and to a certain extent in Maharashtra and Gujarat [10].

Hermit crabs are ubiquitous animals often not considered to be 'true' crabs as they lack an external shell on their soft abdomen which leaves them vulnerable to predators. To protect themselves, they live in abandoned gastropod (snail) shells and often select larger shells as they grow up. Their last two pairs of legs are small and modified and, along with their uropods (appendages at the end of the abdomen), are used to clamp onto the internal whorls of the shell. More than 40 species of hermit crabs were documented from the Kerala coast [11]. In this line, the present short-term study on species composition of decapod crustacean fauna was studied in the Dharmadam coast, Kannur District of Kerala.

II. MATERIALS AND METHODS

STUDY AREA

The present investigation was carried out at the Dharmadam coast in Kannur district, Kerala. Dharmadam coast (Long. 75° 27' 23"E, Lat. 11° 46' 35"N) is an exposed area with mixed type of sediment composition; rocky and sandy (Fig. 1). It is a long clean coast and the characteristics of the beach sand are fine sand with darker in color and adhering with scattered laterite rock formations. 15-30 m of beach from high to low will be exposed at low tide time.

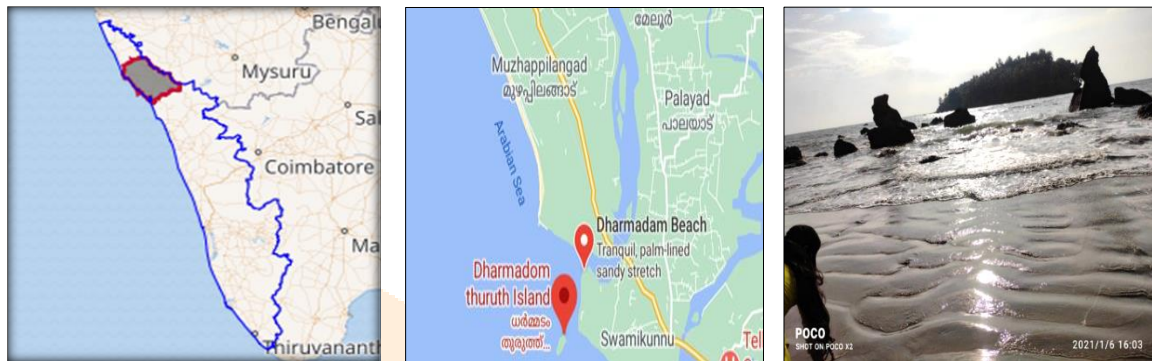


Fig. 1 Description of the Study Area

METHODS OF SAMPLE COLLECTION

Sampling was done during November 2020 to January 2021 on weekly basis at morning and evening hours. Mainly two methods are employed by local fisherman for collection of deep water marine crabs and shrimps. Shore crabs and crustaceans were collected by direct hand picking. The collected specimens were washed using tap water in order to remove debris and make it clean.

TRAWL NET

The gear used is 18-28 meter trawl which is generally operated for prawns and other bottom fishes. The operation was carried out at depth of 15-40 meters. Trawl net fishery is carried out in deeper waters up to 40 meters depth [12].

GILLNET

Sample collections were conducted by using gillnets with mesh sizes of 3.81, 6.35, and 8.89 cm. The Gillnet was deployed in the afternoon and hauled in the morning of the next day [13].

HAND PICKING

Crabs were either handpicked from beneath stones and small rocks or dug out from burrows. During collection hand gloves are employed. Like-wise hermit crabs are also collected by handpicking.

IDENTIFICATION

The photographs of collected specimen were taken by using Canon 50D camera and OPPO A37. The collected sample of representative decapod crustacean fauna were identified up to species level using the Marine Species Identification Portal. The classification of decapod crustacean fauna was adopted from WoRMS Editorial Board.

III. RESULTS

In the present study, totally 20 species of crustaceans belonging to order Decapod were identified, which belongs to 13 genera that spread over 7 family (Table 1, Table 2 & Table 3). The crustacean order decapod includes crab, shrimp and hermit crab. Penaeidae is the dominant family in collected decapod crustaceans with 5 genera and 7 species (Fig. 2).

Among 10 species of crab, 5 family and 6 genera have been recorded (Table 1). Off these 5 families, Portunidae was the most dominant in terms of species richness which hold 6 species belonging to 2 genera such as Portunus (30%) and Charybdis (30%). The families such as Matutidae, Menippidae, Dotillidae and Grapsidae hold only 1 species each which include the genera Matuta (10%), Menippe (10%), Dotilla (10%) and Grapus (10%) (Fig. 3).

There are seven species of shrimp belonging to over 5 genera were recorded from Dharmadam coast during the study period (November 2020-January 2021) (Table 2). Totally 7 shrimp species were recorded belonging to the family Penaeidae and represented by Fenneropenaeus genera (29%) comprise 2 species, Metapenaeus genera (29%) include 2 species, Parapenaeus genera (14%), Penaeus genera (14%) and Litopenaeus (14%) genera include only one species each (Fig. 4).

There are three species of hermit crabs were recorded at Dharmadam coast belonging to family Diogenidae (Table 3). The first genera Diogenes (67%) include 2 species of hermit crab and second genera Clibanarius (33%) include only one species of hermit crab (Fig. 5).

The first genera of crab species belonging to Portunus prefer sandy mud bottom habitat. The second genera of crab species belonging to Charybdis prefer rocky and muddy habitat. The third genera of crab species belonging to Matutidae are seen in sandy shore, the fourth and fifth genera such as Menippidae and Dotilla prefer sandy banks habitat and sixth genera of crab species belong to Grapus are prefer to be in rocky shore habitat.

The identified shrimp species belonging to genera *Penaeus*, *Fenneropenaeus*, *Litopenaeus*, *Parapenaeus* and *Metapenaeus* prefer bottom mud or muddy sand habitat whereas the hermit crab belonging to genus *Diogenes* are prefer to inhabit at sandy coast. The shallow rocky shore habitat are highly preferred by the hermit crab species *Clibanarius infraspinatus*.

Table 1: List of crab species identified from Dharmadam coast, Kerala

Sl. No.	Common Name	Scientific Name	Family	Habitat
1.	Three spot swimming crab	<i>Portunus sanguinolentus</i>	Portunidae	Subtidal aquatic beds
2.	Blue crab	<i>Portunus pelagicus</i>	Portunidae	Sandy mud bottoms
3.	Flower crab	<i>Portunus reticulatus</i>	Portunidae	Sandy mud bottoms
4.	Crucifix crab	<i>Charybdis feriata</i>	Portunidae	Rocky areas as well as muddy areas
5.	Brown crab	<i>Charybdis lucifera</i>	Portunidae	Sandy and rocky areas
6.	Banded legged crab	<i>Charybdis annulate</i>	Portunidae	Rocky areas as well as muddy areas
7.	Common moon crab	<i>Matuta victor</i>	Matutidae	Sandy areas
8.	Stone crab	<i>Menippe mercenaria</i>	Menippidae	Sandy banks and rocks
9.	Sand bubbler crab	<i>Dotilla myctiroides</i>	Dotillidae	Sandy banks of channels
10.	Mottled crab	<i>Grapus albolineatus</i>	Grapsidae	Rocky shore

Table 2: List of shrimps recorded from Dharmadam coast of Kerala

Sl. No.	Common Name	Scientific Name	Family	Habitat
1	Indian white shrimp	<i>Fenneropenaeus indicus</i>	Penaeidae	Bottom mud or sand
2	Banana shrimp	<i>Fenneropenaeus merguensis</i>	Penaeidae	Bottom mud
3	Jinga shrimp	<i>Metapenaeus affinis</i>	Penaeidae	Bottom mud
4	Speckled shrimp	<i>Metapenaeus monoceros</i>	Penaeidae	Bottom sandy mud
5	Black tiger shrimp	<i>Penaeus monodon</i>	Penaeidae	Bottom mud
6	White leg shrimp	<i>Litopenaeus vannamei</i>	Penaeidae	Bottom mud
7	Neptune rose shrimp	<i>Parapenaeus fissurus</i>	Penaeidae	Bottom mud or muddy sand

Table 3: List of hermit crab species reported from Dharmadam coast, Kerala

Sl. No.	Common Name	Scientific Name	Family	Habitat
1	Unknown	<i>Diogenes alias</i>	Diogenidae	Sandy coast
2	South claw hermit carb	<i>Diogenes pugilator</i>	Diogenidae	Sandy coast
3	Orange striped hermit crab	<i>Clibanarius infraspinatus</i>	Diogenidae	Shallow rocky shore

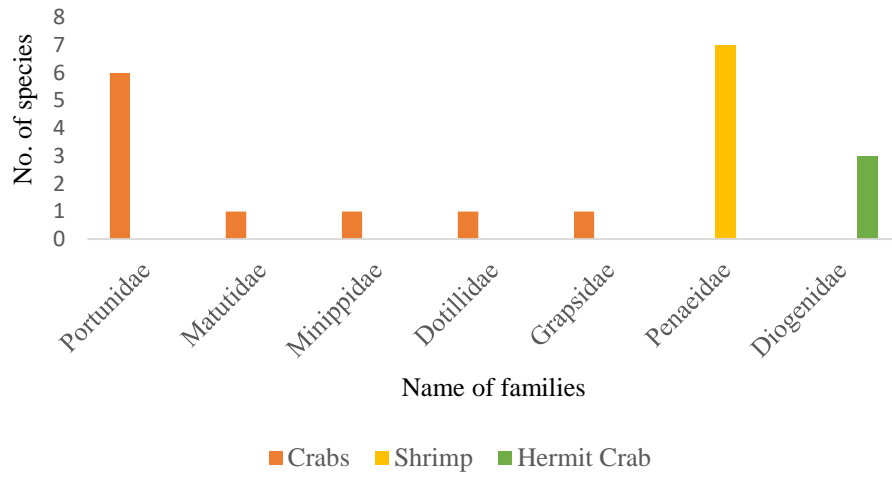


Fig. 2 Family wise distribution of decapod crustaceans in Dharmadam coast, Kerala

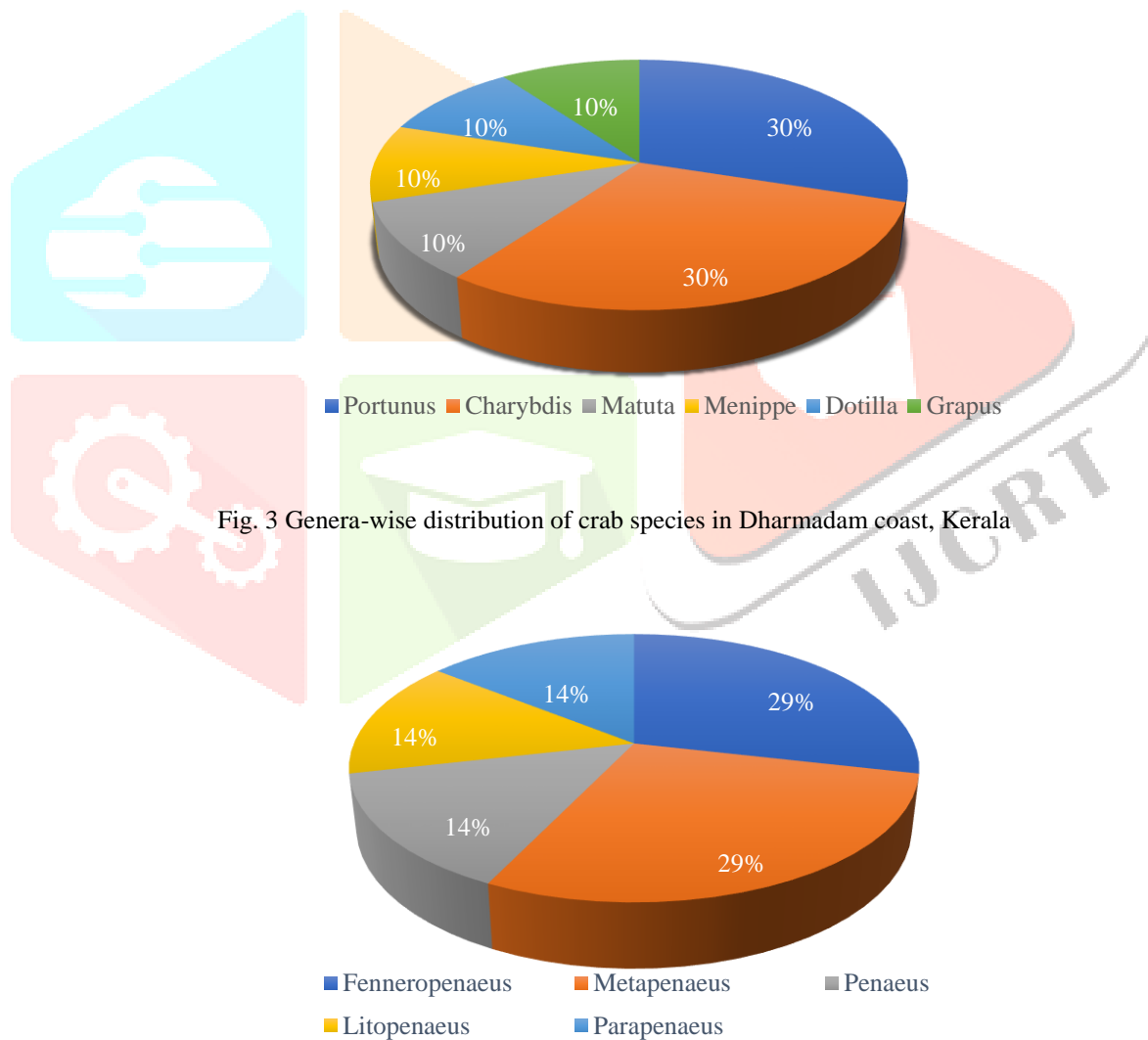


Fig. 3 Genera-wise distribution of crab species in Dharmadam coast, Kerala

Fig. 4 Genera-wise distribution of identified shrimp species in Dharmadam coast

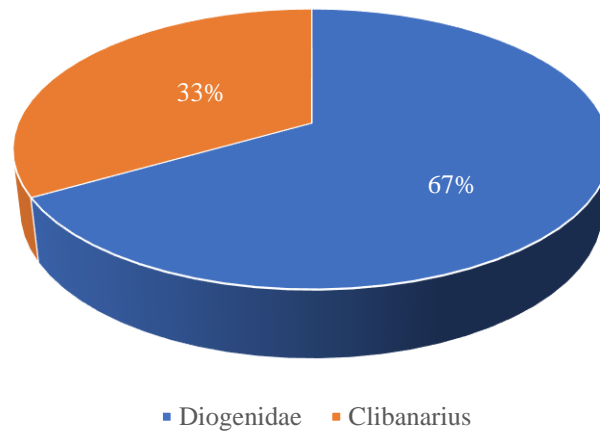


Fig. 5 Genera-wise distribution of hermit crabs in Dharmadam coast, Kerala

IV. DISCUSSION

This work is comprehensive study on species composition of decapod crustacean fauna in Dharmadam coast, Kannur District of Kerala state, India. In the present study, different species of decapod crustaceans were recognized over a period of 3 months. A total of 20 species of crustaceans belonging to order Decapod has been identified, which belongs to 13 genera that spread over 7 family were recorded. Penaeidae is the dominant family in collected decapod crustaceans, with 5 genera and 7 species. Among 10 species of crab identified, 5 family and 6 genera have been recorded. Out of the 5 family, Portunidae show maximum species richness. About 7 species of shrimp that spread over 5 genera and 3 species of hermit crab were recorded from Dharmadam station.

Similar findings were reported [14] on Decapod crustacean diversity of Ratnagiri coastal waters, Maharashtra, India. The study reported total of 24 species of decapod crustacean under three infra-orders, seven families and 13 genera from coastal waters of Ratnagiri in Maharashtra. There are about 16 species of shrimp belonging to eight genera and three family, seven species of crabs belonging to four genera and three family and one species of lobster were identified from the study area. The most diverse family was Penaeidae with 12 species and six genera, followed by Portunidae with five species and two genera, Solenoceridae and Sergestidae with one species and two genera each, Calappidae, Xanthidae and Palinuridae with one species and one genera each.

Authors [15] recorded 9 species of decapod crustaceans belonging to 6 family and 9 genera from Cochin Estuary, India. However, present record of 20 species was quit higher compared to earlier report. Authors [16] recorded 20 species of decapod crustaceans belonging to five family and 10 genera from Vembanad Lake along west coast of India. According to [17], the brachyuran crabs associated with trawl by-catch in Kerala coast of India reveal that the Charybdis and Portunus were the species-rich genera, represented by 8 and 5 species respectively. Like-wise the present study also reported Charybdis and Portunus as rich genera.

Authors [7] reported 10 shrimp species viz., *Penaeus monodon*, *Penaeus indicus*, *Penaeus semisulcatus*, *Penaeus merguensis*, *Penaeus (Litopenaeus) vannamei*, *Penaeus affinis*, *Metapenaeus dobsonii*, *Metapenaeus monoceros*, *Metapenaeus brevicornis* and *Parapenaeopsis styliifera* belonging to family Penaeidae from Nagapattinam, Tamil Nadu. The present study and above mentioned earlier study shares almost same species (S=6) richness of shrimp. Authors [18] reported twelve species of hermit crabs belonging to three genera, i.e., *Clibanarius*, *Diogenes*, and *Pagurus* from two families of Diogenidae and Paguridae from the three sampling sites. Three species of hermit crab belonging to two genera; *Clibanarius* and *Diogenes* from one family Diogenidae were recorded in the present study.

Authors [8] had identified 12 variety of commercially important crab species. Identified crab species are *Portunus pelagicus*, *Portunus sanguinolentus*, *Scylla tranqubarica*, *Scylla serrata*, *Portunus galadiator*, *Charybdis natator*, *Charybdis feriatus*, *C. lucifera*, *Charybdis variegata*, *Podaphthalamus vigil*, *Charybdis granulate* and *Charybdis truncate*. The maximum quantity of species recorded were *Portunus pelagicus*, *Portunus sanguinolentus*, *Scylla serrata* and *Scylla tranqubarica*. The moderate quantity recorded was *Portunus galadiator*, *Charybdis natator*, *Charybdis feriatus* and *Podaphthalamus vigil*. The minimum quantities were observed in *Charybdis lucifera*, *Charybdis variegata*, *Charybdis truncate* and *Charybdis granulate*. In the present study *Portunus* species and *Charybdis* species were reported equally.

Authors [19] recorded five species of hermit crabs from Muscat, Oman and 19 decapods from the same region [19]. *Diogenes* is currently represented by 61 species [20, 21, 22], most of which are distributed in shallow waters in the Indo-West Pacific region. Three species of hermit crab was recorded during the present investigation, of which the genera *Diogenes* include two species.

Authors [23] had documented 91 species of marine crabs from Maharashtra coastal waters. However present record of 10 species of marine crabs were lower compared to earlier report. This might be due to local environmental and water quality conditions prevailing in the respective study areas. The species number of *Brachyura* group found in the present study were comparatively lower than that found earlier by [24, 25, 26, 27]. It is evident from the present study that more number of crab species belonged to family *Portunidae*. Authors [28] reported a similar result.

Authors [29] had reported 157 species of crustaceans from various coastal areas of Gujarat state. Out of 157 species reported, maximum species diversity was reported for *Brachyuran* crabs (113 species) followed by prawns and shrimps (30 species). All the hermit crab species reported, belonged to genus *Clibanarius* Dana, 1852. In the present study, total number of species of decapod crustaceans reported was low (i.e. 20 species). It is well reported that the major threats to decapod crustacean diversity might be the pollution in coastal waters followed by destruction of aquatic habitats, over-exploitation and unregulated fishing due to increased anthropogenic activities.

V. CONCLUSION

The survey was made on the species composition of Decapod Crustacean fauna in Dharmadam coast, Kannur District, Kerala. Various species of Decapod Crustaceans have been recorded from this location during the period of three months from November 2020 to January 2021. The present findings reveal that the commercial important decapod crustaceans especially shrimps and crabs population was predominant in the Dharmadam coast of Kerala when compared to non-edible crustaceans population. Present short-term investigation on species composition of decapod crustaceans will serve as the baseline data for the future Marine Biologists in general and Marine Crustacean Biologists in particular for the conservation and sustainable utilization of decapod crustacean resources.

VI. ACKNOWLEDGEMENT

Authors are gratefully acknowledge the Head, Department of Zoology, Principal and authorities of Nirmala College for Women (Autonomous), Coimbatore-18, Tamil Nadu, for the facility provided.

REFERENCES

1. Kumar BA., Kumar MS, Raffi M, and Khan SA, Diversity of brachyuran crabs associated with trawl by-catch in Kerala coast, India. *Indian Journal of Fisheries*, 2007; 54(3): 283-290.
2. Roy MD, Conservation concerns on crustacean fauna of India. *J Environ socio bio*, 2015; 12: 77-98.
3. Anon, Trends in Marine fish production in India 1981. *Mar. Fish. Inform. Serv. T & E Ser.* 1982; 41: 1-32.
4. Melo-Filho GASD, 1996 Manual de identificacao dos brachyura (caranguejos e siris) do litoral brasileiro (No. 595.3 (81) MEL).
5. Hendrickx ME, Checklist of brachyuran crabs (Crustacea: Decapoda) from the eastern tropical Pacific. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie.* 1995; 65: 125-150.
6. Benetton MLFN, Rosas FCW, and Colares EP, Aspectos do hábito alimentar da ariranha (*Pteronura brasiliensis*) na Amazônia brasileira. Programa y Resumenes, 4ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur, Valdivia, Chile, 1990; 12-15.
7. Sathiyá U, and Valarmathi V, Diversity of marine shrimp species along the coast of Nagapattinam, Tamilnadu, India. *International Journal of Zoology and Applied Biosciences*, 2018a; 3 (3): pp 410-416.
8. Sathiyá U, and Valarmathi V Diversity of commercially important marine crabs in Nagapattinam coastal area, Tamilnadu, India. *IOSR Journal of pharmacy and biological Science*, 2018b; 81-86.
9. Josileen, Food and feeding of blue swimmer crab, *Portunus pelagicus* (Decapod, Brachyura) along the coast of Mandapam, Tamilnadu, India. *Crustaceana*, 2011; 84(10): 1169-1180.
10. Samuel NJ, and Soundarapandian P, Fishery Potential of Commercially Important Crab *Portunus sanguinolentus* (Herbst) along Parangipettai Coast, South East Cost of India. *Int. J. Anim. Veter. Adv.*, 2009; 1(2): 99-104.

11. Nandakumar T, Four new crab species found in Kerala. *The Hindu*, October 25, 2015
12. CMFRI, 1973. Proceedings of the Symposium on Living Resources of the Seas around India. Central Marine Fisheries Research Institute.
13. Hamid A, and Wardiatno Y, Diversity of Decapod Crustaceans in Lasongko Bay, South-east Sulawesi, Indonesia. *Biodiversity Journal*, 2018; 9(3): 303-311.
14. Kolhe SS, and Mogalekar HS, Decapod crustacean diversity of Ratnagiri coastal waters, Maharashtra, India. *J. Entomol. Zool. Stud*, 2017; 5(3): 370-372.
15. Geetha PN, and Nandan SB, Ecology, diversity, and abundance of macrobenthic crustaceans in Cochin Estuary, India. *Research Journal of Recent Sciences*, 2014; 3(104): 137-148.
16. Mogalekar HS, Ansar CP, Golandaj A, and Dinesh K, Biodiversity of Decapod Crustacean in the Vembanad Lake at Panangad-Kumbalam Region of Kochi, Kerala. *Environment and Ecology*, 2015; 33(4B): 1920-1923.
17. Kumar BA, Kumar MS, Raffi M, and Khan SA Diversity of brachyuran crabs associated with trawl by-catch in Kerala coast, India. *Indian Journal of Fisheries*, 2007; 54(3): 283-290.
18. Kachhiya P, Poriya P, Raval J, and Kundu R, Distribution of Newly Recorded Intertidal Hermit Crabs along Gujarat Coast. *Intl. Jour. of Ecol. and Envi. Sci.*, 2017; 42(4): 327-332.
19. Hogarth PJ, Anomuran Crustacea (Paguridea, Porcellanidae, and Hippidea) from Oman, principally from Dhofar province, southern Oman. *Journal of Natural History*, 1988; 22(4): 1095-1110.
20. Asakura A, and Tachikawa H, *Diogenes holthuisi*, a new species of hermit crab (Decapoda, Anomura, Diogenidae) from shallow waters of the Ogasawara (Bonin) Islands, Japan. In: Fransen C.H.J.M., De Grave, S. & Ng, P.K.L. (Eds.), studies on Malacostraca: Lipke Bjideley Holthuis Memorial Volume. *Crustaceana Monographs*, 2010; 14: 133-144.
21. McLaughlin PA, Komai T, Lemaitre R, and Rahayu D L, Annotated checklist of anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheoidea) Part I-Lithodoidea, Lomisoidea and Paguroidea. *Raffles Bulletin of Zoology*, Supplement 23, 5–107.
22. Komai T, Liang J, and, Yang T, Records of four species of the shallow water hermit crab genus *Diogenes* (Crustacea: Decapoda: Anomura: Diogenidae) from southern China, with description of a new species. *Journal of Natural History*, 2012; 46: 1219-1248.
23. Pati SK, Sahu KC, Swain D, Baliarsingh SK, and Sharma RM, Marine crabs (Decapoda: Anomura and Brachyura). *Fauna of Maharashtra, State Fauna Series*, 2012; 20(2): 381-385.
24. Fazrul H, Hajisamae S, Ikhwanuddin M, and Pradit S, Assessing impact of crab gill net fishery to bycatch population in the Lower Gulf of Thailand. *Turkish Journal of Fisheries and Aquatic Sciences*, 2015; 15(3): 767-777.

25. Dev Roy MK, Rath S, and Nandi NC A note on portunid crabs of Odisha Coast, India. *Oceanography & Fisheries*, 2017; 1 (3): OFOAJ.MS.ID. 555562: 1–3.
26. Kunsook C, and Dumrongrojwatthana P, Species diversity and abundance of marine crabs (Portunidae: Decapoda) from a collapsible crab trap fishery at Kung Krabaen Bay, Chanthaburi Province, Thailand. *Tropical Life Sciences Research*, 2017; 28(1): 45.
27. Pawar PR, Biodiversity of brachyuran crabs (Crustacea: Decapoda) from Uran, Navi Mumbai, west coast of India. *Advances in Environmental Biology*, 2017; 11(2): 103-112.
28. Harshith UP, Apoorva MD, Precilla D, Silva, and Anita DD, Lima, 2016. Crab diversity in mangrove and coastal ecosystem. Lake 2016: Conference on conservation and sustainable management of ecologically sensitive region in Western Ghats.
29. Trivedi DJ, Trivedi JN, Soni GM, Purohit BD, and Vachhrajani KD, Crustacean fauna of Gujarat state of India: A review. *Electronic Journal of Environmental Sciences*, 2015; 8: 23-31.

